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Teacher and Superintendent of Schools, Iowa; Institute Lecturer and Instructor; Author of Educational Literature; Editor of "The Teachers' and Pupils' Cyclopedic," "Current Reference," and "Practical Home and School Methods of Study and Instruction."

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RURIC NEVAL ROARK

Teacher and Educational Writer; Author of Pedagogical Works; President Kentucky State Normal School, Richmond, Ky.

And Many Assistant Editors and Contributors

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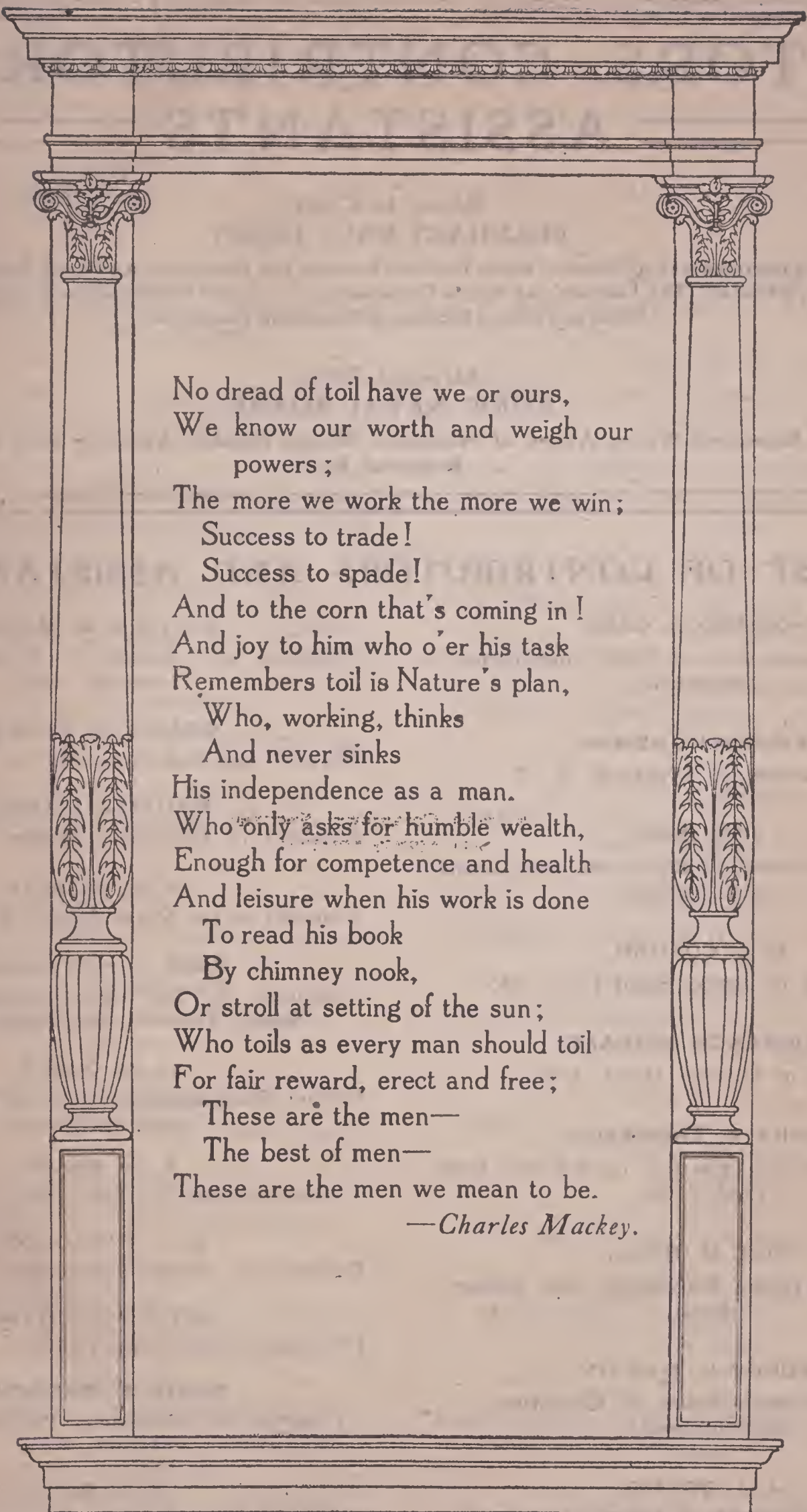
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No dread of toil have we or ours,
We know our worth and weigh our
powers ;

The more we work the more we win ;
Success to trade !

Success to spade !

And to the corn that's coming in !

And joy to him who o'er his task

Remembers toil is Nature's plan,

Who, working, thinks

And never sinks

His independence as a man.

Who only asks for humble wealth,

Enough for competence and health

And leisure when his work is done

To read his book

By chimney nook,

Or stroll at setting of the sun ;

Who toils as every man should toil

For fair reward, erect and free ;

These are the men—

The best of men—

These are the men we mean to be.

—*Charles Mackey.*

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PREFACE

BOOKS of reference have an abiding place in every modern library. They combine convenience in obtaining facts with a wide range of knowledge, enabling the student, the man of commerce, and the professional man and woman to remain in close touch with reliable and recent information.

In this age of the telephone, the automobile, the flying machine, and thousands of new and useful implements of civilization, the demand for books of reference has multiplied beyond the dreams of the past. Those who wish to remain in contact with the advancing spirit of the age, who desire to stand abreast with the intelligent in the struggle for place and power, need to have at their command information fitted for the spirit of the times.

When asked for an opinion in regard to the relative value of different kinds of books, Chauncey Mitchell Depew, famous among the public men of America, made the following reply:

“I look with great favor on and attach considerable importance to encyclopaedias, as may be judged from the fact that I not only paid \$250.00 for my first set, but have bought several others since then. I have always advised young men who could not afford to buy a library to get an encyclopaedia, which is a library in itself.”

This work of reference is more than a storehouse of knowledge, more than a collection of facts in the arts, sciences and literature, in that it contains the instruments which enable students to spell and pronounce correctly, as well as to define and properly use the thousands of titles which are treated. A fact without a mind to use it is valueless, hence the writers of this work have made it doubly valuable by dividing the difficult titles into syllables and by marking the vowels diacritically. This enables the student who needs help, aside from securing information about important subjects, to pronounce and use the words understandingly.

The subjects are treated with the view to furnish accurate information and at the same time to give prominence to the different titles in proportion to the places they occupy in the field of knowledge. Some are treated briefly, while others are explained exhaustively, this depending upon the average requirement for facts as reference is made to the different subjects of thought and conversation. To obtain this balance in the arrangement and to secure the greatest possible accuracy, many subdivisions of the titles treated were arranged by the writers, including such as agriculture, biology, education, geography, history, pedagogy, architecture, and hundreds of other vital topics. Editors of recognized ability gathered the information from the most reliable sources, corresponding with leading students and officials in all the civilized nations, after which the editor-in-chief compared and re-edited the entire productions so as to unify and systematize the scope and general plan of treatment.

Another feature to which the attention of the reader is directed, one which is of much utility, is the collection of illustrations. Practically all the leading plants and animals, the scientific and mechanical devices, the astronomical and geographical topics, are illustrated so as to combine the picture with the printed information. This method fixes in the mind facts of importance more clearly, almost indelibly, which otherwise might be lost or even uncompre-

hended. The artists employed to illustrate this work used in nearly all cases, in fact wherever it was at all possible, objects instead of pictures to make the illustrations as recent and practical as possible.

While scientific accuracy has been maintained, the language is clear and free from such technicalities as often tend to confuse. This feature of the work commends it to all students, who find the treatment such as to understand it. The different titles are not only pronounced diacritically, but cross references are employed to make the subjects plain. In references of this kind, certain titles or subheads are indicated, or the Latin term *quo vide* (q. v.) is used.

Attention is called to the numerous photographic plates and beautiful maps. These illustrations were made especially for this work, hence they aid in a direct way in simplifying the subjects and extending the information sought. Besides the colored maps of political divisions, the work contains wash drawings in the form of physical maps of the continents. The provinces of Canada, the states of the United States, and many of the islands are shown by small maps in the text, giving the outline, the water and land surface, the principal railways, and the capitals and other cities.

The pages are printed from entirely new plates, made by the most approved methods. The type is clear and easily read. This enables the student to search for information without waste of time and with no unnecessary tax upon the eye.

Attention is called to the need of reliable reference in commerce, banking, politics, social development, astronomical research, and the vast achievements of recent years in the arts and sciences. Those who rely upon the newspapers for this information soon find they are not in touch with the spirit of this progressive age, not that the periodicals fail to inform, but they are easily lost or mislaid, or the file on hand becomes too voluminous for practical use. With such a work as this, giving the titles in alphabetical order, brought up to the date of publication, the speaker, the writer, the student, and the teacher are all enabled to utilize facts to the best advantage.

No work has been spared in making this publication an accredited fund of knowledge. Many standard works of reference were consulted, including such as Webster's *International Dictionary*, the *Century Dictionary*, the *Standard Dictionary*, Muret's *Encyclopédie*, Spamer's *Konversation Lexikon*, Brockhaus' *Konversation Lexikon*, and numerous other American and European works of high repute, whose accurate details furnish essential aid in the verification of uncertain dates and controverted facts and events.

This work is offered to the reading public with the feeling of assurance that it will receive a hearty reception, that it will fill a useful place in the library of its owner. It is believed that the newer information, the record of ancient development and modern achievements, as treated and presented in this work, will help and gratify those who search for a larger view of civilization and its attainments.

Those who dedicate their lives to the work of research realize the truth of Charles Mackey's well-written words:

Blessings on Science! When the earth seemed old,
When Faith grew dotting, and the Reason cold,
'Twas she discovered that the world was young,
And taught a language to its lispings tongue;
'Twas she disclosed a future to its view,
And made old knowledge pale before the new.

BERNHART PAUL HOLST.

KEY TO PRONUNCIATION

VOWELS

- ă (short), as in *hat, cat*.
ā (long), as in *ale, hate*.
ã (Italian), as in *car, mar*.
à (short Italian), as in *fast, class*.
ą (broad), as in *all, fall*.
â (circumflex), as in *care, snare*.
ạ (short obscure), as in *final, spinal*.
ầ (long obscure), as in *surface*.
ạ = ỗ, as in *was, what*.
ae = ê, as in *Caesar* (sounded as though they were *e* alone).
ë (short), as in *net, met*.
ē (long), as in *me, eve*.
ê (circumflex = â), as in *there*.
ẽ (tilde), as in *her*.
ẹ (short obscure), as in *patent*.
ê (long obscure), as in *delay*.
è = ĭ, as in *pretty*.
ĩ (short), as in *hit, bit*.
ī (long), as in *kite, mite*.
î (tilde), as in *sir*.
î (long obscure), as in *idea*.

- ỗ (short), as in *pop, hop*.
ō (long), as in *cone, bone*.
ô (circumflex = ą), as in *for*.
ô (long obscure), as in *hero*.
ỗ (short), as in *book, brook*.
ō (long), as in *moon, spoon*.
o = û, as in *word*.
o = oō, as in *who*.
o = ỗ, as in *wolf*.
ò = ỹ, as in *son*.
ũ (short), as in *rut, cut*.
ū (long), as in *muse, fuse*.
û (circumflex), as in *turn, urn*.
ũ (long obscure), as in *unite*.
w is a vowel only after a vowel, when it forms the second element of certain diphthongs, as in *few, how*.
ÿ (short) = ĭ, as in *hymn*.
ÿ (long) = ĭ, as in *by, cry*.

CONSONANTS

- c (hard) = k, as in *cat, cape*.
ç (cedilla) = s, as in *cell, façade*.
ġ (hard), as in *dog, gave*.
ġ (soft), as in *gem, gentle*.

- k for the German ch, as in *ich, Bach* (bäk).
ü for the German ü, as in *Blücher, Grünberg*.
ö for the German ö, as in *Göttingen, Görgey*.
n for the French n, as in *bon, Bréton* (bră-tõn').

MANGEL-WURZEL (mǎŋ'g'l-wûr'z'l), or **Field Beet**, a large beet grown extensively as food for domestic animals. The plant seems to have been originated by propagation in Germany, whence the name. It has a large root and yields from 18 to 25 tons per acre. The roots may be stored in pits or a cool cellar and kept in a good condition until the following spring. It is fed principally to cows, swine, and sheep. From 15 to 25 pounds is the quantity fed to dairy cows per day. The mangel-wurzel has valuable milk-producing properties, hence is fed extensively on the dairy farms of Europe. It is cultivated to some extent in Canada and the United States, especially in the older sections, where it is displacing other forage crops to a good advantage.

MANGO (mǎŋ'gõ), a genus of evergreen trees, belonging to the natural order *Anacardiaceae*. The common mango is native to India



MANGO.

A, Flower; B, Fruit.

and the Malay Peninsula. It attains a height of from thirty to fifty feet, grows rapidly, and has beautiful spreading, glossy foliage. The fruit is about the size of a hen's egg, has a kidney shape, and is used mostly for preserves, pickles, and tarts. In some countries it is eaten as a dessert. The kernel of the fruit is nutritious and is prepared for table use by cooking. Cultivation has greatly improved the mango un-

til now its fruit is agreeable in flavor and highly luscious. About thirty species have been described. Large orchards of mangoes are now grown in the West Indies and several species are cultivated profitably in Florida and California. They can be propagated either by inarching or from the seed. The wood is rather soft, but is used to some extent for building purposes.

MANGOSTEEN (mǎŋ'gõ-stën), a fruit native to the Molucca Islands, but now cultivated in tropical Asia and various islands of the Pacific and Indian oceans. The tree attains a height of twenty feet, has a firlike appearance, bears large oval leaves, and yields abundantly. More than thirty species have been described. The fruit is shaped like an orange, is similarly partitioned, and has a thick rind. It is a most delicious product, being juicy, cooling, and delicately flavored. The mangosteen is cultivated for the market similarly to the orange.

MANGROVE (mǎŋ'grõv), a genus of tropical trees and shrubs that grow in muddy places on low coasts. It includes several well-marked species, all of which send roots out from the main stem. Some branch off from near the ground, while others send shoots from their branches into the ground beneath and form a peculiar and extensive cluster of vegetable growth. These trees resemble the banyan tree of India. They have a durable, dark red, hard wood useful in manufacturing and building. The bark is utilized in tanning. The fruit has a pleasant, sweetish taste, is edible, and is utilized in the production of light wine. In many of the marshy lands surrounding the mouths of rivers there are dense forests of mangrove trees, in which great numbers of wild animals and birds find shelter.

MANHATTAN ISLAND (mǎn-hăt'tan), a portion of New York City, constituting the borough of Manhattan. It is separated from the mainland on the north and northeast by Spuyten Duyvil Creek and the Harlem River, whence it extends south to New York Bay, being a few hundred yards wide and about thirteen miles long. On the west it is bounded by the Hudson, or North, River, and on the east by the East River. It is connected with Jersey City, N. J., by ferries and a railway tunnel under the Hudson River and with Long Island by the subway under the East River. The latter is also crossed by the Brooklyn Bridge, the Williamsburg Bridge, and the East River Bridge. The total area of Manhattan Island is 22 square miles. Though purchased in 1626 by Peter Minuit for \$25, it is at present the most valuable tract of land in North America.

MANILA (mä-nī'l'á), or **Manilla**, the most important city and seaport of the Philippine Islands, on Manila Bay, at the mouth of the Pasig River. It is situated mostly on a gently undulating plain and on the land side is surrounded by a semicircle of picturesque hills and mountains. The river divides the city into two parts, separating Binondo from Manila proper, but there is convenient passage by a number of bridges. It has railroad connections with Lingayén Gulf and interior points, while steamboat lines are maintained with the leading commercial centers of the world. The manufactures

Hospital of San Juan de Dios. The promenade called the Luneta and several parks are very beautiful.

Manila was founded in 1571 by the Spaniards, who fortified it in 1590. It has suffered severely from earthquakes at various times. A destructive hurricane visited it in 1882, when 3,850 houses were destroyed and many persons were killed. Admiral Dewey captured Manila for the Americans on May 1, 1898, by destroying the Spanish fleet in Manila Bay. The inhabitants consist chiefly of Tagals, Chinese, Spaniards, and a number of Americans. Manila includes Binondo, Tondo, San José, Santa Cruz, San Miguel, and a number of other suburbs. Population, 1908, 311,045.

MANILA HEMP, the fiber of several tall perennial herbs of the same genus as the banana and the plantain, which grow in some of the East India islands. They include a number of species, such as the *abaca*, which has large dark green leaves. The fiber is very valuable, the finer grades being used in the manufacture of scarfs, handkerchiefs, and other fabrics, while the coarser is employed in making cordage, such as rope, binding twine, and paper. Manila hemp is an important product in the Philippine Islands, where the *abaca* grows to a height of fifteen to twenty feet.



consist principally of tobacco, cigars, sugar, wearing apparel, machinery, earthenware, cordage, and utensils. These articles and rice, hides, mats, manila hemp, trepangs, leaf tobacco, and fine lumber are exported. Among the imports are spirituous liquors, ironware, lead, silks, and textiles.

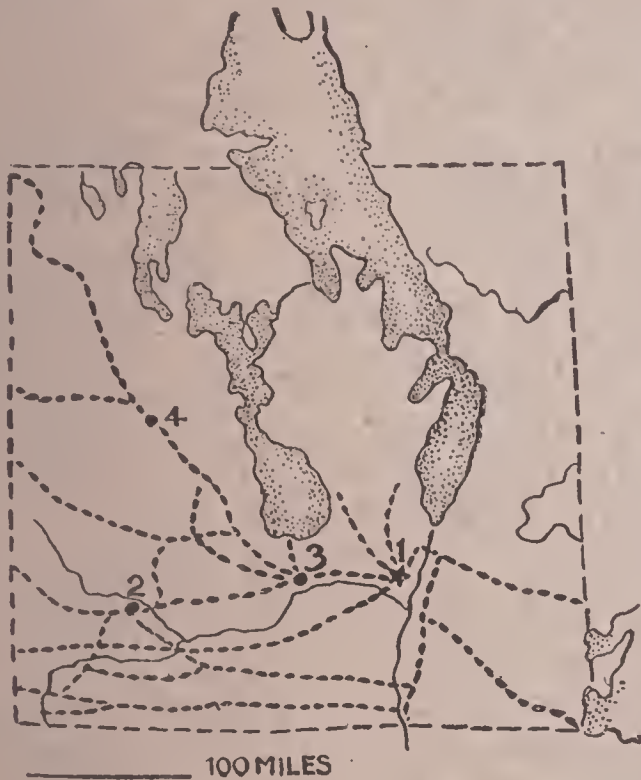
Several well-improved streets with fine buildings make up the interior business portion of the city. In the suburbs are beautiful residences of wealthy merchants, but blocks of inferior habitations are scattered throughout the residential sections. The principal streets are paved and have electric street railway lines, public lighting, mains of the public waterworks, and sanitary sewerage. Among the noteworthy buildings are the government offices, the public library, the Federal post office, the cathedral, the palace of the archbishop, the weather observatory, and many schools, hospitals, and churches. It is the seat of the University of Saint Thomas, the College of San Juan de Letrán, and the

MANISTEE (män-īs-tē'), a city in Michigan, county seat of Manistee County, on Lake Michigan, at the mouth of the Manistee River, 140 miles northwest of Lansing. It is on the Manistee and Grand Rapids, the Père Marquette, and other railroads. Regular steamboat communication is maintained with Chicago and the chief cities on the Great Lakes. Among the noteworthy buildings are the county courthouse, the high school, the public library, and many business blocks. It has electric street railways, city waterworks, several hospitals, and an industrial home. The manufactures include cigars, machinery, clothing, furniture, and utensils, but its salt works are the most important industry. The surrounding country is agricultural and fruit growing, and contains deposits of salt, some of which are fully thirty feet thick. It has a growing trade in merchandise. Manistee was settled in 1841 and incorporated in 1869. Population, 1904, 12,708; in 1910, 12,381.

MANITOBA (män-ī-tō'bá), a Province of

the Dominion of Canada, bounded on the north by Keewatin, east by Keewatin and Ontario, south by Minnesota and North Dakota, and west by Saskatchewan. The location is nearly in the center of the continent of North America. In shape it is almost a perfect square with straight lines, being about 270 miles long, the boundaries running along parallels and meridians. The area is 73,956 square miles, of which 9,890 square miles are water surface.

DESCRIPTION. Manitoba is located almost entirely in the great central prairie region. The surface is mostly of a gently rolling character, but there are ranges of the Laurentian Mountains in the northeastern portion, where the country is broken and hilly. The slope is gently northward, the height above the sea being 800 feet in the south and 710 feet in the north. A low escarpment about 500 feet above the sea



MANITOBA.

1, Winnipeg; 2, Brandon; 3 Portage la Prairie; 4, Dauphin. Chief railroads shown by dotted lines.

separates the Laurentian area in the northeast from the plains of the west. Formerly a post-glacial lake, called by geologists Lake Agassiz, covered nearly all of the surface and much of the country toward the north, causing a deposit of clay and silt, now overlaid by two to four feet of black vegetable mold, hence Manitoba is noted for its fertile wheat lands.

The drainage is principally by the Red River of the North, which enters the Province from the United States, and discharges into Lake Winnipeg. It rises in Minnesota and is navigable for small boats from Fargo, N. D., to Winnipeg, where it receives the inflow from the Assiniboine, which drains the western part of

the Province. The Pigeon and Berens drain the northeastern part, and the Swan is the principal river of the northwestern section. All of the streams have cut narrow channels through the soft drift deposits, being from thirty to ninety feet below the surrounding plains, and the flow of water is not rapid. All of the drainage belongs to the Hudson Bay system and is carried by the Nelson River, which is the outlet of the lakes in Manitoba. These lakes include many sheets of beautiful water, but the shores, as a rule, are low, merging into the prairie beyond. They include Lake Winnipeg, 270 miles long; Lake Manitoba, 135; and Lake Winnipegosis, 150.

The climate is continental, but the dryness of the air has a favorable effect upon the extremes of heat and cold. In winter the thermometer often registers 25° below zero, sometimes even 50° below zero, and the extremes of summer are from 90° to 96°. At Winnipeg the mean temperature for January is 5.2° below zero and the mean for July is 65.9°. Though the mean annual rainfall is only 17.4 inches, the precipitation is largely during the growing season. The snowfall is light. Seeding begins about the middle of April, before the frost is fully out of the ground, and the staple small grains mature during the summer.

MINING. Along the Souris, or Mouse, River, in the southern part, are extensive deposits of lignite coal. A large part of the mining is by settlers for domestic use, but considerable quantities are shipped for consumption to the towns and cities of the Province. Limestone is found in the eastern part, where quarries are worked to obtain material for building and general construction purposes. Crystalline rocks are worked to some extent in the Laurentian system. Deposits of iron are known to exist, but they have not been worked to any considerable extent.

FORESTS AND FISHERIES. Belts of timber extend along the streams, but the most valuable forests are found in the eastern part, extending into Manitoba from Ontario. Timbered areas of more or less value are met with on the Brandon Hills, on the Turtle Mountains, and in the northwestern part of the Province.

The interior lakes are rich in fisheries. Nearly half of the output is made up of whitefish. Other important catches include the pickerel, pike, trout, sturgeon, and maskinonge. The fish taken from the lakes not only supply the markets of Winnipeg, but considerable quantities are shipped to towns and cities farther west.

AGRICULTURE. The industrial interests of Manitoba are vested largely in agriculture. All of the hardier vegetables and grains are raised

profitably, but the season is not sufficiently long for corn. Wheat of a superior grade is grown and the area cultivated in this cereal greatly exceeds that devoted to all other crops. Oats takes rank as the second largest crop. Other products include barley, flax, hay, rye, and potatoes. The larger fruits, such as apples, are not grown extensively, but cherries, plums, strawberries, currants, and other small fruits yield abundantly.

Large interests are vested in stock raising, owing to the growth of many nutritious grasses. The dry fall weather cures the standing grass and cattle feed upon it throughout the winter, though they do better when sheltered and fed during the colder part of the year. Dairying has developed to a considerable extent and the products of dairy farming include butter, milk, and cheese. The interests vested in cattle are much greater than those devoted to rearing horses, though the latter are grown profitably for domestic use and exportation. Other domestic animals include sheep, swine, and poultry.

MANUFACTURING. The manufacturing industry is of comparatively recent development and the establishments are centered largely in Winnipeg. Flour is an important product and flouring and grist mills are located in Brandon, Portage la Prairie, Winnipeg, and other centers of trade. Whitemouth is in the center of the lumbering district and has large sawmills. Creameries and cheese factories are operated in many of the smaller towns. Winnipeg is the most important center of machine and railway shops, grain elevators, and manufactures of earthenware. Other manufactures include furniture, clothing, boots and shoes, farm machinery, cotton and woolen goods, and sewing silk.

TRANSPORTATION AND COMMERCE. The Red River of the North is navigable for small boats south to Winnipeg, but north of that point the Saint Andrews Rapids are a bar to vessels. Extensive transportation facilities are afforded by the lakes, which form the only means of communication in the north central part of the Province. Railroad building has been confined chiefly to the southern and western sections. Three transcontinental railway lines cross the Province from east to west, those of the Canadian Pacific, the Grand Trunk, and the Canadian Northern. Several railways connect Winnipeg with the leading commercial centers of the United States, and electric railways are in operation in that city and the adjacent country.

Large amounts of merchandise are imported and exported through Brandon and Winnipeg, where customhouse entries are made for shipments passing to and from the United States.

However, the greater share of trade is with the seaports of Quebec. The wheat shipments are the most important and these frequently tax the capacity of the transportation systems to their utmost capacity. Winnipeg is the chief railroad and commercial center and is important as a distributing point. The imports embrace chiefly manufactured goods, such as clothing and machinery, and the exports consist largely of live stock, wheat, and oats. Winnipeg has the largest wheat market in Canada.

GOVERNMENT. Manitoba is governed by a Lieutenant Governor, an executive council of five members, and a Legislature comprising a single chamber. Residence and manhood suffrage are the basis of the electoral franchise. The members of the Legislature are elected for four years, and that body has a membership of forty. Judicial authority is vested in the supreme court, which consists of the chief justice and three associates. In addition there are county courts, police magistrates, and justices of the peace. The denser units of population are organized as villages, towns, or cities, depending upon the number of inhabitants. English is the official language.

EDUCATION. The largest expenditures in the Province are for education, which is directed by a council of public instruction. Certain lands in every township were set apart by the government and the income from this is applied to the support of the schools. All the settled districts have well-established public schools. Religious instruction is permitted in schools at certain hours of each day, but pupils are not required to attend the religious exercises. Collegiate institutes for advanced education are located at Brandon, Winnipeg, and Portage la Prairie, and a provincial normal school for teachers is at Winnipeg. The University of Manitoba, located at Winnipeg, is a flourishing institution of higher learning.

INHABITANTS. Many nationalities are represented in Manitoba. Those born outside of the Dominion of Canada include principally people from England, Austria, the United States, Russia, Scotland, Iceland, and Ireland. All of the leading Christian denominations are represented, the most numerous being the Presbyterians, Methodists, Episcopalians, Roman Catholics, Lutherans, and Baptists. Winnipeg, in the southeastern part, is the capital and largest city. Other cities include Brandon, Portage la Prairie, West Selkirk, Dauphin, and Saint Boniface. In 1901 the total population was 254,921, of which 22,170 were Indians. Population, 1906, 808,863.

HISTORY. The first permanent settlement in Manitoba was made at Selkirk, on the Red Riv-

er, in 1812. The entire region known as the Northwest Territory was acquired from the Hudson Bay Company in 1869, and it was transferred by the general government to Canada. Previous to that a number of settlements had been made in different places, but the largest one was near Fort Garry, now Winnipeg. While the transfer of territory was under consideration, the region was the scene of considerable violence and contention. At that time it had a French-speaking population and this element, under the leadership of Louis Riel, laid claim to certain property titles that were in dispute. In 1870 the government sent a military force under Colonel Wolseley to quash the disturbances and Riel, fearing capture, fled. Railway lines were built into Manitoba from the United States in 1878, including those of the Northern Pacific and the Great Northern, and the Canadian Pacific was constructed about the same time. A second uprising under Riel took place in 1885, but it was soon suppressed and Riel was captured and hung.

Formerly a majority of the inhabitants were Catholic in religion, but a large immigration of Protestants was attracted to the country by the development of the natural resources. These conditions caused separate schools to be maintained, but the Legislature abolished the separate school systems in 1890 and established a provincial system without regard to religious lines. The Catholic leaders appealed to the government of England, but the whole matter was referred back to the Dominion, by which it was directed that the former school system be restored. However, the Province refused to obey the order on the ground that separate schools would be too expensive as well as quite unsatisfactory, and the controversy was settled by giving the Catholic minority certain privileges desired by them, though the unified school system was retained. Since its admission into the confederation forming the Dominion of Canada, in 1870, Manitoba has enjoyed an era of remarkable growth in wealth and population.

MANITOBA, a large lake of Canada, in the Province of Manitoba, sixty miles southwest of Lake Winnipeg. It is 125 miles long and 25 miles wide. The area is 1,900 square miles. It is forty feet higher than Lake Winnipeg, into which it discharges through the Saskatchewan, or Dauphin, River. This river expands in about the middle of its course to form Saint Martin's Lake. The White Mud River is the largest stream that flows into Lake Manitoba.

MANITOU (mǎn'ī-tōō), a town of Colorado, in El Paso County, six miles northwest of Colorado Springs, on the Colorado Midland and

the Denver and Rio Grande railroads. It is situated 6,310 feet above the sea and is renowned for the wonderful scenery in its vicinity. The site is at the base of Pike's Peak and near it are many canyons, Monument Park, and the Garden of the Gods. It is the terminus of the Pike's Peak Cog Railway, by which ascent is made to the summit of the mountain. Many tourists and persons in search of health visit the locality. Population, 1900, 1,303.

MANITOULIN ISLANDS (mǎn-ī-tōō'-līn), an island group in the northern part of Lake Huron, including Drummond, Cockburn, Grand Manitoulin, Fitzwilliam, Lonely, and several other islands. The entire group belongs to Canada, except Drummond Island, which forms a part of the State of Michigan. The islands are largely barren, but contain excellent fisheries. Drummond is especially noted as a favorite summer resort. More than one-half of the inhabitants are Algonquin Indians. Population, 1907, 2,146.

MANITOWOC (mǎn-ī-tō-wōk'), a city of Wisconsin, county seat of Manitowoc County, on Lake Michigan, about 150 miles north of Chicago. It is on the Wisconsin Central and the Chicago and Northwestern railroads and has regular communication by steamboats on the Great Lakes. Among the principal buildings are the county courthouse, the public library, the high school, the county insane asylum, and a Polish asylum for orphans. The manufactures embrace glue, ironware, flour, machinery, leather, edged tools, and earthenware. The city is surrounded by a fertile farming country. It has a large and growing trade in produce and merchandise. Manitowoc was incorporated as a city in 1870. Population, 1910, 13,027.

MANKATO (mǎn-kā'tō), a city in Minnesota, county seat of Blue Earth County, on the Minnesota River, 85 miles southwest of Saint Paul. It is on the Chicago Great Western, the Chicago, Milwaukee and Saint Paul, and the Chicago, Saint Paul, Minneapolis and Omaha railroads. The city is surrounded by a fertile farming country and near it are several beautiful lakes. The noteworthy buildings include a State normal school, the county courthouse, the Federal building, the Carnegie public library, the Saint Joseph's Hospital, the high school, and the Tourelotte Hospital. Among the manufactures are clothing, flour, cement, woolen goods, machinery, candy, packed meats, and earthenware. It has good municipal facilities, such as electric lights, waterworks, pavements, and street railways. Mankato was settled in 1853 and incorporated in 1868. Population, 1905, 10,996; in 1910, 10,365.

MANNA (măn'nà), a sweetish substance obtained by making incisions in the stems of various trees or shrubs, especially the stems of the manna ashes of Southern Europe. The different species of manna ash are cultivated largely in Calabria and Sicily, whence the largest amount of commercial manna is derived, though they are grown in plantations in other portions of Europe and in some sections of Asia and Africa. In most cases the incisions are made about the first of August, and during warm weather the manna oozes from the cuts and forms hardened flakes or lumps that cling to the tree. Its taste is sweetish, with a slight acidity, and the odor resembles that of honey. The best quality of flake manna comes from cuts made in the upper part of the stem. It has a pale yellow color, is somewhat transparent, and consists mainly of sugar, mucilage, resin, sweet gum, and not more than four per cent. of inorganic matter. Several other species of trees yield manna, but the product differs somewhat in substance and consistency. The different varieties are used for food, but more particularly as an adjunct in cases of treatment by other medicines, the manna serving as a food for those constitutionally weak. The eucalyptus tree of Australia and several species of camel's thorn found in Persia, Arabia, and Egypt yield a manna less nauseous than the manna ash product.

It is related in the Scriptures that the Israelites were supplied by God with a manna in the wilderness, while journeying to the promised land. The supply was furnished during the forty years spent in the Arabian wilderness, and this product has been identified with the saccharine substance produced by the plants of Arabia, since it is related that the manna of the Israelites melted when the sun became hot, and, if left to the next day, bred worms and stunk. This class of manna is now secured from a kind of tamarisk, and is eaten by the people of Southwestern Asia in place of honey.

MANNHEIM (măn'hîm), or **Manheim**, a city of Germany, in the grand duchy of Baden, near the confluence of the Neckar and Rhine, forty miles southwest of Frankfort. It is an important commercial city, has extensive docks, a good harbor, and important railroad connections. The manufactures embrace cotton and woolen goods, leather, machinery, paper, sugar, tobacco, chemicals, and musical instruments. Among the principal buildings are the townhall, the gymnasium, the Imperial Theater, the public library, and the railway station. Fine monuments of Bismarck and William I. are located in prominent places. It has statues of Schiller and Dalberg. The city has modern municipal facil-

ities, including telephones, sewerage, waterworks, and electric street railways. Mannheim was founded in 1606 and became a part of Baden in 1801. Population, 1905, 163,693.

MAN-OF-WAR, the name applied to a naval vessel that is commissioned by a government and fitted for service in war. It is considered that a vessel of this kind belongs to the soil of the nation whose flag it carries, and by the law of nations possesses greater authority than that possessed by the ships under control of private persons or companies. Vessels that make war but do not belong to an acknowledged government are classed as pirates or privateers.

MANS, Le. See **Le Mans**.

MANSFIELD (mănz'fêld), a city in Ohio, county seat of Richland County, 78 miles southwest of Cleveland. It is on the Erie, the Pennsylvania, and the Baltimore and Ohio railroads. The chief buildings include the public library, the county courthouse, the Y. M. C. A. building, the Ohio State Reformatory, and many schools and churches. It has communication by electric railways, gas and electric lighting, brick and macadam pavements, and the Sherman-Heineman Park. The manufactures include cotton textiles, furniture, woolen goods, farming machinery, paper, flour, carriages, and hardware. Mansfield was settled in 1808 and incorporated in 1828. It was the home of John Sherman. Population, 1900, 17,640; in 1910, 20,768.

MANTIS (măn'tîs), a genus of locusts remarkable for their form. They are widely distributed in Europe and Asia. These insects include several species, most of which are noted for the large spinous fore legs, which appear as if folded for prayer when waiting for the insects on which they prey. They resemble in appearance and color the plants and trees they frequent, by which they are able to elude observation. They feed on other insects. The different species are found most generally in tropical regions, where they attain to a length of two and a half inches, and their pugnacious habits cause them to be kept by Chinese in cages to fight against each other. A few species are found in the warmer parts of the United States and several have been introduced by accident.

MANTUA (măn'tû-à), a city of northern Italy, on the Mincio River, 25 miles southwest of Verona. It was formerly a city of Lombardy, forming the capital of the duchy of Mantua. The city is strongly fortified, is connected with several railway lines, and has a considerable trade in merchandise. The streets are regularly platted and well graded. They are paved with stone and asphalt. Among the noteworthy buildings are the Cathedral of San Pe-

tro, the Church of Saint Andrea, the public library, and the Plazzo Vecchio, in which Napoleon held his court. It has manufactures of various kinds and considerable business, most of which is under the influence of Jews. The city dates from the Etruscans, having been founded earlier than Rome, and during the long period since has been a point of contention by the Romans, Ostrogoths, Lombards, Germans, French, and Italians. Pietole, a suburb, is thought to be the birthplace of Virgil. Population, 1906, 29,344.

MANUAL TRAINING, a branch of education, the department of a system of schools designed to train the hand in the use of tools and in practical grafting. The tools used in conducting instruction along this line include those necessary in forging, carpentering, carving, and general building. These apply chiefly to the educational work of boys, while the girls are trained in cooking, sewing, and various lines of doing fancy work. Manual training is favored by its advocates as a means of fitting youth for the practical duties of life, in addition to training them in the fundamental principles of a general education. It has been favored particularly in the larger cities, where fewer opportunities are offered to learn the arts and duties of the business world and the household than in the smaller towns and rural districts. Kindergarten work and laboratory practice in the sciences are not classed as manual training, since they do not teach the trades or cultivate proficiency in household arts.

Manual training may be said to have had its beginning in Finland as early as 1858, when Uno Cygnaeus formulated a plan to teach it as a branch of study in the primary schools of that country. Eight years later the law made it obligatory for all male teachers to take training in the art of teaching manual occupations, and the boys in all the elementary schools were required to pursue some branch of study in this line. In 1872 the government of Sweden, in order to counteract the decline of the home industries, established what is known as the *sloyd system*, which is named from the Swedish word *slojd*, meaning skill or dexterity. Two years later the Sloyd Seminarium was established at Naas, where an active and stimulating interest in manual training was rapidly developed. Other countries of Europe, including France, Germany, and England, promoted by legal enactment instruction along this line, and at present sloyd is taught in the schools of all the leading cities of Europe.

The first institution of this kind in North America was established in Massachusetts,

known as the Sloyd School of Boston, which was organized in 1877. Similar institutions were founded in Chicago, Saint Louis, New York, Omaha, Cleveland, Toronto, Montreal, and other cities of America, and at present most of the cities that have a population of 8,000 promote manual training as an established department in the schools. In 1903 the movement received a marked impetus by the National Educational Association, which planned a movement to introduce this branch as well as instruction in elementary agriculture in the village and rural schools. Two years later a committee of the same association recommended the establishment of secondary schools in rural communities and suggested that training in manual arts, domestic economy, and the elements of agriculture should be made leading features of such schools. It was found that many of the teachers were unable to teach efficiently along these lines, hence practically all of the private and public normal schools have adopted courses designed to stimulate interest and cultivate efficiency along the line of manual training.

In the beginning the advocates of manual training were not numerous, and educators held to the view that the general courses were best fitted for the average youth, while the arts and industries may be learned in the homes or business establishments at the time or after school attendance. However, the concentration of population in the cities, the rise of the factory system, and the division of labor have caused a marked change in the requirement of educational systems. The theory that youth should become fitted to earn a livelihood through the training in the public schools is now deeply seated in the minds of all educators, hence manual training as a distinct branch or department in the system of schools is well rooted. The education now held to be worth while is that which develops all the faculties of the mind and body, which fits youth to the needs of the home, the industries, and the state. The direct object is not to produce an article of merit, but rather to develop power in the pupil to produce and at the same time acquire habits of industry.

MANURE (mā-nūr'), any substance that may be utilized for accelerating vegetation or increasing the production of plants. The constituents of the soil necessary to plant growth are exhausted by continuous cultivation of plants, and it becomes necessary to replace them by the addition of manure. The soil absorbs air food naturally to some extent. Besides, there is a decomposition of some waste material, such as stubble, roots, and foliage left on the land, and more or less decomposition of mineral

matters. However, this is not sufficient to maintain fertility for long periods. Besides, various plants require different kinds of substances to mature, for which reason it is beneficial to change the classes of plants cultivated from time to time, such as alternating corn, wheat, oats, grasses, and different crops. Experience has demonstrated that the best of soil even under a rotation of crops will not bear abundantly without limit, the yield gradually decreasing. For these reasons it becomes necessary to employ manure fertilizing to maintain the virgin fertility.

The substances used most commonly for fertilizing include the stable manures, such as are formed of the excrements of animals, as the dung of cattle, horses, swine, sheep, and poultry. Commercial fertilizing consists largely of guano, seaweed, refuse of fish, sewage of cities, and artificial saline mixtures, such as ammoniacal salts, phosphoric acid, and phosphates. Dust made from the bones of animals is utilized to a considerable extent, particularly in floriculture and horticulture. The stable manures are spread over the surface of the cultivated lands and are plowed under, while the phosphates, bone dust, and other powdered fertilizers are usually drilled in with the seed. In the Mississippi valley it is possible to maintain fertility by rotation of crops in connection with rearing stock and utilizing all the manures forming naturally. This is true of many sections of Canada and the United States, but in regions having a thinner soil it is quite necessary to use commercial fertilizing, else the cultivation of the land ceases to be profitable.

MANUSCRIPT (män'ü-skript), a book or paper written by hand or on a typewriter, as distinguished from one that is printed. The term is applied to all classes of writing, whether on paper, parchment, or any other substances. Before printing was invented, the manuscripts were generally written on papyrus, parchments, leather, or vellum, and were formed into a roll or made into a book, when they were called respectively *volumen* and *codex*. The oldest manuscripts extant are now preserved in Paris, and were taken from tombs built by the eleventh dynasty of Egypt. They are written on papyri and are computed to be nearly 4,000 years old. Manuscripts of later dates are very numerous, including writings in the Egyptian, Babylonian, Jewish, and Grecian, besides many others. The science of *paleography* includes the decipherment and proper use of these manuscripts.

The manuscript writings are the forms in which the knowledge of the ancients was pre-

served. They comprised the only class of writings of which the great libraries of the ancients were constituted. The art of illuminating manuscripts with miniature and ornaments dates from remote antiquity. Vignettes or miniatures are attached to chapters of the Egyptian papyri that date from the eighteenth dynasty, and are painted in primary colors or designed in black outline. The Greek and Roman manuscripts were largely plain, but those dating from the 4th century A. D. are ornamented in art of the Byzantine style, and some of them bear portraits ornamented in the vignette style. The practice of making large capital letters at the beginning of chapters originated with the ancients, and was carried through the centuries even long after the invention of printing. In the larger museums of London, Paris, Rome, Berlin, and Vienna are specimens of manuscripts of different centuries, the collections including various styles of material and designs in finish.

MAN WITHOUT A COUNTRY, The, a story written by Edward Everett Hale, in 1863, and published in the *Atlantic Monthly*. It relates the case of Philip Nolan, an officer who was involved in the treason of Aaron Burr. Having publicly cursed the United States, he was sentenced never to hear the name of his country and was transferred from one ship to another in the foreign service, hence he never saw his own land again.

MANYTCH, or **Manych**, a river of Europe, in the southeastern part of Russia. It rises in a chain of lakes between Astrakhan and Caucasia, near the Caspian Sea, and flows toward the northwest, joining the Don near Tcherkask, a short distance before it discharges into the Sea of Azov. Its upper course is on the line that divides Asia from Europe.

MANZANILLO (män-sä-něl'yö), a seaport city of Cuba, in the province of Santiago de Cuba, on the Gulf of Guacanabo. The site is low and surrounded by mangrove swamps. Its harbor is spacious and it has a large trade in tobacco, sugar, and lumber. The streets are wide and cross each other at right angles. It has a number of hospitals and schools. Population, 1906, 14,984.

MAORIS (mä'ö-rêz), a branch of the Polynesian race, embracing the natives of New Zealand. They are large in stature and fond of bodily exercise, and resemble the Caucasians rather than the Mongolians. Formerly they were savage and cannibalistic, but have become advanced in civilized arts and intermarriages with Europeans are quite frequent. They reside chiefly in the western part of the North

Island. Within late years they have steadily increased in numbers.

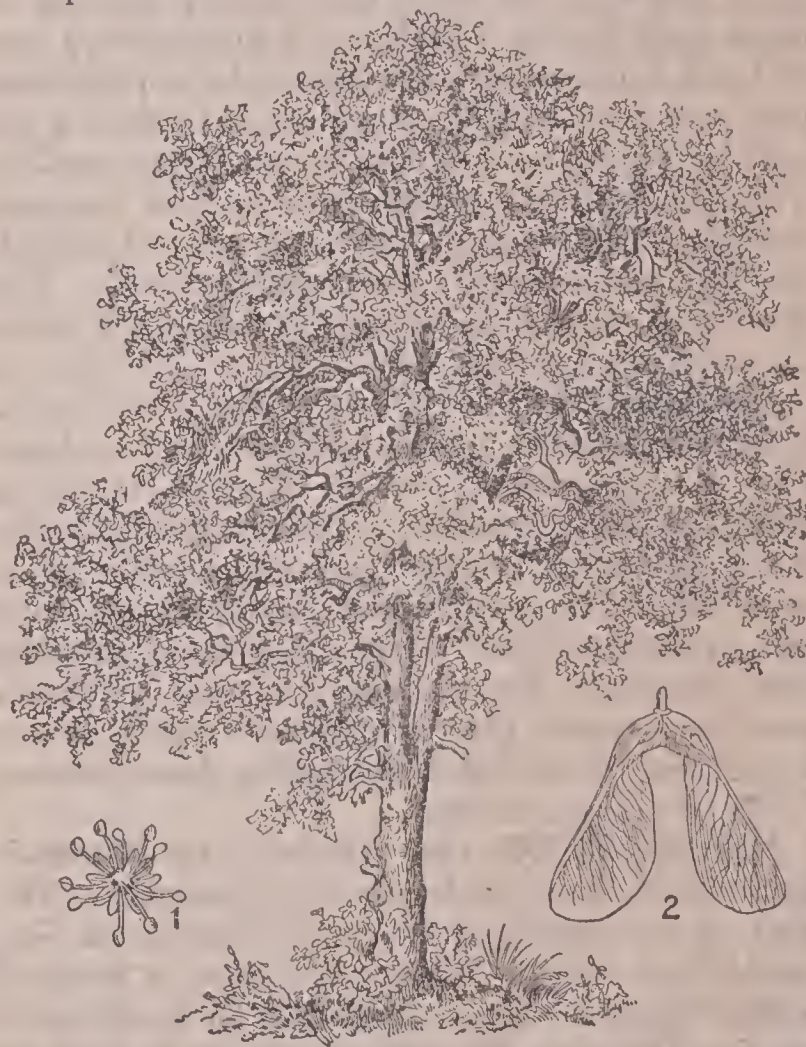
MAP, a representation, usually a plane projection, of the whole or a part of the earth's surface. The surface of the earth being curved in every direction, it is impossible to represent correctly outlines, distances, directions, and proportions of its features, except upon surfaces similarly curved. For this reason it is possible to indicate the location of features of the earth's surface with much better effect upon a globe. But as globes are too bulky to be moved about conveniently and too small to admit of the representation of minute details, it is found much more convenient to make representations of the earth upon plane surfaces, like the pages of a book. That a map on this plan cannot be made accurate may be proven by endeavoring to spread a plane projection upon a globe, which cannot be done without wrinkles, nor can the paper covering of a globe be laid flat without stretching or tearing. However, it is possible to color maps so as to show depressions and projections in the surface, and to represent by curved lines the different degrees of longitude and latitude. Besides, it is quite satisfactory to represent by color and lines the mountains, countries, lakes, rivers, oceans, cities, thermal relations, amount of rainfall, languages spoken, productions, and various other matters.

The different classes of maps include political, meteorological, relief, hydrographical, geological, contour, historical, ethnological, and statistical. In geographical projections latitude is designated by number north and south from the Equator, and longitude is indicated east or west of a standard meridian. The conventional meridian in the United States is fixed at Washington; in England, at Greenwich; in France, at Paris; in Germany, at Berlin, and similarly in other countries. Nearly all the larger maps published in the United States give the distance east or west from both Washington and Greenwich. All standard maps are made on a given scale of miles to the inch, the scale being published on the map, thus enabling the student to make comparisons and estimate approximate distances by means of the scale.

As far as known, it is believed that the Egyptians were the first makers of maps, the earliest dating from Sesostris, about 1618 B. C., who represented his conquests on tablets that the people might study the advantages gained by military activities. The Grecian Anaximander prepared a map of the whole world as known in 560 B. C., while Ptolemy made a stereographic projection about 150 A. D. Gerhard Mercator (q. v.) is

the best known of modern map makers, and in the latter part of the 16th century prepared his projection that represents the earth on a map in which all the parallels and meridians are straight lines. This plan has been elaborated and is still used extensively in most of the modern school books. Maps of practical accuracy were not made until the latter part of the last century, since actual surveys of the earth's surface are necessary to reach a state of high perfection. Many of the maps now published of some of the grand divisions are quite deficient topographically. See **Chart**.

MAPLE, a genus of trees which belong to the genus *Aceraceae*, containing about eighty species, all of which are confined to the North Temperate Zone. About ten of the species are



HARD MAPLE.

1, Flower; 2 Seed.

native to North America, but others have been introduced from Europe for ornament or for shade. The principal species of maple found in the United States are hard, bird's-eye, white, red, black, striped, California, mountain, and soft maple. Of these the *hard maple* is the principle source of maple sugar. It is a hardy tree of slow growth, attains a height of from 25 to 100 feet, and yields from 15 to 30 gallons of sap annually, which is obtained by boring a hole in the wood of the tree in the spring about a foot above the roots, and inserting a spout to convey the juice into a vessel placed below for its

reception. On boiling down the liquid, about three or four pounds of dark colored crystalline sugar is obtained. A sap quite similar, but less sweet, is obtained from the *soft maple*.

The *bird's-eye maple* is the most valuable for cabinet work, while the soft maple is planted extensively as a rapid-growing ornamental shade tree. The *mountain maple* is a tall shrub with terminal clusters of green flowers, and is a favorite in some localities as an ornamental tree. The two principal species of Europe are the *sycamore* and the *field maple*, the latter being valuable for its wood in manufacturing furniture, musical instruments, and household utensils. The *Japan*, the *Norway*, and the *Tartarian* maples are other foreign species of much value. The soft maple and many other species bear large quantities of seeds that usually develop in pairs, each having a fleshy seed formation at one end and a fan-shaped extension, the whole being two and a half inches long. Hard maple trees bear a similar seed, but it is somewhat smaller. They are particularly numerous in New England and in the Mississippi basin, where vast quantities of maple sugar are manufactured. The flowers of nearly all species are of much value in supplying food for bees.

MARABOU (mār-ā-bōō'), the name of a large stork, allied to the adjutant bird and native to the western part of Africa. It has a large bill and a peculiar pouch on the neck, the latter being an air sac and not a crop as is sometimes supposed. The feathers are long and ornamental and command a good price as ornamentations for the hats of ladies. Being a good scavenger, this animal is sometimes domesticated for its habit of clearing away various kinds of refuse matter.

MARACAYBO (mā-rā-kī'bō), or **Maracaybo**, a gulf, lake, and city of Venezuela. The gulf is an extension from the Caribbean Sea, connecting it with Maracaybo Lake, a body of water 100 miles long, and from 35 to 65 miles wide. The gulf narrows down to a neck 34 miles long and 10 miles wide, but the largest class of vessels cannot enter on account of the sand bars shifting continuously. In 1499 the gulf and lake were discovered by Rodrigo de Bastidas. These waters contain many species of valuable fish. Their banks are low, the water is fresh, and the surface is not affected by tides. The city of Maracaybo is situated on the western shore of the strait, about 21 miles from the sea. It has fortifications and various manufactures and is a central export city for coffee, cocoa, cotton, hides, and tropical fruits. Manso Pacheco founded the city in 1571. Population, 1908, 48,637.

MARAJÓ (mā-rā-zhō'), or **Joannes Island**, a body of land situated between the estuaries of the Pará and Amazon rivers. It belongs to the province of Pará, Brazil, and has an area of 17,850 square miles. The surface is low and level, with extensive swamps in the northern part, and the southwestern part has fine forests of rubber and other trees. Most of the inhabitants engage in hunting, rubber gathering, and stock raising. Sauré, on the eastern coast, is the principal settlement. Population, 1906, 20,178.

MARANHÃO (mā-rān-youn'), or **Sao Luiz**, a city of Brazil, on the island of Maranhão, capital of a state of the same name. It is located opposite the mouth of the Itapicurú River, 275 miles southeast of Pará. The surrounding country is somewhat hilly and the climate is warm, but it is healthful and has a good trade. The chief buildings include a cathedral, a hospital, and several schools. The city was founded by the French in 1612. Population, 1906, 39,506.

MARATHON (mār'ā-thōn), an ancient village of Greece, about twenty miles northeast of Athens, the site of which is now occupied by Vrana. It is noted in history for the celebrated battle fought there on Sept. 28, 490 B. C., which Creasy considers one of the decisive military engagements of the world. The Persians were led by Darius, numbering 110,000 men, while the Greeks under Miltiades had an army of only 10,000. The latter were reënforced by 1,000 Plataeans with heavy arms, which inspired Miltiades to attack the Persians with great vigor. He succeeded in defeating the enemy with a loss of 6,400, while the Greeks lost only 195. The result of this battle preserved the independence of Greece, but, if the Athenians had been defeated, Persia would have made all of Greece tributary.

MARBLE, a small ball of marble or some other hard substance, used by children as a plaything. Various games have been played with marbles from an early date in the history of mankind, and for some unaccountable reason these pastimes are played instinctively for several weeks early in the spring. In some countries and at early ages children count marbles with their toys, and those belonging to this class are usually of larger size than the kind ordinarily employed in playing games. The most extensive marble manufactory is at Coburg, Germany, where they are made in large quantities of limestone. In some localities they are made of marble, glass, and clay. The so-called striped and the bull's-eye marbles are molded in clay, and, when partly dried, are baked and glazed. The games played with marbles are very numerous.

MARBLE, a name applied to any limestone that is sufficiently hard to take a fine polish. The species which are of value for building or ornament are composed mainly of calcium carbonate or of calcium and magnesium carbonate. The colors of marble range from pure white through all shades of gray to black, while violet, red, drab, yellow, pink, and green are likewise abundant. Gray and black colors are due to carbonaceous matter, and the others mainly to iron oxide. Excellent marbles are secured from some of the fossiliferous limestones, such as are taken from the carboniferous formations, and these are colored various shades of gray. Good marbles are also secured from non-fossiliferous crystalline formations, these consisting mainly of sedimentary calcareous strata, which are altered by metamorphism. The purest classes of marble are used for statues and monuments, while others are of value for building material.

A fine grade of marble of various colors is obtained from the Grand Cañon of the Colorado, but there are quarries of more or less value in many portions of Canada and the United States. The marble used by ancient artists in sculpturing came largely from the Parian and Carrara quarries, located respectively in the island of Paros and in Italy, which still produce species of very excellent quality. Both the *Carrara* and the *Parian* marbles are white. The *Numidian marble* of Africa is either white or yellow, but usually white with yellowish markings. Extensive marble quarries are worked at Glens Falls, N. Y., in Vermont, in Georgia, and in Ontario.

MARBLEHEAD, a town of Essex County, Massachusetts, on a peninsula in Massachusetts Bay, eighteen miles northeast of Boston. It is on the Boston and Maine Railroad, has a commodious harbor, and is a popular summer resort. The chief buildings include the public library, the Abbott Hall, an art gallery, and many schools and churches. Fountain and Fort Sewall parks are fine public resorts. It has manufactures of boots and shoes, clothing, machinery, canned fish, and boats. It was settled in 1629 and furnished 1,440 men for the Revolution. Population, 1905, 7,209; in 1910, 7,338.

MARBURY DECISION, a decision of the Supreme Court of the United States, growing out of a case brought by William Marbury against President Madison. Marbury had been appointed justice of the peace in the District of Columbia by President Adams, which appointment was confirmed by the Senate, but President Jefferson had failed to receive the commission of appointment, hence Marbury moved the Supreme Court to issue a mandamus to

James Madison, commanding him to deliver the commission. The decision is to the effect that Marbury was entitled to his commission, but that the Constitution did not invest it with the authority to issue a mandamus in such a case. It was stated by Chief Justice Marshall, by whom the opinion was delivered, that the Constitution is supreme to any statute. The decision is important for the reason that it is the first one in which the court set aside an act of Congress because of being in conflict with the Constitution.

MARCH, the third month of the year, so named from Mars. It was the first month in the year of ancient Rome and continued as such until the adoption of the Gregorian calendar. It has 31 days. See **Month**.

MARDI GRAS (mär'dě grä'), a term meaning Fat Tuesday, applied to a carnival celebrated annually on the day before Ash Wednesday in New Orleans and other southern cities of the United States. The festival occurs at the same time as Shrove Tuesday, a day celebrated in England. Festivals of revelry and merrymaking were observed at that time of the week in many European cities for several centuries. The practice was first introduced in America by the creoles, in 1827, and since then has been a delightful and popular pastime among the people of many communities.

MARE ISLAND, a small island of California, in Solano County, near San Francisco. It is located in the northeastern part of San Pablo Bay, opposite the city of Vallejo, and is the Pacific station of the United States navy. An observatory, a lighthouse, a naval arsenal, and a sectional floating dock are among the important structures.

MARENGO (mä-rěng'gō), a village near Bormida, northern Italy, in the province of Alessandria, noted for a decisive battle on June 14, 1800. The Austrian army of 32,000 was led by General Melas and the French forces of 23,000 by Napoleon, but the latter were victorious, the Austrians losing about 9,000 in prisoners and killed and the French losing 7,000. An armistice followed, by the terms of which the Austrians gave up all their fortified places in Italy west of the Mincio River.

MARGARITA (mär-gä-rě'tà), an island off the coast of Venezuela, in the Caribbean Sea, belonging to the state of Nueva Esparta, Venezuela. It is 45 miles long and from four to twenty miles wide, and has an area of 450 square miles. The surface is mountainous, but it has a considerable proportion of fertile land. Agriculture, stock raising, and fishing, are the chief industries. Salt, coffee, sugar, cotton, and pearl

are exported. Columbus discovered the island in 1498. Population, 1906, 39,875.

MARIAZELL (mä-rê-â-tsël'), a village in Austria, in the grand duchy of Styria, famous on account of an image of the Virgin Mary. The image was presented to the place in 1157. Nearly 500 years afterward, in 1644, it was put into a magnificent church, where it is visited annually by thousands of pilgrims.

MARIETTA (mā-rī-ĕt'tā), a city in Ohio, county seat of Washington County, at the confluence of the Muskingum and Ohio rivers, 124 miles southeast of Columbus. It is on the Pennsylvania, the Baltimore and Ohio, and other railroads, and is surrounded by a country which produces coal, petroleum, natural gas, and farm products. The noteworthy buildings include the county courthouse, the public library, the high school, and the Marietta College, founded in 1835. Among the manufactures are farming machinery, flour, hardware, cigars, furniture, leather, carriages, and oil. It has a large trade, electric street railways, steamboat communication, and systems of pavements and waterworks. Marietta was settled in 1788 by Rufus Putnam and a colony from New England, and became the chief seat of the Northwest Territory, which was organized here the same year. The place was incorporated in 1800. Blennerhasset Island, twelve miles down the river, was associated with the conspiracy of Aaron Burr. Population, 1910, 12,923.

MARIGOLD (mār'ī-göld), the name of various plants of the aster family, having flowers

colored flowers. They are native to Southern Europe and attain a height of from one to two feet. The *bur marigold* is native to North America, where it thrives in wet places, and is allied to the *water marigold*, which is found in the United States and the warmer parts of Canada. The *fig marigold* is native to Africa and the *corn marigold* to Great Britain, but the latter is sometimes classed as a chrysanthemum. Many of the species have been improved by cultivation, are widely naturalized, and are used for flavoring edibles and in coloring butter and cheese. They are raised from the seeds, being transplanted when three or four inches high.

MARINETTE (mār-ī-nĕt'), a city in Wisconsin, county seat of Marinette County, on Green Bay, at the mouth of the Menominee River. It is on the Chicago and Northwestern, the Wisconsin and Michigan, and the Chicago, Milwaukee and Saint Paul railroads, and has communication by electric railways and steamboats on the Great Lakes. The noteworthy buildings include the county courthouse, the public library, the high school, and two hospitals. It has systems of pavements, sewerage, and waterworks. Among the manufactures are lumber products, ironware, paper, machinery, and flour. The place was first settled about 1850 and was incorporated in 1887. Population, 1905, 15,354.

MARION (mār'ī-ŭn), a city in Indiana, county seat of Grant County, on the Mississinewa River, 65 miles northeast of Indianapolis. It is on the Toledo, Saint Louis and Western, the Cleveland, Cincinnati, Chicago and Saint Louis, and other railroads, and has communication by interurban electric lines with many neighboring towns and cities. The surrounding country is fertile and contains deposits of natural gas. Besides other fine buildings, it has a fine courthouse, a public library, a normal school, and a soldiers' home. Among the manufactures are machinery, clothing, glass, bicycles, furniture, boilers, flour, spirituous liquors, and cigars. The municipal facilities include sewerage, public lighting, waterworks, and pavements. It has a large trade in merchandise and farm produce. Population, 1910, 19,359.

MARION, a city in Ohio, county seat of Marion County, 44 miles north of Columbus, on the Erie, the Pennsylvania, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. The noteworthy buildings include the county courthouse, the public library, the Y. M. C. A. building, the Sawyer Sanitarium, a normal school, and many churches. In its vicinity are extensive deposits of limestone, which are quarried for building purposes and the manufacture



AFRICAN MARIGOLD.

FRENCH MARIGOLD.

prized for their beauty and deep yellow color. The common species of garden and pot marigolds have sessile leaves with double orange-

of lime. It has a large trade in merchandise and produce. The industries of the city produce carriages, flour, steam machinery, ironware, bicycles, engines, threshers, and utensils. Population, 1900, 11,862; in 1910, 18,232.

MARJORAM (mär'jō-rām), a class of plants of the genus *Origanum*. They have nearly entire leaves, dense oblong spikes of flowers, and colored bracts. The two principal species are the *sweet marjoram* and the *pot marjoram*. Both are cultivated for seasoning in cookery. The common marjoram is native to Western Europe and is perennial. It has small acute leaves and reddish flowers, and has been naturalized in Canada and the United States. The blossoms are used as a seasoning and the oil of marjoram, which is also called oil of thyme, is distilled from the various species.

MARK, the monetary unit of the German Empire, equal to 100 *pfennige*. It was adopted as the monetary unit in 1873, immediately following the Franco-German War, and represents .3982 grammes of gold, or \$0.23821 in the money of Canada and the United States. The crown is equal to ten marks, and the double crown is valued at twenty marks. The mark is the monetary unit of Finland, where it is divided into 100 *penni*, and is equal to one franc in the money of France.

MARL, a deposit of earthy matter, consisting principally of calcium carbonate, sand, and clay in various proportions. The more prominent ingredients characterize its appearance and consistency, the carbonate of lime usually varying from five to twenty per cent. It is used as a fertilizer, its utility for this purpose depending largely upon the presence of calcareous and argillaceous substances. In England, France, Germany, and other European countries marl has been used for fertilizing for many centuries, though in some countries slacked lime is employed as a substitute for the mineral marl.

MARLBORO (mär'l'būr-ō), a city of Massachusetts, in Middlesex County, 26 miles west of Boston, on the Boston and Maine and the New York, New Haven and Hartford railroads. The chief buildings include the public library, the city hall, the high school, the G. A. R. building, and the Saint Anne's Convent. Among the manufactures are bicycles, boots and shoes, ironware, machinery, vehicles, cigars, and fabrics. It has electric street railways, brick and macadam pavements, and a large trade in merchandise. The surrounding country is agricultural and dairying and near the city is Williams Lake, a sheet of water covering about 160 acres. The place was settled in 1656 and in 1676, at the time of King Philip's War, it

was nearly destroyed. It was chartered as a city in 1890. Population, 1910, 14,579.

MARMORA (mär'mō-rā), **Sea of**, a sea lying between Europe and Asiatic Turkey, known anciently as the Sea of Propontis. It is connected with the Black Sea by the Bosphorus and with the Aegean Sea by the Dardanelles. The length is 176 miles, the breadth is about 50 miles, and area is 4,500 square miles. The coast is indented by a number of gulfs with good harbors. In the southern portion are several islands, of which Marmora is the largest, and it is famous for quarries of alabaster and marble. The seaport cities and Constantinople give it commercial importance.

MARMOSET (mär'mō-zēt), a class of small monkeys of South America. They have a squirrel-like appearance. The long tail and body are covered with soft, woolly hairs. In some species the head is tufted. They subsist on insects, fruits, birds, and birds' eggs. The *striated marmoset* is one of the best known. It has a deep gray color with bands of lighter shades. These animals are small, from eight to ten inches long, and the tail is as long as the body. The *silky marmoset* has long silken hairs.

MARMOT (mär'möt), a class of rodent quadrupeds allied to the squirrel, native to North America, Europe, and the northern part



ALPINE MARMOT.

of Asia. The best known species of North America are the *prairie marmot*, or *prairie dog*, which is found in large families on the western plains, and the *woodchuck*, found abundantly in the middle states. The *Alpine marmot* is native to the mountains of Europe. In this animal the body is eighteen inches long, the tail is about three inches, and the color is a dark gray. Allied species are found more or less widely

distributed in different parts of Asia. Marmots live in large societies in extensive burrows, feed on roots, leaves, and grasses, and are about as heavy as a common rabbit, but have very short legs and a bulky body. In the winter time they live in a state of torpidity, but they are very active in the summer, barking at the approach of danger, which is usually signaled by a monitor who keeps constant watch.

MARNE (märn), a river in France, rises in the Côte d'Or Mountains, and after a course of 275 miles joins the Seine near Paris. It is navigable for 210 miles. Among the towns on its banks are Châlons, Joinville, Langres, and Épernay.

MARONITES (mär'ō-nīts), a sect of Christians who constitute a class in Syria, so named from a monk called Maron. The sect dates from the 5th century and numbers about 150,000. The Maronites acknowledge the Pope of Rome as their head, but have the privilege of using the Syriac language in their service and celibacy is not enforced upon the priests. They are under the direct supervision of the Patriarch of Antioch, who has his seat in a convent of the Lebanon Mountains. Gregory XIII. founded the Maronite College for them in 1584, at which their priests are educated.

MAROONS (mā-rōonz'), a name applied in Guiana and Jamaica to the Negroes who have escaped from slavery and to their descendants. When England conquered Jamaica, in 1655, many slaves escaped to the mountains, where they constituted a formidable body until 1795, when they were subdued and removed to Nova Scotia and later to Sierra Leone. In Guiana the Maroons still number fully 4,000. They are organized into independent communities and support themselves by hunting, fishing, and pastoral pursuits.

MAROS (mǒ'rōsh), a river of eastern Hungary, having its source in the eastern Carpathians. After a course of 400 miles it joins the Theiss near Szegedin. It is navigable for a distance of 228 miles, as far as Ujvar, and is an important commercial route. It receives the discharge from the Kokel River in Transylvania. On its banks are the cities of Vásárhely, Arad, and Ménes.

MARQUE (märk). See **Letters of Marque and Reprisal**.

MARQUESAS (mär-kā'sās), a group of Polynesian islands, located in the South Pacific Ocean. These islands were discovered in 1596 by Mendaña de Neyra, a Spanish navigator. The area is 495 square miles. Nukahiva, area 183 square miles, is the largest island. All the larger islands are mountainous, but the smaller

islets and atolls have a level surface. The productions embrace tropical fruits, cattle, swine, and various manufactures. The inhabitants are a class of brown Polynesians. They tattoo themselves, are of strong physique, and have considerable development in industrial arts. The entire group has belonged to France since 1842. Population, 1908, 4,624.

MARQUETTE (mär-kět'), a city in Michigan, county seat of Marquette County, located in the Upper Peninsula, on Lake Superior. It is on the Marquette and Southwestern and the Duluth, South Shore and Atlantic railroads. Among the noteworthy buildings are the high school, the county courthouse, the Federal building, the Peter White Public Library, the Northern State Normal School, the Upper Peninsula State Prison and House of Correction, and the Roman Catholic and Protestant Episcopal cathedrals. The manufactures include flour, powder, ironware, machinery, furniture, and lumber products. In its vicinity are quarries of brown sandstone, iron mines, and many fine grain and dairy farms. It was settled in 1845 and incorporated in 1869. Population, 1910, 11,503.

MARRIAGE, a mutual and voluntary contract between a man and a woman, properly based on mutual regard and affection. As a condition of validity in most countries, the bond of marriage is authorized by a license and is dignified or solemnized according to certain legal forms. It implies that the contracting parties will live together as husband and wife until they are separated by death. All the civilized countries regard marriage as an essential institution and maintain laws for its proper protection. The main design of marriage is to constitute the family and for the preservation of moral and social purity, the continuance of the race, and the training of the young for the duties of life.

Three systems of marriage are recognized, but *monogamy*, in which an individual may have but one person in marriage, is now universally maintained in all the leading nations. *Polygamy* implies a plurality of wives and *polyandry* is the practice of having two or more husbands at the same time. In ancient times both polygamy and polyandry existed more or less among the people of the most intelligent nations, and both are still practiced to some extent in various countries, particularly in Tibet and other parts of Asia. Several of the Christian churches regard marriage among the sacraments, holding that it can be set aside only by death, while the law generally holds it to be a civil contract that may be terminated for good and sufficient cause under the divorce laws. Marriage and divorce

laws are maintained in the provinces of Canada and the states of the United States, but no divorces are permitted in South Carolina, and these laws are modeled more or less after the common laws of the leading countries of Europe.

In general, a marriage contract cannot be made by males under 21 and females under 18 years of age, unless consent is given by the parents or guardians. A license must be obtained from a proper officer, usually the clerk of the courts, and the marriage solemnized by a clergyman or a civil officer competent to perform that act. In some states a definite number of witnesses must be present at the time. The marriage contract differs from general civil contracts in that it cannot be set aside by mutual consent, but only in a court having competent jurisdiction of such cases. The grounds for divorce include desertion, impotency at the time of marriage, the commission of felonies, and others, but in this the laws of the several states and most countries do not exactly coincide. A movement has been on foot for some time to unify the marriage and divorce laws, the consummation of which, no doubt, would be in the interest of bettering family relations.

The General Assembly of North Dakota, in 1899, enacted a law whereby it was made necessary for parties wishing to enter a marriage contract to appear before a commission of three physicians, such a commission being established in each county, and in their presence have it determined whether the parties wishing to marry are fitted to enter into such relations. Similar laws are in force in many countries of Europe. They are considered of value from a sanitary point of view, since they guard against the procreation of defective or degenerate offspring. A like control of marriage contracts has been advocated by national laws, since such legislation would establish uniformity throughout the country. See **Divorce**.

MARS, a superior planet, the one most like the earth, with which we first come in contact in passing from the orbit of the earth, being located in space between the earth on one side and a vast cluster of asteroids on the other. It appears to the naked eye as a red star with a steady light, by which it is distinguished from the fixed stars. The mean distance from the sun is placed at 139,875,000 miles, and at perihelion it is about 26,000,000 miles nearer to that luminary than in aphelion. Mars moves through space with an average velocity of about fifteen miles per second, the day is about forty minutes longer than ours, and the year is equal to 687 terrestrial days. Its distance from the earth

varies from 33,000,000 to 243,000,000 miles. Mars has a diameter of 4,200 miles, a volume one-fourth that of the earth, and a density of approximately three-fourths. The mass is about one-eighth of the terrestrial mass. Its orbit is inclined to the ecliptic at an angle of $1^{\circ} 51' 5''$. The heat received from the sun is less than one-half that of the earth and its axis is inclined about 28.7° , therefore its seasons and zones are quite similar to ours. Its atmosphere is like ours and has clouds. The telescope reveals reddish spots that are thought to be continents and greenish tints which are considered bodies of water. The proportion of land to water is directly reversed from that of the earth, fully three-fourths being land. White portions apparently surrounding the poles indicate that there are snow zones. This is further verified by the snow zones apparently melting during the summer season and increasing in size on the approach of winter. No mountains have been discovered, but Professor Hall of the Naval Observatory, Washington, discovered two small satellites in 1877. The one nearest the planet is thought to be 5,900 miles from it and makes a complete revolution in seven hours and thirty-eight minutes, while the one farthest away is 14,600 miles and makes a revolution in thirty hours and fifteen minutes.

MARSEILLAISE (mär-să-yâz'), the celebrated war song of the French Republic, which was written by Rouget de Lisle (1760-1836), an officer of artillery, of Strassburg, Germany, in 1792. The name given to it by the author is "Song of the Army of the Rhine," but the name by which it is now known was applied to it from a party, or festival, given by the Marseillaise Club in Paris on the invitation of Madame Roland. The revolutionists adopted it in all the centers of population, but its use was forbidden during the empire. Soon after the beginning of the Franco-German War the republicans again made it popular.

MARSEILLES (mär-să'y'), a seaport and commercial city of France, capital of the department of Bouches-du-Rhône, on the Mediterranean Sea. It has a good harbor and is important as a military and naval station. Communication is by interurban railways, steam railroads, and regular lines of steamships. A Greek colony from Asia Minor settled at its present site about the year 600 B. C., when it became known as Massalia. A high state of civilization flourished at Massalia under the Grecians nearly 600 years. It was taken by Caesar in 49 B. C., but with the decline of Rome it became subject to the attacks of Gothic invaders. The Saracens conquered it in 735, and in 1575 Henry

III. of France made it a part of his dominion. It has been noted from antiquity for its inclination toward republicanism and was for some time an independent city. In 1871 it was foremost in supporting the new republic.

Marseilles has many fine public institutions, among them government buildings, many public and parochial schools, several colleges, a university, and a public library of 100,000 volumes. The noteworthy buildings include the Hôtel de Ville, the Palais de Justice, the Byzantine cathedral, the Church of Notre Dame, and the Commercial Exchange. Its botanical and zoölogical gardens are among the finest in France, as are also its museum and system of elementary education. The manufactures include machinery, cotton and woolen goods, clothing, sugar, iron and brass wares, glass, oils, soap, chemical products, leather, silk, spirituous liquors, flour, and canned goods. Near the city are many valuable fisheries. The trade has been growing constantly in importance since the construction of the Suez Canal and the establishment of French colonies in North Africa. Among the municipal facilities are public lighting and waterworks, stone and asphalt pavements, electric street railways, sanitary sewerage, and city baths and markets. Population, 1906, 517,498.

MARSH, a tract of soft wet land, usually covered partially or wholly with water. Peat bogs, such as are common to Ireland, are found in many marshes, and they are frequently characterized by bogs, quagmires, and mucky tracts of land. Marshes are due to overflows, especially where springs or rivulets discharge so the water spreads over a considerable tract of low and level land. Bogs and quagmires are found chiefly on hillsides, where springs have their outlet some distance above the valley, the outflow being obstructed by a tract of level land. In some cases landslides result, especially where small marshes are located on the sides of hills or mountains. Most of the deltas of great rivers are marshy, such as those of the Indus and the Mississippi. Other extensive marshes are found in Florida and along the Mississippi River, especially in Louisiana and Mississippi.

MARSHAL (mär'shəl), a term originally applied to the person who had charge of the horses of a high official. It is of German origin and was first used in connection with the horsemen of the king, but in the Middle Ages it came to be applied to the chief officer of arms, both in the army and at tournaments. Charles I. of England created the knight marshal's court, and this was presided over by the marshal of the king's household until 1849. At present the marshal of the king's bench has the custody of

the marshalsea, or king's bench prison, in Southwark. *General field marshal* is the highest military honor in Germany and in France this honor is vested in the *maréchal de France*. In the United States a marshal is an officer of one of the Federal judicial districts, having duties similar to those of a sheriff. In some states the name is applied to the chief police officer of a town or city.

MARSHALL, a city in Missouri, county seat of Saline County, 82 miles east of Kansas City, on the Missouri Pacific and the Chicago and Alton railroads. It is surrounded by an agricultural country, which also has deposits of coal and building stone. Besides fine public schools, it has the Missouri Valley College and Saint Xavier's Academy. Other noteworthy buildings include the county courthouse, the city hall, and the opera house. Among the manufactures are carriages, earthenware, canned goods, salt, and machinery. Electric lights and waterworks are among the improvements. The place was settled in 1839 and incorporated in 1866. Population, 1900, 5,086; in 1910, 4,869.

MARSHALL, a city in Texas, county seat of Harrison County, 40 miles northwest of Shreveport, La., on the Texas Southern and the Texas and Pacific railroads. It is surrounded by a fertile agricultural country, which contains mineral springs, deposits of iron, and valuable forests. The noteworthy buildings include the county courthouse, the Wiley University, the Bishop College, the opera house, and the high school. Among the manufactures are machinery, furniture, cotton goods, oils, ice, and lumber products. Many of the streets are improved by grading and pavements. It has systems of sewerage and waterworks. Population, 1910, 11,452.

MARSHALLTOWN, a city in Iowa, county seat of Marshall County, on the Iowa River, 58 miles northeast of Des Moines. It is on the Iowa Central, the Chicago Great Western, and the Chicago and Northwestern railroads. The city is surrounded by an excellent farming and dairying country and has a large commercial trade. Among the chief buildings are the county courthouse, the high school, the public library, the Pilgrim Hotel, and the Iowa Soldiers' Home. The manufactures include carriages, flour, clothing, machinery, glucose, soap, canned goods, and packed meats. It has electric street railways, brick and asphalt pavements, and systems of sewerage and waterworks. Marshalltown was settled in 1860 and was chartered as a city in 1868. Population, 1905, 12,045; in 1910, 13,374.

MARSHFIELD, a city of Wisconsin, in Wood County, 75 miles east of Eau Claire, on

the Wisconsin Central and the Chicago, Saint Paul, Minneapolis and Omaha railroads. It is surrounded by a rich farming and stock-raising country. The manufactures include lumber products, machinery, clothing, and earthenware. Good public schools, electric lights, and water-works are among the improvements. It is the seat of Saint Joseph's Hospital and a water-cure sanitarium. It has a growing trade in merchandise. Marshfield was settled in 1871 and became a city in 1883. Population, 1910, 5,783.

MARSH MALLOW, a plant of Europe and Asia, including several species, found in marshes and meadows. The common marsh mallow is a perennial plant, has a stem from two to three feet high, and bears a flesh-colored flower and a carrot-shaped root. The stem yields fibers, starchy substances, and sugars, though the last named are found principally in the roots. Different parts of the plant are used in the preparation of demulcent lozenges. Several species have been widely naturalized, among them the hollyhock, which is an allied plant.

MARSTON MOOR, a region of England, situated seven miles west of York, celebrated for a battle fought there on July 2, 1644. It was a decisive contest between the royal army of Charles I. under command of Prince Rupert and the Parliamentary forces under Fairfax and Cromwell. The latter were victorious and the result was to bring Cromwell into prominent notice. The Royalists lost 4,000 killed and were compelled to flee.

MARSUPIALIA (mär-sū-pī-ā'li-ā), a group of mammals that have a marsupium or pouch. It includes many widely distributed species, some being vastly different in their organization from ordinary mammals, while others are quite similar to each other. Some species are rodents. The group includes carnivorous, insectivorous, and several species of purely herbivorous animals. They are different from other mammals more particularly because the young are brought forth of a small size and imperfect in condition, and immediately after birth are placed in the *pouch*, or *marsupium*. The pouch contains mammae or teats to which the young become attached, and are there nourished by milk food to maturity. Naturalists connect the marsupials to birds and reptiles through the monotremata, since this arrangement faintly approaches the oviparous characteristics. Most species of marsupials are native to Australia and the vast archipelago southeast of Asia, but the American ant-eater, opossum, and bandicoot belong to the group. The principal species are the kangaroos, kangaroo rats, Tasmanian tigers, wombats, opossums, bandicoots, and ant-eaters.

MARTEN (mär'těn), a class of carnivorous quadrupeds, characterized by a slender and elongated body, short legs, sharp claws, a bushy tail, and a body which is formed similarly to that of the weasel. Martens live largely among trees, which they are able to climb with much facility. The North American group includes about ten species, among them the *beech marten*, *pine marten*, and *sables*, all of which yield valuable fur. Most of these species and several others occur in the northern part of Europe and Asia, particularly in Siberia, where the *sable marten* attains a large size, fully 45 inches in length. Several of the smaller species yield a fine grade of fur used in ornamental trimming.

MARTHA'S VINEYARD, an island of Massachusetts, off the southern coast, forming the principal part of Dukes County. Other islands connected with it are Chappaquiddick and the Elizabeth Islands. Martha's Vineyard is twenty-one miles long, from two to seven miles wide, and contains several prosperous towns and a railway line. The surface is gently undulating and has many species of trees and other plants. It is popular as a summer resort. Edgartown, in the eastern part of the island, is the county seat, and at the promontory of Gayhead is a lighthouse. The island was discovered in 1602 by Bartholomew Gosnold.

MARTIAL LAW (mär'shāl), a term pertaining to military operations, embracing the exercise of arbitrary power by the military authorities of regions where ordinary administration has been rendered inoperative by civil disturbances. It differs from military law, in that the latter governs the soldiers of an army at all times, while martial law is applied more particularly to civilians when accompanying a military force on active service, and its administration rests with the officials in supreme authority. The conditions under which martial law may be exercised are set forth in the army regulations of the national governments. For this reason, when officially proclaimed, the martial law displaces the civil law to a certain extent in a province or other minor subdivision of a country. In cases of riots or insurrections the Governor of a State or Territory, or the President of the United States, may declare martial law by proclamation, but it is limited to the region affected by the disturbances, which is said to be under martial law.

MARTIN. See **Swallow**.

MARTINIQUE (mär-tī-nēk'), an island of the Lesser Antilles, between the Caribbean Sea and the Atlantic Ocean, forming the most important of the Windward group. It is 42 miles

long and from 10 to 20 miles wide. The area is 380 square miles. The Spaniards discovered it in 1493, on Saint Martin's day. It was first settled by the French in 1635 and has since been a French colony, with only several short intervals. At present it is represented in Paris by a senator and two deputies and has a resident governor and general council, with the seat of government at Fort-de-France. The climate is favorable and the soil is fertile. It has a number of excellent harbors. Among the chief productions are live stock, sugar, sweet potatoes, coffee, cacao, rum, tobacco, cotton, and tropical fruits. The export and import trade with France is extensive. Saint Pierre has a fine harbor and is the largest city. In 1902 the volcanic eruptions of Mount Pelée overwhelmed Saint Pierre and its vicinity, causing the death of 30,000 people. The inhabitants consist chiefly of the colored races, especially Negroes and Mulattoes, and include about 15,000 Europeans. Population, 1908, 200,108.

MARTINSBURG, a city in West Virginia, county seat of Berkeley County, in the Shenandoah valley, about 76 miles west of Washington, D. C. It is on the Cumberland Valley and the Baltimore and Ohio railroads. The principal buildings include the Federal courthouse and post office, the high school, the public library, and a number of churches and hospitals. Among the manufactures are bicycles, woolen goods, machinery, hardware, agricultural implements, lime, carriages, and hosiery. It has a large trade in produce and merchandise. The place was settled and incorporated in 1778. At the time of the Civil War it was important as a base of supplies for the Confederates. Population, 1900, 7,564; in 1910, 10,698.

MARTIN'S FERRY, a city of Ohio, in Belmont County, on the Ohio River, nearly opposite Wheeling, W. Va. It is on the Pennsylvania, the Baltimore and Ohio, and other railroads, and has extensive communication by steamboats. It has a fine high school, a public library, and Walnut Grove Cemetery, the last mentioned containing the remains of many early settlers. The manufactures include engines, stoves, hardware, farming implements, glass, lumber products, and vehicles. An abundance of coal is produced in the vicinity. It has modern municipal facilities and a well-organized system of public instruction. The place was settled in 1769 and incorporated in 1865. Population, 1900, 7,760; in 1910, 9,133.

MARTYR (mār'tēr), a word derived from the Greek equivalent of memory or witness, applied by the Christian churches to a person who suffers death rather than to renounce his reli-

gion, thus bearing witness to the truth by surrendering his life. In the early history of Christianity and during many periods up to modern times, widespread persecutions were frequent and many suffered death rather than forsake the Christian cause. Prayers were offered at the tombs of the martyrs by Christians, and in many cases praise services were conducted that persons would so willingly and positively maintain the faith. *Martyrology* is a discourse or treatise containing a list of saints and martyrs, with brief notices of their life and death, commemorated on each day of the year. The earliest treatise of this character was published in the 9th century, but the most extensive appeared in 1586, written by Cardinal Caesar Baronius (1538-1607), who connected with it critical commentaries.

MARYLAND (mēr'i-land), one of the thirteen original states of the United States, popularly called the *Old Line State*. It is bounded on the north by Pennsylvania and Delaware, east by Delaware and the Atlantic, south by Virginia and West Virginia, and west by West



Virginia. The northern boundary is known as the Mason and Dixon's line and the southern border is very irregular, being formed by the Potomac River. Its length from east to west along the northern border is 215 miles, to which 35 miles of extension is added by the stretch eastward south of Delaware, hence the extreme length is about 250 miles. The greatest breadth from north to south is 128 miles. The area is 12,210 miles, of which 2,350 square miles are water surface.

DESCRIPTION. The larger part of the State is included in the Atlantic coast plain, but the western portion has ranges of the Blue Ridge and Allegheny mountains, which rise to heights of about 3,000 feet above sea level. Chesapeake Bay extends almost to the northern boundary, hence divides the State into what are known as the *east shore* and the *west shore*. The east shore has a general elevation of about 25 feet above the sea, but in the northern part it reaches 100 feet, while the west shore rises con-

siderably higher, ranging from 25 feet in the southern part to 300 feet in the vicinity of the District of Columbia. The extreme western part is diversified by parallel ridges of mountains, separated by deep valleys, and all of the region is timbered. Between Chesapeake Bay and the mountains is a rolling and hilly country. Many islands are located in Chesapeake Bay and the shores are indented by important inlets, many of which furnish excellent harbors.

Most of the drainage is by small streams that flow into the Potomac, the Atlantic, and Chesapeake Bay. The region lying east of Chesapeake Bay is drained by the Chester, Choptank, Nanticoke, and Pocomoke rivers, all these flowing into Chesapeake Bay. The Susquehanna enters the State from Pennsylvania and flows into Chesapeake Bay. Other streams of the west shore include the Gunpowder, Patapsco, and Patuxent rivers. The Potomac, which drains the western part, receives the inflow from the Monocacy River.

The climate is healthful and may be said to be a transition between the frozen winter of the north and the open winter of the south. Snow falls in all parts of the State, but lies longest in the higher altitudes of the western section. At Baltimore the mean annual temperature is 56°, while the average for January is 30° and for July, 75°. The extremes of winter are 25° below zero and in summer, 102°, in the western part, and the southern and eastern sections are noticeably modified by proximity to the sea. All parts of the State have an abundance of rainfall, ranging from 36 inches in the western region to 45 inches in the coastal plain.

MINING. Coal is the chief mineral product and is found in a district of 500 square miles. Some of the veins are fourteen feet thick. The output is 5,200,000 tons annually, giving the State twelfth rank in the production of coal. Fine building stones are found in many sections of the State. In the vicinity of Baltimore and Port Deposit are extensive quarries of granite and marble, whence much of the output is shipped for building purposes to Philadelphia, Washington, and New York City. Clays suitable for stoneware, pottery, paint, brick, and sewer pipe are abundant. Deposits of iron, copper, lead, feldspar, zinc, and mica are found in different sections, but these are not worked extensively. Most of the mining industries are toward the western part and in the mountains.

FORESTS AND FISHERIES. The western section of the State has fine forests, consisting principally of oak, pine, chestnut, walnut, and hickory. Numerous species of southern plants thrive along the eastern shore, where the climate is

equable and the soil is favorable to many kinds of shrubs and trees.

The fisheries of Maryland are very important and take rank next to those of Massachusetts. Chesapeake Bay is noted for its fine quality of oysters, and the streams flowing into it yield large quantities of shad. The oyster beds have an area of about 215 square miles, and the oysters taken annually constitute about 80 per cent. of the catch for the entire country. At present the output of oysters, including those sold in bulk and the canned product, has a value of \$5,500,000. Other catches include crabs, white perch, striped bass, trout, carp, menhaden, and mackerel.

MANUFACTURING. The manufacturing industry is of much importance, having grown steadily from the early settlement of the State. About ten per cent. of the people are engaged in this enterprise, and the annual production has a value of \$245,700,000. In the output of cotton duck Baltimore exceeds all cities in America, and it is the chief manufacturing and commercial center of the State. At present the canning and preserving of fruits and vegetables rank as the most important manufacturing enterprises. However, they are closely approximated by the output of tobacco, iron and steel, flour, and textiles. Large interests are vested in the manufacture of fertilizers, being stimulated by the extensive cultivation of fruits and vegetables. The canning and preserving of oysters and other shellfish has opened a large market for the fisheries of the State. Other manufactures include engines, steamships, machinery, hardware, spirituous liquors, and scientific instruments.

AGRICULTURE. About 82 per cent. of the land is included in farms, which average 112 acres. Corn is grown on the largest area devoted to any one cereal, but it is closely approximated by the cultivation of wheat. Hay holds third rank in acreage. Other products include oats, tobacco, potatoes, and fruits. The State has large interests in gardening and fruit raising and much of the product is shipped to Baltimore and other cities, or is canned for the market. The area cultivated in sweet corn is 17,500 acres and that of tomatoes is 45,000 acres. A superior quality of peaches are grown and the output of the peach orchard is more than half of all the fruit raised in the State. Considerable interests are vested in rearing cattle for meat and dairying. Other domestic animals include horses, swine, sheep, mules, and poultry.

TRANSPORTATION. The first railroad in the United States, the Baltimore and Ohio, has extensive trunk lines that connect the cities of the State with Philadelphia, New York, and Chi-

cago. Other lines include those of the Pennsylvania system, the Baltimore and Lehigh, and the Western Maryland. The lines operated aggregate 1,500 square miles. Numerous electric railways extend into the country from Baltimore, Cumberland, and other cities. The shores of Assateague Bay and the Atlantic have shallow water and are not important for commerce, but Chesapeake Bay has many fine harbors. Large steamers navigate the Potomac to Washington, a distance of 125 miles, and large boats ascend the Susquehanna. The Chesapeake and Delaware Canal extends from Chesapeake, Md., to Delaware City, Del.; and the Chesapeake and Ohio Canal connects Cumberland, Md., with Washington, D. C. Baltimore is the chief railway and commercial center. The exports consist largely of oysters, fruits, coal, and fish, and the imports embrace raw material and food stuffs.

EDUCATION. Maryland has an efficient system of public education. The per cent. of illiteracy among whites is 4.1 and among negroes it is 35.1, the latter being next to the lowest in the states that have a large colored population. General supervision is vested in the State board of education, which is composed of the Governor, the principal of the State normal school, the State superintendent, and four persons appointed by the Governor. A board of school trustees appointed by these commissioners has general management of the districts. The school year averages about 188 days. Separate schools are maintained for white and colored children. State normal schools are located at Frostburg and Baltimore and a normal department is maintained in Washington College.

Johns Hopkins University, at Baltimore, is one of the leading centers of education in America. Other institutions of higher learning include The University of Maryland and the Women's College at Baltimore; the Western Maryland College, Westminster; the Rockhill College, Ellicott City; the Saint John's College, Annapolis; the Washington College, Chestertown; and the Jacob Tome Institute, Fort Deposit. Baltimore has houses of refuge for boys and girls and the State penitentiary. Owings Mills has an institution for feeble-minded children and Spring Grove and Sykesville have hospitals for the insane. The school for the deaf is at Frederick and schools for the blind and deaf are maintained at Baltimore. Near Pikesville is the Maryland Confederate Soldiers' Home.

GOVERNMENT. The constitution now in force was adopted in 1867. It vests the chief executive authority in a Governor, who is elected for

a term of four years. In case the office is vacant, the Governor is elected by the Legislature, but if that body is not in session the succession is vested in the president of the senate and the speaker of the house, respectively. Other State officers include the attorney-general, comptroller of the currency, and treasurer. The Legislature consists of a senate and a house of delegates, the former having 27 and the latter 101 members. Though the senators are elected for terms of four years, they are apportioned so the terms of one-half expire every two years, and the members in the house of delegates are elected for two years. Biennial sessions of the Legislature are held. The regular sessions are limited to ninety days and the special sessions to thirty days. The chief judges of the first seven circuits and a special judge in Baltimore comprise the highest court, known as the court of appeals. Each circuit, except the circuit of Baltimore, has a chief judge and two associate judges, while Baltimore has nine judges. All of these judges are elected by the people, and the courts over which they have charge have jurisdiction of civil and criminal cases. The justices of the peace are appointed by the Governor and senate, and the judges of the orphans' courts are elected.

INHABITANTS. About half of the inhabitants reside in cities having a population exceeding 8,000. The density per square mile is 122 inhabitants. Only a small per cent. of the people are of foreign birth and these are represented chiefly by Germans. Annapolis, the capital, is located on Chesapeake Bay. Baltimore, the largest city, contains about one-half of the total inhabitation of the State. Other important cities include Cumberland, Hagerstown, Frederick, and Cambridge. In 1900 the State had a population of 1,190,050. This included a total colored population of 235,620, of which 235,064 were Negroes and 544 were Chinese. Population, 1910, 1,295,450.

HISTORY. The first settlements in Maryland were made by Cecil Calvert, Lord Baltimore, in 1634. His father, George Calvert, was Secretary of State under James I. and became associated with the London Company, but conflicts arose with traders who made claims under the Virginian, William Clayborne. Religious toleration was extended to all, but the Protestants outnumbered the Catholics after 1691. The feudal system of land had been established, but this was overthrown in 1688, when the representatives of Lord Baltimore declined to proclaim William and Mary as ruling sovereigns. The charter first granted included Delaware and a part of Maryland, but final adjustments were

made in 1760, and Mason and Dixon's line was finally established in 1767 to mark its present limits. The Articles of Confederation adopted by Congress in 1777 were not ratified until in 1781, but Maryland actively supported the Revolutionary War. It likewise supported with alacrity the War of 1812 and the Mexican War, and, though a slave-holding State, it did not secede from the Union in the Civil War, but many of the citizens fought in both the armies.

MARYSVILLE, a city in California, county seat of Yuba County, at the confluence of the Feather and Yuba rivers, 48 miles north of Sacramento. It is on the Northern California and the Southern Pacific railroads. The chief buildings include the county courthouse, the city hall, and the college of Notre Dame. It has manufactures of flour, woolen goods, machinery, carriages, wine, and canned goods. The surrounding country is mining and fruit growing. The place was founded in 1849, when it was known as New Mecklenburg, and it was chartered as Marysville in 1851. Population, 1900, 3,497; in 1910, 5,430.

MASAI (mä'sī), a race of people found in British East Africa, classed with the Ethiopian-Negro races. While the color is chocolate, they are quite like Europeans in features, except that the eyes are slightly oblique. The hair is black and frizzly, the stature is large, and the physique is well developed. Several tribes or clans are included, all of which are nomadic and subsist chiefly by hunting and stock raising. They are fond of ornaments, such as beads, rings, and brooches. The Masai are largely pagans and make sacrifices of vegetables and fruits to their idols. They do not bury the dead, but leave them to be devoured by hyenas and birds of prey. They engage in warfare and have a loosely organized militia. More recently they have made some advancement in agricultural arts and fruit raising, tools and machinery having been imported for that purpose since the country became British territory.

MASAYA (mä-sä'a), a city of Central America, in Nicaragua, near a lake of the same name, fifteen miles southeast of Managua. It has railroad connections, is one of the oldest cities in Nicaragua, and has an important trade and some manufactures. Near it is the celebrated volcano of Masaya, which in 1670 had an eruption that spread lava in a northerly direction fully twenty miles. The inhabitants of the city are largely of Indian descent and have made considerable advancement in the industries. Population, 1908, 19,306.

MASHONALAND (mä-shō'nä-länd), a province of Rhodesia, South Africa, located be-

tween Matabeleland and the Zambezi River. The surface has an elevation of from 3,000 to 5,000 feet above the sea and consists mainly of a fertile region. The drainage is mainly by the Sabi and tributaries of the Zambezi. It has a healthful climate, but the rainfall is not sufficient to make all classes of farming profitable. Valuable deposits of gold are worked and several railways are operated, the chief outlet to the coast being by a line from Salisbury to Beira, a port on Mozambique Channel. Stock raising, farming, and mining are the principal occupations. Rice is grown successfully in the lowlands. Other products include fruit, tobacco, flax, and vegetables.

Carl Mauch, a German traveler, explored the region in 1871. He came in contact with the natives, who are known as Mashonas, and discovered a number of ruins indicating a former high state of civilization. These ruins are centered at a place called Zimbabwe, where are located many remains of ancient temples and fortresses. They appear to belong to prehistoric times and are sometimes identified with the Ophir of the Bible. Great Britain acquired Mashonaland in 1890. Salisbury is the seat of local government, but politically it belongs to the territory of Southeastern Rhodesia. In 1907 Mashonaland had 7,654 European inhabitants. Population, 1907, 432,732.

MASK, a covering worn to disguise or protect the face. The practice of wearing masks in the drama originated in ancient times, probably among the peasants of Greece, where they were associated with the worship of Bacchus. These coverings were of various kinds, though most of them either concealed the face only or covered the entire head. They were usually much larger than the natural head or face, and were provided with mouthpieces so as to permit the wearer to speak with a louder voice. Later the mask played an important part in the drama of Rome, where it was afterward worn at balls and masquerades, similar to the practice of modern times.

Another kind, known as *death masks*, are valuable in that they closely resemble the faces from which they are modeled. They are made by covering the face of the dead body with oil and then applying a covering of plaster of Paris. The oil prevents the form from becoming fastened to the skin and, when it is sufficiently hardened, it is removed. This death mask is then carefully oiled and fresh plaster is poured into it, which, when sufficiently dried, closely resembles the face. Death masks of this kind were made of thin gold plate by the Egyptians, of wax by the Romans, and of clay by the

Peruvians. It is possible to make similar masks from the face of the living and these are better than those made from the dead, as the product more nearly resembles the form of the face during life.

MASON AND DIXON'S LINE, the boundary line between Pennsylvania and Maryland, so named from Charles Mason and Jeremiah Dixon, two English surveyors, who located it between the years 1765 and 1767. A portion of this line was completed by others, the two surveyors not finishing the survey entirely. It passes along $39^{\circ} 43' 26.3''$. When the Missouri compromise was before Congress for discussion, John Randolph of Virginia applied the phrase to designate the line between free and slave territory and the term came into popular use. However, Mason and Dixon's line as applied to slave territory passes from the boundary between Pennsylvania and Maryland down the Ohio to the Mississippi and thence west on the parallel of $36^{\circ} 30'$, this being the southern boundary of Missouri, though Missouri was a slave State. The original Mason and Dixon's line was designated by milestones located at points five miles apart, on one side of which was cut the coat of arms of Lord Baltimore and on the other side that of William Penn.

MASON BEE, the name of several bees that construct their cells of mud. They are quite small in size and most of the species are dark in color. The cells are constructed in chambers of hollow trees, under flat stones, or in empty shells. Some species glue the materials, such as sawdust, sand, and chips, together in the course of construction, and the inside is made smooth for the storage of honey and pollen for the larvae, one of which occupies each cell. Some of these bees construct cells of great perfection, especially those common to the warmer climates. Many temples in Egypt contain cells built by bees of this class. In some places they are fastened to the ceilings and hang downward like stalactites. In the region of the Baltic Sea the bees of this class fasten their cells to the eaves of houses. Several species native to the United States construct mason work with considerable ingenuity. The larvae of these bees spin delicate cocoons and winter as pupae. Not more than from ten to twenty cells are in a group. The honey stored by these bees is mixed with pollen and is unsuitable for use.

MASON CITY, a city in Iowa, county seat of Cerro Gordo County, 88 miles northeast of Fort Dodge. It is on the Chicago Great Western, the Iowa Central, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads, and is surrounded by a farming

and dairying country. The noteworthy buildings include the county courthouse, the high school, the public library, the Odd Fellows' Orphans' Home, and the National Memorial University. Among the manufactures are flour, earthenware, machinery, and vehicles. Building stone is quarried in its vicinity. It was settled in 1855 and incorporated in 1870. Population, 1905, 8,357; in 1910, 11,230.

MASONRY. See **Freemason**.

MASQUE (màsk), a kind of dramatic entertainment, comprehending scenic effect and dances. It was popular in Europe during the 16th and 17th centuries, and reached its highest point of development in England during the reign of James I. In the Middle Ages it was confined largely to the shows patronized by the middle classes and to religious processions, when the actors wore masks. It became recognized as a form of the spoken drama in the miracle and moral plays and was the only form of dramatic art in which females, generally ladies of rank, took part. Ben Jonson and the leading dramatic authors in the reign of James I., with the exception of Shakespeare, wrote masques for the court. Milton's "Arcades" and "Comus" are, from the literary point of view, beautiful specimens of the writings that may be classed as masques. Henry Lawes furnished the music for several court masques written by Inigo Jones. The queens of James I. and Charles I. joined the chief nobility of the court in participating in these entertainments, the preparation of which frequently occupied many months. With the death of Ben Jonson, who may be regarded as the chief writer of masques, and the rise of the Civil War the taste for them declined.

MASS, the prayers and ceremonies offered by the Roman and the Greek Catholic churches in connection with the perpetual sacrifice of the new covenant, in which the body and blood of Christ are held to be really and truly received in communion under the species of bread and wine. The mass as held at present embraces four principal parts: the *introduction*, the *sacrifice*, the *consecration*, and the *communion*. A mass held on an extraordinary occasion is called the *Votive mass*. The ordinary mass performed by the priest without music is called *Low mass*. When celebrated with the assistance of a deacon or other clergyman and accompanied by vocal and instrumental music, it is known as *High mass*. A *Requiem* mass is offered for the dead and a *Pontifical* mass is celebrated by a bishop. The Latin rite is used in the Roman and the Coptic, Greek Syriac, and other rites are employed in the Greek church. All are expected to

hear mass on holy days of obligation and on all Sundays.

MASS, a term used in physics to designate the quantity of matter which a body contains. It is precisely proportional to the weight of the body and embraces the sum of all the material particles of the body. Two bodies are regarded of equal mass, if they exactly balance each other when placed in opposite scales in vacuo.

MASSACHUSETTS (mās-sā-chū'sēts), one of the thirteen original states of the United States, popularly called the *Old Bay State*. It is bounded on the north by Vermont and New Hampshire, east by the Atlantic Ocean, south by the Atlantic Ocean, Rhode Island, and Connecticut, and west by Rhode Island and New York. The length from east to west is 184 miles and the average breadth is 48 miles, but the distance from Nantucket Island, in the south, to Round Rock, in the north, is about 115 miles.



A number of islands and peninsulas in the Atlantic, together with three important bays, give the State an irregular coast line. The area is 8,315 square miles, which includes a water surface of 275 square miles.

DESCRIPTION. The eastern half of the State is located in the Atlantic coast plain, where the surface is generally level or undulating. Cape Cod Peninsula is a low and sandy tract that extends toward the southeast in the form of an arm, north of Nantucket Sound, and at the extremity curves slightly toward the northwest. Immediately south are Nantucket Island, Martha's Vineyard, and the sixteen Elizabeth Islands. The ocean frontage, measuring the indentation, is nearly 300 miles. Massachusetts Bay, Cape Cod Bay, and Buzzard's Bay are the principal indentations. In the western part are ranges of the Green, Hoosac, and Taconic mountains. These belong to the Appalachians and extend into the State from Vermont. In the western part of the State they are known as the Berkshire Hills, since they cover Berkshire County. Greylock or Saddleback Mountain, the highest peak of the Taconic Range, has

an altitude of 3,535 feet. Spruce Hill, elevation 2,588 feet, is the highest summit of the Hoosac Range. Within this highland section is the valley of the Hoosatic and east of it is the Connecticut valley. The former has an elevation of 800 feet in the south to about 1,100 feet in the north, but the Connecticut valley is much lower, sloping gradually from the north toward the south. Several isolated peaks are located in the central part of the State, including Mount Tom, 1,215 feet, and Mount Holyoke, 955 feet.

All parts of the State are well drained, but the rivers are not important from the standpoint of navigation. The Connecticut, which flows entirely through the State, is characterized by numerous falls and cataracts. It receives the inflow from the Chicopee and Miller's rivers, from the east, and the Westfield and the Deerfield, from the west. The Hoosac and Housatic rivers drain the region between the Taconic and the Hoosac Mountains, flowing into the Hudson, which discharges into Long Island Sound. The Merrimac flows through the northeastern part of the State, discharging into the Atlantic near Newburyport. Other streams include the Blackstone and the Taunton, discharging into Narragansett Bay, and the Concord, a tributary of the Merrimac. All of the streams are important for the water power which they furnish, and in consequence many manufacturing cities have been built upon their banks. Near Cape Cod and in various parts of the State are a number of small lakes, usually called ponds. Boston has the most important harbor in the State, but good harbors are also located at Salem, Lynn, Gloucester, Marblehead, and at the mouth of the Merrimac. Cape Ann and Cape Cod are the principal extensions into the Atlantic.

The climate is healthful, though variable, and the prevailing winds are from the east. It is more equable in the east than in the west, and in the mountainous regions the winters are quite severe. All parts of the State have an abundance of rainfall, which is distributed evenly throughout the year. It averages annually 40 inches. Heavy snows fall in the mountains, usually from 50 to 60 inches. Nantucket Island and vicinity have the highest wind average in the United States, the velocity for the year being fourteen miles per hour. The temperature falls to 20° below zero and rises to 100° above, and the mean temperature for the year is 48°.

MINING. In the output of granite the State has first rank. The quarries are located mainly in the eastern part, and the product is used extensively for building and monument purposes.

Large quantities of limestone are quarried and used in the manufacture of lime. Clays of commercial value are widely distributed. The product is employed to a large extent in the manufacture of pottery, brick, sewer pipe, and tile. A large per cent. of the iron pyrite used in making sulphuric acid is obtained in the State. Other products include slate, tin, corundum, and manganese.

FISHERIES. Boston has been an export market for fish since 1633. Gloucester continues to hold rank as one of the most important centers of cod and mackerel fisheries in the world. Other catches of importance include the halibut, herring, and many species of shellfishes. The principal oyster beds are off the southern coast. Woods Hole, on the south shore of Buzzard's Bay, has an extensive government hatchery and laboratory, and hatcheries operated by the State are located at Winchester and Wilkinsonville.

AGRICULTURE. While agriculture is not an extensive enterprise, about 61 per cent. of the land is included in farms, which average 83 acres. Hay is the principal product and is grown on a larger area than all the other farm products combined. The value of hay and forage produced equals forty per cent. of the total value of all crops. Farming is confined principally to the valleys, where the soil is fertile, and it is devoted largely to dairying. Corn and potatoes are grown on about an equal area. Other products include oats, rye, and potatoes. Large interests are vested in truck gardening, poultry raising, and fruit growing. Apples, plums, peaches, pears, and quinces are raised in abundance, and there is a large production of strawberries and cranberries. The dairy cows within the State exceed the number of horses. The output of canned milk, cream, butter, and cheese is a material item. Other live stock includes horses, swine, and sheep.

MANUFACTURING. The State ranks particularly high as a manufacturing community. It is surpassed only by three states in the value of the manufactures, namely, New York, Pennsylvania, and Illinois. In the output of textiles the State holds first rank. Beverly, where the first cotton mills of America were established, continues to be a center of the cotton industry. About 7,850,000 spindles are operated in the State, and the cotton output represents about one-third of the entire manufacture of this commodity in the country. Lowell, New Bedford, and Fall River are noted as centers of the cotton industry and Lawrence has large interests in the manufacture of cotton and woolen goods. Boots and shoes, both rubber and leather, are manufactured more extensively in Massachu-

setts than in any other State. Brockton, Haverhill, and Lynn are centers of the shoe manufacturing industry. Waltham, the seat of the Waltham Watch Company, has the largest factory of the kind in the world. Holyoke produces large quantities of paper and wood pulp. Gloucester has extensive fish canning establishments, Worcester is a center of foundries and machine shops, and Boston is famous as a printing and publishing center. Other manufactures include confectionery, sugar, furniture, jewelry, malt liquors, cordage, clothing, rugs and carpets, butter and cheese, and slaughterhouse products. Water power being an important factor in developing these enterprises, the manufacturing centers are located in various parts of the State, but the largest number of establishments are in the eastern part.

TRANSPORTATION AND COMMERCE. Boston, on Boston Harbor, is the most important railway center. A network of railways extends its lines to all parts of the State and many localities have communication by electric railway lines. The State has 2,200 miles of railways, which, together with extensive navigation facilities, give easy access to its trade centers. Much has been done to supply and maintain carriage roads of a high class, and these extend from the cities to nearly all sections of the State.

In commerce the State holds second rank, being exceeded only by New York. Steamers ply regularly between Boston and the leading ports of Europe and America. Twelve ports of entry are maintained, those of Barnstable, Boston, Charlestown, Fall River, Gloucester, Marblehead, New Bedford, Beverly, Salem, Newburyport, Edgarton, and Plymouth. These ports in the aggregate carry a large commerce and handle products that come from and are shipped to many points inland. Among the chief exports are fish, cereals, dressed meats, clothing, cotton, and lumber, and the imports include fibers, wool, hides, and metals.

GOVERNMENT. The constitution of the State was adopted in 1780, but a number of amendments have been added at different times. All the executive officers of the State, including the Governor, are elected for a term of one year. The Governor is aided by a council of eight members and, in the case of a vacancy, he is succeeded by the Lieutenant Governor. A general court, composed of a senate of forty members and a house of representatives of 240 members, constitutes the legislative authority. All the members are elected annually on the Tuesday following the first Monday in November, and the Legislature convenes in regular session on the first Wednesday in January. The Gov-

ernor, with the advice of the senate, has the power to appoint the judges, who remain in office during good behavior. The judiciary consists of a supreme and a superior court, the former being presided over by a chief justice and six associates and the latter by a chief justice and fifteen associates. Probate and insolvency courts are maintained in each county, and municipal and police courts have jurisdiction in the towns and cities. Government by township originated in Massachusetts, where the annual town meeting chooses the officers to preside over the town.

EDUCATION. The Massachusetts Board of Education consists of the Governor and the Lieutenant Governor, ex-officiis, and eight other persons who serve without pay, one of whom is appointed annually in May by the Governor, with the advice and consent of the council, for a term of eight years. This board has the management and control of the ten normal schools and the supervision of the education of State beneficiaries in schools for the deaf and blind. However, the board has no direct jurisdiction over the public schools, but it may, and in practice does, to some extent through its own members and in a large way through its secretary and agents, call local attention to such laws, court decisions, and principles as should be heeded in the local management of the schools. And it is the practice of the local school committees to consult the board or its officers on doubtful points in school administration. Reports are made annually to the Legislature by the board and its secretary upon the condition and efficiency of the public school system, in connection with which recommendations are made in regard to practicable means of improving and extending instruction. The secretary of the board, whose duties are similar to those of State superintendents in other states, is appointed annually by the board. He has immediate supervision of from twenty to thirty teachers' institutes that are held annually throughout the State.

Massachusetts has a State school fund amounting to \$5,000,000, the income of which is distributed to towns under a valuation of \$2,500,000 each for the support of public schools. The system of supervision by skilled superintendents of schools is compulsory. Any town under a calculation of \$2,500,000 must unite with another town or other towns for the employment of a superintendent of schools. The superintendents of these unions in which each town is aided by the State are examined by the State board of education. State aid to the extent of \$500 each is given to towns under 500 families maintaining high schools. All schools over

500 families must maintain high schools. All high schools are subject to the approval of the State board of education before State aid of any kind is given. Each town and city has a school committee, must raise by taxation money necessary for the support of schools, and is required to appoint truant officers to see that the school laws are enforced. Medical inspection of schools is required by a law passed in 1906. The compulsory school age is from 7 to 14 years.

Although Massachusetts has no State university, higher education is amply provided for by numerous institutions of learning. These include Harvard University, Cambridge; Williams College, Williamstown; Amherst College, Amherst; Mount Holyoke College, South Hadley; College of the Holy Cross, Worcester; Tufts College, Medford; Massachusetts Institute of Technology, Boston; Boston College, Boston; Massachusetts Agricultural College, Amherst; Worcester Polytechnic Institute, Worcester; Boston University, Boston; Wellesley College, Wellesley; Smith College, Northampton; Clark University, Worcester; and Simmons College, Boston. Danvers, Northampton, Medford, Taunton, Westboro, and Worcester have hospitals for the insane. Reformatories are maintained at Concord and at Sherborn. Boston has the State prison, a school for the deaf, and two schools for the blind. A school for the deaf is likewise located at Northampton.

INHABITANTS. Massachusetts is the most densely populated State in the Union, having 350 persons to the square mile. The large percentage of increase in the last few decades may be attributed to the development of its manufacturing enterprises. Formerly the people were almost entirely of English descent, but at present the non-English type predominates. This is due to a large immigration from Canada and Europe. Those of foreign birth include principally Irish, Germans, French, Italians, and Jews. Fifty-six towns have a population of more than 8,000 inhabitants, and this is a larger number than in any other State. Boston, the capital, is the largest city and most important seaport of New England. Other cities include Worcester, Fall River, Lowell, Cambridge, Lynn, Lawrence, New Bedford, Springfield, Somerville, Holyoke, Brockton, Haverhill, Salem, Chelsea, Malden, Newton, Fitchburg, Taunton, and Gloucester. In 1900 the State had a population of 2,805,346. This included a colored population of 35,582, of which 31,974 were Negroes. In 1910 the population was 3,366,416.

HISTORY. Massachusetts was named from an Indian word meaning "the great hills," a term

derived from the Blue Hills near Boston. It is thought that the Norsemen first sighted the shores of Massachusetts Bay in the year 1001. The Cabots explored a portion of its coast in 1497, but extended explorations were first made by John Smith in 1614. In 1620 the Pilgrim Fathers landed with the *Mayflower* at Plymouth, where the first permanent settlement was made. John Endicott settled with a company of Puritans at Salem in 1628 and this settlement, with those of Boston, Lynn, and other places, became known as the Massachusetts Bay Colony. War with the Indians caused the colonists to suffer many hardships, especially those with the Pequots in 1637 and under King Philip from 1675 until 1676. The Puritan religion was made obligatory in the early history of Massachusetts, and laws requiring some form of worship continued in force until 1833. In the Revolutionary War the State was recognized as a leader, the first battles occurring at Lexington and Bunker Hill. It entered with enthusiasm into the War of 1812, supported the Union cause in the Civil War, and has given to the nation many eminent statesmen and military leaders.

Massachusetts has been foremost in many educational and political movements. Higher education was provided for as early as 1636, when Harvard University was founded at New Town, now Cambridge, and which continues to rank among the leading centers of learning in America. The movement to abolish slavery began here as early as 1780, when the Bill of Rights prefixed to the constitution practically abolished it. Amherst College was established in 1821, and the State board of education was established soon after, at the head of which Horace Mann made popular the system of public instruction by the states. William Lloyd Garrison and others were prominent factors in spreading the movement for the abolition of slavery in the Union. In 1873 the State completed the construction of the Hoosac Tunnel, the most important public improvement in the Commonwealth. A movement to reduce the working day from twelve hours was begun in 1853 and since the State has greatly improved the condition of the working classes. It has given more than ordinary attention to the regulation of corporation, the civil service, the liquor traffic, and the government of municipalities.

MASSACHUSETTS BAY, a coast indentation of Massachusetts, extending from Cape Ann to Cape Cod. It has an irregular coast, includes numerous small islands, and within its coast lines are Cape Cod Bay, Plymouth Bay, and Boston Bay. The bay is important for its commerce and fisheries.

MASSACHUSETTS BAY COLONY, a colony founded at the present site of Salem, Mass., in 1628. It was promoted by the Massachusetts Company, who received a grant on March 19, 1628. The territory extended from the Atlantic to the Pacific Ocean, and in width from a line running three miles north of the Merrimac to one running three miles south of the Charles. John Humphrey and John Endicott were the most prominent members of the company. The latter was sent from England in 1628 and made a settlement at Naumkeag, now Salem, and the next year a charter was granted that constituted the law of the colony for 55 years. The chief officers consisted of the Governor and thirteen councilors. Since the Puritans were in a majority, much controversy arose on account of religious differences, and because of it many prominent members left the colony and took a prominent part in establishing Connecticut, New Hampshire, and Rhode Island.

MASSACHUSETTS INDIANS, the Indians found in the territory included in Massachusetts. They consisted of five Algonquin tribes. The lands around Massachusetts Bay were inhabited by the tribe known as the Massachusetts; the Nipmucks resided in the central portion; the Pennacooks, in what is now New Hampshire; the Pokanokets, in the southeastern part of the State; and the Nausets, in the vicinity of Cape Cod. All except the Nausets were friendly to the colonists, but this tribe entered into a treaty of peace with the Plymouth settlers. In 1644 missions were established on Martha's Vineyard. John Eliot soon after collected the converted Indians, who were termed praying Indians, into a settlement at Natick, having previously translated the greater part of the Bible into the Indian language. In 1674 there were 3,200 who had embraced Christianity. King Philip organized an insurrection in 1675, when all the Massachusetts Indians became participants, and both whites and converted Indians were attacked by the savages. The war ended the following year with the death of King Philip, after which some of the leading members were sent to the West Indies, others settled westward and in Canada, and those remaining became peaceable. Many of these Indians lost their identity by intermarrying with whites and Negroes.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, a noted scientific and industrial institution in Boston, Mass. It was founded in 1861, but the regular courses of instruction were not opened until the close of the Civil War, in 1865. This institution was the first school of the kind opened in the United States

and was a pioneer in the adoption of laboratory methods. The thirteen distinct courses, each covering a period of four years, include chemistry, architecture, biology, physics, civil engineering, mining engineering and metallurgy, mechanical engineering, electrical engineering, chemical engineering, sanitary engineering, geology, general studies, and naval architecture. Postgraduate courses are maintained in a number of the departments, and all of the work is affiliated with the view of giving strength and support to the entire system. The degree of bachelor of science is awarded to the student who completes any one of the courses. At present the value of the property is placed at \$10,500,000 and the institution has an endowment of \$2,125,000. About 225 professors and instructors are included in the faculty. The attendance averages 1,750 students, who represent all of the states and many foreign countries. The library has 82,500 volumes and pamphlets.

MASSAGE (mās'sāj), a method of treating the body for the cure of diseases. It consists of systematic manipulations, including surface friction, kneading, manipulations with the tips of the fingers, and striking or percussion with the hands. These procedures are administered daily and are combined, or interchanged, according to definite rules, the treatment varying as may seem best from the nature of the disease and the locality affected. Massage has been found of much service in treating rheumatism, paralysis, neuralgia, joint diseases, diabetes, and many other ailments.

MASSILLON (mās'sil-lōn), a city of Ohio, in Stark County, on the Tuscarawas River, eight miles west of Canton. It is on the Ohio Canal and on the Pennsylvania, the Baltimore and Ohio, and other railroads. The surrounding country is fertile and has deposits of bituminous coal. Among the noteworthy buildings are the high school, the public library, and the State Hospital and Asylum for the Insane. The manufactures include threshing machines, iron bridges, hardware, engines, glass, flour, and machinery. It has electric lights, a sanitary sewer system, waterworks, street railways, and brick and asphalt pavements. Massillon was settled in 1825 and incorporated in 1853. Population, 1900, 11,944; in 1910, 13,879.

MAST. See Ship.

MASTER AND SERVANT, in law, the term applied to the relationship between two parties, one of whom is engaged to perform certain duties for the other in consideration of remuneration. Two classes of servants are usually recognized, including those known as apprentices and those distinguished as employees.

An *apprentice* is a person bound in due form of law to a master under the condition that he is to receive certain compensation and at the same time learn from him his art, trade, or business. One of full age may bind himself as an apprentice, but a minor cannot be so bound without the consent of his parents or guardian. Recently legislation has been enacted in England and the United States to define and fix the responsibility of employers for the acts and offenses of their servants. This is generally known as the employers' liability acts. Considerable discussion arose on account of it during the presidential election of 1908, President Roosevelt having called the attention of the Congress to the advisability of more definite legislation by addressing several special messages to that body. The legislation more recently enacted enlarges the responsibility of employers by making them liable for certain actions of one servant against the other, especially for those of superior employees to those working under them as subordinates.

Among the essential rules governing the relations of master and servant are that the former may recover damages from a third party for injuries to his servants, provided they caused the loss of services. The death of the master works a dissolution of the apprenticeship, unless otherwise provided in the contract, or unless the apprentice elects to continue his service. In case of a dissolution under such conditions, the apprentice is entitled to receive reasonable allowance for his services previously rendered, but, if a contract is broken by an *employee* without justification, he cannot recover compensation for services already rendered. The master may discharge an employee for disobedience, immorality, or gross negligence and incompetence, but if he is discharged without good and sufficient cause the master is liable for unpaid wages and reasonable damages. The servant may recover damages for injury or loss sustained through the neglect of the master to provide suitable conditions or instruments, provided that the employer knew of the danger and had received notice of it within a reasonable time. Third parties may recover damages from the employer for offenses committed by his servants, provided the act complained of was committed within the scope of relationship between the master and servant.

MASTER OF ARTS, a degree conferred by colleges and universities to certify scholarship in the arts. It is the highest degree in the faculty of arts and follows a *bachelor's* degree, but is inferior to those of *bachelor of divinity* and *doctor of philosophy*. This degree was is-

sued in Germany as early as the 12th century. It is now given in most countries after pursuing a course of study and passing an examination in mathematics, history, languages, physics, and philosophy. At present there is a wide range of difference in the requirements of different schools, since there is no general agreement as to what constitutes the necessary experience and scholarship for this and other degrees.

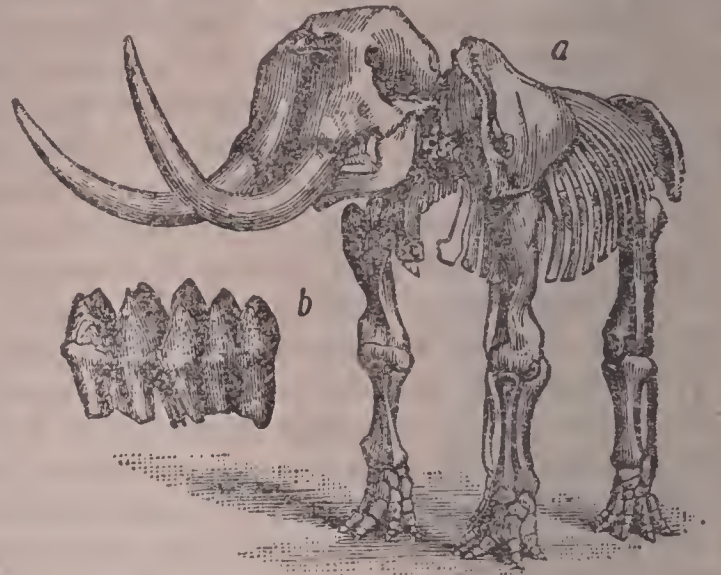
MASTERSINGERS, or **Meistersingers**, the name of a class of minstrels who flourished in Germany during the period from the 14th to the 16th centuries. They combined the qualities of poets and singers, and in the reign of Emperor Charles IV. were formed into guilds or associations. The imperial cities, such as Mentz and Nuremberg, were noted as seats of these associations, and in the latter city they flourished most successfully and were longest supported. Their compositions consisted chiefly of devotional and scriptural pieces, mingled with the burgher expressions of local characteristics. In public contests a board of judges sat to hear the poems recited or sung, the purpose being to criticise the prosody, rhymes, and tunes, and to compare the compositions with the text of the Bible. A prize was given to the one who produced the best composition and acted with the greatest skill, and successful competitors were permitted to receive apprentices. Hans Sachs (q. v.) was the most famous of the Mastersingers and stands high in the list of these singers and poets. The associations declined rapidly after the 16th century, but one at Ulm flourished until 1839. Other forms of singing societies, such as the *Sängerbünde* and the *Liederkränze*, succeeded the Mastersingers in modern times.

MASTICATION (mäs-tī-kā'shūn), the process by which the food is divided and mixed with the salivary secretion, preparing it for the further action of the stomach. Mastication is performed by means of the lips, teeth, and mouth, and digestion depends largely upon its thoroughness. Indigestion often results from imperfect mastication. In infants and the lower animals it is instinctive, but in adults it is largely voluntary.

MASTIFF (mäs'tif). See **Dog**.

MASTODON (mäs'tō-dŏn), a genus of elephants now extinct, but of which fossil remains occur in America as late as the Post-Pliocene period. In Europe and Asia they occur from the middle of the Miocene to the end of the Pliocene, when the animals became extinct. The mastodons closely resembled existing species of elephants, differing from them mainly in the formation of the teeth. They had a vaulted and

cellular skull, large tusks in the upper jaw, and a heavy form. Remains found in America indicate that they approximated a height of twelve



MASTODON.

a, skeleton; b, molar tooth.

feet and a length of eighteen feet. *The first complete skeleton found in America was secured in Orange County, New York, in 1801.

MATABELELAND (mät-ä-bē'lē-länd), a district in the southeastern part of Rhodesia, forming an important part of British South Africa. It extends about 200 miles north of the Limpopo River, by which it is separated from the Transvaal Colony. Buluwayo, the capital, is connected with Cape Town by a railway. The region was placed in the British sphere of influence in 1888.

The natives are known as Matabele. They are Zulus of Bantu stock. In 1827 they removed from Transvaal and Natal to their present location. These people engage chiefly in stock raising, but have made some advancement in cultivating maize, tobacco, and vegetables. The men are expert horsemen and hunters and engage in making pottery, utensils, and battleaxes. The native population is about 40,000. In 1908 Matabeleland had a population of 158,500.

MATAMOROS (mät-ä-mō'rös), a city of Mexico, in the state of Tamaulipas, on the Rio Grande opposite Brownsville, Tex. It has regularly platted streets and good transportation facilities. The trade is chiefly in cotton, silk, flax, and woolen goods, tobacco, flour, hides, and machinery. Gold is mined in the vicinity, but the surrounding country is devoted chiefly to grazing. The city was captured in 1816 by an American force under General Taylor. Population, 1908, 12,042.

MATANZAS (mä-tän'zas), a seaport of Cuba, capital of the province of Matanzas, 41 miles east of Havana. It is extensively connected by railways, has a fine harbor on the

Bay of Matanzas, and has been greatly improved since the Spanish-American War. Among the features are a public library, the government buildings, the Estéban Theater, and several fine schools and churches. It has manufactures of tobacco products, sugar, clothing, and machinery. The export and import trade is of growing importance, embracing principally sugar, coffee, cigars, spirituous liquors, machinery, utensils, fabrics, and earthenware. Three miles east of the city are the caves of Bellamar, in a range of rocky hills. The place was settled in 1693, but the city is of modern development. Population, 1909, 46,329.

MATCHES, the articles manufactured for the purpose of starting a fire, consisting principally of splinters of soft wood tipped with a combustible composition that ignites by friction. Fire for domestic and other purposes was obtained up to the beginning of the last century with sulphur-tipped splints of wood, which were lighted with tinder ignited by steel and a flint. Attempts to use a chemical agency were not made until 1805, when splints of wood were coated with sulphur and tipped with a mixture of sugar and chlorate of potash. To obtain fire it was necessary to bring the match in contact with the contents of a bottle consisting of asbestos, saturated with strong sulphuric acid. The first friction match with a phosphorus tip was made in France in 1816, but friction matches did not come into general use until in 1827, when John Walker, a druggist of Stockton, England, invented a wooden match tipped with sulphur and a mixture of sulphide of antimony, chlorate of potash, and gum. Several improvements were made in 1833, and since then the manufacture has been largely by labor-saving machinery.

In 1855 the first *safety matches* were made in Sweden. They are so formed that the tips contain only a part of the necessary composition, the other ingredients required being attached to the box, thus making it necessary to bring the two in contact when lighting. Matches of this character are used extensively on account of not being liable to ignite in case of friction by accident. The wood employed in match making is largely pine and aspen. It is cut into splints by forcing blocks of the proper length through steel plates containing small holes of the exact size of a match. After being cut, the splints are fed into machines for dipping the ends into the igniting composition. The important element of the igniting composition is phosphorus, but there are various special mixtures used by different manufacturers. Usually the igniting composition is spread in a shallow basin, into

which the tips are dipped, and, after proper drying the matches, they are placed in pasteboard boxes for the market. The poisonous property of phosphorus requires much care in the process of manufacturing and in using these matches, since accidents are liable to result, especially from carelessly placing them in reach of children. The match-making industry has assumed large proportions in Sweden, Norway, Germany, Great Britain, and the United States.

MATE (mä'tā), or **Paraguay Tea**, the name of a small tree native to South America, where it is grown for its leaves, which are used as a substitute for tea. This plant is of the holly family. It has smooth leaves and small flowers, and the physiological effects resemble those of coffee. It is cultivated extensively in Brazil, Paraguay, and other countries of South America. The small branches are cut off and dried, after which the leaves are removed and when thoroughly dry are packed in bundles for the market. Mate is used extensively as a beverage. It is made by steeping the leaves in boiling water in the manner of making tea. Those accustomed to it like its flavor, though the taste is not like that of tea.

MATERIALISM (mä-tē'rī-äl-iz'm), the philosophy that denies the existing of any immaterial part in man and accounts for the universe, embracing man and the systems of nature, by matter alone. Materialism has been divided into two classes, perfect and imperfect materialism. *Perfect materialism* affirms that there is but one substance in the universe, and that substance is matter. *Imperfect materialism* is of two classes. One of these admits a spirit in man, but none in the universe; while the other admits a spirit in the universe, but none in man. It may be said there are numerous schools of materialists, the lines varying from theories scarcely distinguishable from spiritualism to those of persons who, like Jacob Moleschott (1822-1893), believe that the brain secretes thought as the liver secretes bile. The latter class generally holds to the view that there is no matter without force, and no force without matter.

MATERIA MEDICA (mä-tē'rī-ä mēd'ī-kä), that department of medical science which treats of the different medicines employed for curative purposes. Some writers divide the subject according to the use of organic and inorganic substances, while others employ an alphabetical arrangement in outlining and describing all the different substances which are considered of utility in treating diseases. The latter classify them in regular order according to their modes of operation and their effects upon the human

body. *Materia medica* embraces both therapeutics and pharmacology.

MATHEMATICS (măth-ĕ-măt'iks), the science that treats of quantity, the measuring of quantities, and the ascertainment of their properties and relations. It is divided into pure and mixed mathematics. *Pure mathematics* investigates the properties of abstract numbers and magnitudes. It embraces arithmetic, algebra, geometry, trigonometry, calculus, and other sciences. *Mixed mathematics* is used in all the physical sciences, such as electricity, magnetism, optics, logic, and economics. In both pure and mixed mathematics the treatment may be by synthesis or by analysis. See **Algebra**; **Arithmetic**; **Geometry**, etc.

MATTEAWAN (măt-tĕ-ă-wŏn'), a village of New York, in Dutchess County, 44 miles north of New York City. It is located on Fishkill Creek, about two miles from the Hudson River, and has transportation facilities by the New York, New Haven and Hartford and the Newbury, Dutchess and Connecticut railroads. Waterworks and electric lighting are among the public utilities. It is the seat of a hospital for the insane, several village hospitals, and the Howland Library. The manufactures include machinery, wool and straw hats, silk and cotton textiles, and novelties. It was founded in 1814. Population, 1905, 5,584; in 1910, 6,727.

MATTER, in physics, anything which occupies space and prevents other matter from occupying the same space at the same time. It is the agent through which force is manifested. By its properties matter is made manifest through the senses, though the intermolecular and interstellar ether is regarded as matter, but is not perceived by the senses owing to its subtlety. The three forms of matter are *solids*, *liquids*, and *gases*. All of these forms have volume; that is, length, breadth, and thickness. Two classes of theories are held as to the ultimate constitution of matter—the theory that regards it as made up of atoms and the one which considers it as a homogeneous plenum, the former being now generally accepted by scientific men. *Matter* and *mind* are commonly regarded as antithetical.

MATTERHORN (măt'tĕr-hŏrn), a peak of the Alps, called Mont Cervin by the French and Monte Silvio by the Italians. It is located on the boundary line between Switzerland and Italy and has an altitude of 14,780 feet. The peak is very steep. It was first scaled by Lord Francis Douglas and several guides on July 14, 1865, when Douglas and three others were killed by falling over a precipice.

MATTOON (măt-tŏŏn'), a city of Illinois,

in Coles County, in a fertile agricultural country, 55 miles west of Terre Haute, Ind. It is on the Illinois Central and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. Among the principal buildings are the public library, the high school, and the Odd Fellows' Home. It has manufactures of carriages, machinery, brooms, earthenware, wagons, and utensils. Other industries include the repair shops of the Big Four and the Illinois Central railroads. Mattoon was settled and incorporated in 1855. Population, 1900, 9,622; in 1910, 11,456.

MAUCH CHUNK (măk chŭnk'), a borough of Pennsylvania, county seat of Carbon County, on the Lehigh River, 45 miles northwest of Easton. It is on the Lehigh Canal and on the Central of New Jersey and the Lehigh Valley railroads. Large quantities of anthracite coal are mined in the vicinity. The notable buildings include the high school, the Y. M. C. A. building, and the Dimmich Memorial Library. The place was founded in 1818 and incorporated in 1850. It is connected by railway with Summit Hill, at which burning mines have existed since 1858. Population, 1900, 4,029.

MAULMAIN (măl-mĭn'), or **Moulmein**, a seaport city of Burma, capital of the Amherst district, on the Gulf of Martaban, an inlet from the Bay of Bengal. It is situated on the Salwin River, at the point where its waters are joined by the Attaran and Gyaing rivers, and where they enter the gulf. The principal buildings include a general hospital, the public library, and several educational and charitable institutions. It has a large export and import trade, its wharves being reached by the largest vessels at the time of spring tide. The exports consist mainly of rice, hides, cotton, timber, and minerals, and the imports embrace cotton and woolen goods, machinery, and general merchandise. Shipbuilding is an important industry. Steam railways and electric lines furnish urban and interurban transportation facilities. Population, 1908, 61,306.

MAUMEE (mă-mĕ'), a river formed at Fort Wayne, Ind., by the confluence of the Saint Mary's and Saint Joseph rivers, whence it flows northeast into Lake Erie, at Toledo. The length is 150 miles. Ordinarily it is navigable for ten miles and during high water about fifty miles, or to Defiance, Ohio. A large part of its course is paralleled by the Miami and Erie Canal, which connects Lake Erie with the Ohio River.

MAUNA KEA (mou'nă kă'ă), the highest mountain peak of the Hawaiian Islands, situated on the island of Hawaii, about fifteen miles from the northeastern coast. It is an extinct volcano,

has snow at the peak nearly the entire year, and is 13,805 feet above sea level.

MAUNA LOA (mou'nä lö'ä), an active volcano of the Hawaiian Islands, elevated 13,758 feet above sea level. It is situated near the center of the island of Hawaii. Fine forests surround the lower altitudes. The craters are numerous, the central one being about 1,000 feet deep and 8,000 feet in diameter, and new openings are not infrequent. Among the celebrated eruptions of recent years are those of 1880 and 1887, the stream of lava in the latter extending fully 25 miles from the seat of disturbance.

MAUNDY THURSDAY (mañ'dý), or **Holy Thursday**, the Thursday in Passion week, preceding Good Friday. It is probably named from the mandate, "A new commandment give I unto you, that ye love one another," of John xiii., 34. This day commemorates the ceremony of Christ washing the apostles' feet. In some countries the Roman Catholics wash the feet of pilgrims and food is distributed to the poor, in compliance with the phrase "take and eat."

MAURITANIA (ma-ri-tä'nĩ-à), the ancient name of that portion of Northwestern Africa which corresponds to the area included in Morocco and the western portion of Algeria. It extended south to the Sahara Desert and was separated from Numidia on the east by the Mulucha River, now called the Muluya. The Romans made it a province in the year 40 A. D., the Vandals controlled it from 429 to 534, and in 650 it became an Arabian possession. Mauritania was so named from its early inhabitants, the Mauri, a tribe of Moors closely allied to the Numidians.

MAURITIUS (ma-rish'ĩ-üs), or **Isle of France**, an island in the Indian Ocean, 550 miles east of Madagascar. The area is 705 square miles. Connected with it are several adjacent islands, the principal ones of which include Rodrigues Island, the Amirante, the Oil, the Seychelles, and the Saint Brandon islands. These smaller islands have an area of 350 square miles. Mauritius is of volcanic origin. It has coral reefs and contains a number of mountains. The surface rises gradually from the coast, culminating in its highest peak, Rivière Noire, 2,710 feet above sea level. The climatic conditions are favorable to vegetable growth, but high winds and hurricanes are not uncommon. Much of the soil is a rich vegetable mold, formerly bearing heavy forests, but now utilized largely in agriculture. Sugar is the principal product, but it has comparatively large interests in cotton, live stock, rice, maize, coffee, and many varieties of fruit.

Schools and several institutions of higher learning are maintained jointly by local taxation

and government grants. The administration is by a governor and a council. The language is principally French and the religion of most of the inhabitants is Roman Catholic, but several missionary stations are maintained by the Protestants. A large proportion of the inhabitants are settlers from the East Indies and about one-third are descendants from the French. The imports include flour, grain, clothing, and machinery, and the exports consist of sugar, fiber, vanilla, aloes, and fruits. Mauritius was discovered in 1505 by the Portuguese, who found it uninhabited. In 1598 it was occupied by the Dutch, but was abandoned by them in 1710, when it became a possession of France. The French introduced the culture of sugar and other industries. In 1810 it became a British possession. It is now a crown colony of Great Britain. The seat of government is at Port Louis, a thriving city. Population, 1906, 380,205.

MAUSOLEUM (ma-sō-lē'üm), a magnificent tomb of more than ordinary size. The most celebrated structure of this character was erected in 352 B. C., at Halicarnassus, in memory of King Mausolus of Caria by his widow Artemisia. This structure was regarded the seventh wonder of the world on account of its splendor, and from it the term used to designate fine sepulchers was derived. It is asserted by Pliny that its height was 140 feet.

MAXIMS, Legal, the brief expressions of general principles, either of policy or justice. In many cases they have furnished special rules for the decision of disputes. They fulfill the same purpose for courts and lawyers that the ordinary proverbs subserve in common usage. The number includes about 2,000 legal maxims. They may be divided into those that have reference to the common rights and duties of individuals and those that embrace the fundamental principles in the science of government. Some have come down from the law of Rome, while others were formed in medieval and modern times among the jurists of Europe. A large number of these maxims are stated in Latin and they are classified in Broom's "Legal Maxims." The following is a brief list:

Once a fraud, always a fraud.

To conceal a fraud is itself a fraud.

Where there is a right there is a remedy.

Equity follows the law.

No one is bound to do what is impossible.

Ignorance of the law excuses no one.

He who acts by another, acts himself.

Let the buyer be on his guard.

First in time, first in right.

From nothing comes nothing.

Acts indicate the intention.

MAY, the fifth month of the year in the Gregorian calendar, consisting of 31 days, sometimes called the *month of flowers*. The Romans celebrated the festival of Floralia for several days, usually beginning on the 28th of April. A similar custom prevails in many countries of Europe, where the young folks gather flowers and branches with young foliage. These are used in adorning the windows and doors of the houses and the village Maypole, around which they play youthful games. The most beautiful girl in the village is chosen as queen of May to preside over the festival in England. In Germany it is customary to choose a count of May. A similar celebration is held in some parts of the United States, known as May Day.

MAYA (mä'yä), the name of a group of Indians found in Mexico and Central America. They are short in stature and have a brown skin and a broad head. It is believed that they were quite highly advanced in civilized arts prior to the discovery of America, and at present they still practice many of the industries with considerable skill. They had large cities in Yucatan and other parts of Mexico at the time of the Spanish conquest, when they manufactured fabrics of cotton, made ornamental articles of metal, and constructed with brick and stone. They had domesticated bees for their honey and wax and made considerable advancement in cultivating beans, peppers, and corn. The Mayas had a calendar in which the year consisted of 365 days, divided into eighteen months of twenty days each, the year beginning on July 16th, when the sun crossed the zenith. They had a number of literary works, including several sacred books issued under the title of "Books of Chilán Balam." The government was by tribes and the lands were held in common by the villages. At the time of the Spanish conquest the peninsula of Yucatan was under one government, which consisted of a number of affiliated districts.

MAY APPLE, a perennial plant of North America, which is erroneously called mandrake in some localities. A slender stem about a foot high rises from a creeping rhizome, forking near the upper part into two petioles, each surmounted by a large leaf. At the point of division grows a solitary white flower with waxy petals, and this is followed by the May apple, a fleshy fruit about the size of a pigeon's egg. The fruit is slightly acid and has a pleasant flavor. It is eaten. The root, when dry, constitutes a useful drug, given in the form of a powder as a purgative.

MAYFLOWER, the name of the vessel in which the Pilgrim Fathers sailed from South-

ampton, England, to North America in 1620. It had a capacity of 180 tons. The *Speedwell* sailed from Delft Haven and joined the *Mayflower*, but returned to Holland shortly after leaving England. On Dec. 21, 1620, the *Mayflower* landed on the shores of Massachusetts. The Pilgrim Fathers, before landing, bound themselves to obey the laws they should make. This instrument is known as the Mayflower Compact.

MAYNARD (mä'närd), a village of Massachusetts, in Middlesex County, on the Assabet River, ten miles northeast of Marlboro. It is on the Boston and Maine Railroad. Electric lighting, waterworks, sewerage, and several fine schools are among the public institutions. The manufactures include powder, machinery, and woolen goods. Population, 1910, 6,390.

MAYNOOTH (mä-nöoth'), a village of Ireland, in Kildare County, fifteen miles west of Dublin. Anciently it was the chief seat of the Geraldines, which is attested by the ruins of a castle. Now it is known principally by the Roman Catholic College of Saint Patrick, an institution established in 1795 by the Irish Parliament for the education of priests. It was supported by government grants until 1869. Improvements were made in 1890 by expending \$250,000. The institution has well-planned courses of study and is attended by about 600 students.

MAYOR (mä'är), the chief executive officer in an incorporated village, town, or city. The duties are prescribed by statutory law or by municipal ordinance, hence they differ materially in the different states or nations where the office is recognized. In the larger cities of Great Britain, such as York and London, the chief executive has the title of *lord mayor*. The mayor is appointed by the central government in some countries, such as Sweden and Italy, but in most of the municipalities of the United States and Great Britain the election is by the people for a term of years. In Germany this officer is known as *burgomaster*, or *bürgermeister*.

MAYOTTE, or *Mayotta* (mä-yöt'tä), one of the Comoro Islands, located in the Indian Ocean, near the entrance to Mozambique Channel. The area is 135 square miles. It was ceded to France in 1842. Population, 1906, 11,675.

MAYSVILLE, a city in Kentucky, county seat of Mason County, on the Ohio River, sixty miles northeast of Lexington. It is on the Louisville and Nashville and the Chesapeake and Ohio railroads. Among the chief buildings are the county courthouse, the Masonic Tem-

ple, the public library, and the Odd Fellows' Hall. The manufactures embrace furniture, cotton goods, spirituous liquors, flour, tobacco, and lumber products. It has a growing trade in farm produce and merchandise. Maysville was settled in 1784 and was incorporated in 1787. It became the county seat in 1848. Population, 1900, 6,423; 1910, 6,141.

MAYWEED, a disagreeably strong-scented weed of the aster family, sometimes called dog-fennel, stinking chamomile, and dill weed. It is an annual plant, has finely dissected leaves, composite flowers with a yellow disc and a white rim, and grows particularly along roadsides, paths trodden by cattle, and in pastures. The plant is a native of Europe, but has been naturalized throughout the older settlements of Canada and the United States. It is easily exterminated by cultivation, but, if left undisturbed, it spreads rapidly.

MAZATLÁN (mä-sät-län'), a city and seaport of Mexico, in the state of Sinaloa, near the entrance to the Gulf of California. It is finely located on a small peninsula, opposite the Bay of Olas Altas, and has a large trade in pearls, dyestuffs, minerals, and earthenware. The harbor is one of the most important in Mexico. In 1903 it was afflicted with an attack of the bubonic plague, but ordinarily it is healthful. Population, 16,430.

MEADOW LARK, a bird of North America, ranging from the central part of Canada to the Mexican boundary. It belongs to the oriole



MEADOW LARK.

family, migrates northward in the spring, and is valuable as a destroyer of insects. The song is sweet and plaintive, the feathers are brownish with reddish at the end, and across the breast is a black crescent-shaped collar. In some locali-

ties it is hunted for food. The common species is ten inches long, the bill has a length of nearly two inches, and the extended wings measure fifteen inches. It is allied to the starlings. See **Lark**.

MEADVILLE, a city in Pennsylvania, county seat of Crawford County, on French Creek, 104 miles north of Pittsburg. It is on the Erie and the Pittsburg, Bessemer and Lake Erie railroads. The surrounding country is agricultural and dairying and contains deposits of natural gas, oil, and coal. Among the noteworthy buildings are the county courthouse, the public library, the Meadville Theological School, the Allegheny College, the First Methodist Episcopal Church, and many business blocks. The manufactures include lumber products, flour, machinery, hardware, leather belting, and utensils. The municipal facilities include pavements, electric lights, waterworks, and street railways. The place was settled in 1788 and incorporated in 1823. Population, 1900, 10,291; 1910, 12,780.

MEASLES (mē'z'l'z), an eruptive and infectious disease. It is most prevalent among children and seldom occurs more than once in the same individual. The rash appears about eight days after exposure and is accompanied by sneezing, watery eyes, watery discharge from the nose, and frequently by pain in the forehead. The greatest danger occurs from an affection of the bronchi and a relapse following exposure to cold at the time of affection or immediately after. Crescent-shaped spots of red appear on the skin, occurring first on the face and later passing downward, and disappear in the same order. Measles occurs most frequently in the colder seasons of the year. It rarely affects children under the age of five months and is not particularly dangerous in the young, unless they are exposed to cold or a severe draught of cold air. In old age it is much more dangerous and deaths from it are not infrequent. A form of disease known as *rötheln*, or *German measles*, is often mistaken for scarlatina and measles, but differs from them. The eruptions in *rötheln* last longer, usually from four to ten days. It is a very mild disease, requiring only liquid food, laxative treatment, and keeping in bed a number of days.

MEASURE (mēzh'ūr), the extent, volume, quantity, capacity, or dimensions of anything as ascertained by a certain rule or standard. Standards of measurements are fixed by law or custom. They are recognized by all the civilized countries, but differ materially in the various governments. Below are the principal measurements used in Canada and the United States for determining extent and volume.

LINEAL MEASURE.

12 inches.....	make	1 foot
3 feet.....	"	1 yard
5½ yards, or 16½ feet.....	"	1 rod
4 rods.....	"	1 chain
10 chains, or 40 rods.....	"	1 furlong
8 furlongs, 5,280 feet.....	"	1 mile

SQUARE MEASURE.

144 square inches.....	make	1 square foot
9 square feet.....	"	1 square yard
30¼ square yards.....	"	1 square rod
16 square rods.....	"	1 square chain
10 square chains.....	"	1 acre
640 acres.....	"	1 square mile

SURVEYOR'S MEASURE.

7.92 inches.....	make	1 link
100 links, or 22 yards.....	"	1 chain
80 chains.....	"	1 statute mile
69.121 miles.....	"	1 geographical degree

CUBIC MEASURE.

1,728 cubic inches.....	make	1 cubic foot
27 cubic feet.....	"	1 cubic yard
231 cubic inches.....	"	1 standard gallon
2,150.42 cubic inches.....	"	1 standard bushel
50 cubic feet round timber....	"	1 ton
40 cubic feet hewn timber.....	"	1 ton
16 cubic feet.....	"	1 cord foot
24¾ cubic feet.....	"	1 perch of stone
8 cord feet, or 128 cubic feet...	"	1 cord of wood
36 bushels, or 57¼ cubic feet...	"	1 chaldron

CLOTH MEASURE.

2¼ inches.....	make	1 nail
4 nails.....	"	1 quarter
4 quarters.....	"	1 yard
3 quarters.....	"	1 ell Flemish
5 quarters.....	"	1 ell English
6 quarters.....	"	1 ell French

MEASURING WORM, the name applied to small caterpillars of an extensive group of moths. They are sometimes called *loopers*, owing to the peculiar manner in which they move from place to place. The body is long and slender and the feet are at the extreme ends of the body. In moving they fasten the fore feet and bring the hind feet forward, the body forming a large loop. They vary greatly in color and size. Many species resemble the leaves and twigs of trees frequented by them. Some are injurious to plants, such as the *currant worm*, which is very destructive to currant bushes and other plants. The *cotton caterpillar*, though not a true measuring worm, has the looping or measuring movement when walking.

MEAT PACKING, the industry of slaughtering animals and preparing various kinds of meats and other commercial products from their carcasses. The larger part of live stock raised for the market is purchased by local dealers and shipped by railways to the large meat-packing centers, such as Chicago, Kansas City, South Omaha, Montreal, Cincinnati, and New York. Those engaged in stock raising usually deliver the animals to the local dealer, who loads them in specially constructed stock cars, and trains made up of such cars are usually run at higher speed than ordinary freight trains. The animals

are unloaded and placed in stock yards as soon as possible after they reach the destination, where they are sold through commission merchants to the packing houses. Hogs and sheep are slaughtered soon after being unloaded, but cattle are allowed to rest about a day.

The slaughterhouses are constructed on plans that make it very convenient to handle the animals, both before and after slaughtering. Inclined viaducts permit driving the animals to the top of the building, where they are killed, and the carcasses are handled downward by a series of workmen. Swine are hooked by the nose to an endless chain and passed through scalding vats, and then are carried through an automatically adjusted scraper, by which they are deprived of hair and bristles in a few seconds. The next step is to hoist them head downward upon an inclined rail, when they are disemboweled, beheaded, washed, and trimmed at a rapid rate, usually about twenty a minute. The cattle and sheep are handled in a similar way, but are skinned instead of being scalded. It requires about eight minutes to slaughter and dress a sheep, while a steer is passed through the process in forty minutes. All of the labor is carefully classified, each workman having a particular part in the work of caring for the animals.

After being dressed, the animal is placed in the cooling room, in which the temperature is a little above the freezing point. It requires about three days to remove all the animal heat from pork and make it ready for use, or for the processes by which it is prepared for the market. Both beef and pork are packed in refrigerator cars, after cooling, especially if the shipment is to be made for some distance. However, beef that is intended for local consumption is usually kept in cold storage a little longer, frequently eight or ten days. This permits the product to "ripen," meaning that it is both cooled and rendered tender as a result of being in cold storage. The use of refrigerator cars and refrigerator ships permits the transportation of meats without danger of loss, and these otherwise perishable products are delivered in a first-class condition at Liverpool, Hamburg, and Havre.

Meat packing as at present managed is concerned in placing many products upon the market aside from fresh beef, mutton, and pork. Not more than ten per cent. of the whole hog is sold as fresh meat, the remainder being pickled in brine and smoked, thus forming bacon or ham. The trimmings are used largely in the manufacture of sausage, which constitutes a profitable part of the packing industry. Other products include salt meats, dried beef, lard,

tallow, and canned meats. The carcass of a swine is usually cut to suit the custom of the country where it is to be marketed, but usually into sides, shoulders, hams, loins, and spare ribs. Two kinds of lard are made, known as *leaf lard* and *steam lard*. The better class of trimmings and the pure leaf are used in making leaf lard, while the smaller trimmings from the legs and head bones and the smaller scraps make the steam lard. The poorer cuts and the less valuable grades of cattle furnish the meat for canning.

The meat-packing industry has been systematized so all parts of the animal are used. Leather is made of the hides; sausage casing, of the intestines; fertilizers, of the blood and offal; buttons and knife handles, of the hoofs; and various manufactures, of the wool of sheep and of the bristles of hogs. Soap, glue, and oils are derived from the hoofs. The bones are used in making filters and fertilizers.

In the production of meats of all kinds the first rank is held by the United States, where the dressing, packing, and shipping of meat are consolidated in a number of immense establishments. This is not the case in Europe, where many slaughterhouses are erected and maintained at public expense. Practically all the slaughtering in Germany and a large proportion of it in England is done at municipal abattoirs, but in Canada and the United States a large part of the fresh meat, especially in the smaller towns and cities, is placed on the markets by the slaughterhouses located within the community. Small establishments usually lack systematic inspection, but the larger packing houses are under careful supervision of the government. In such cases the animals are examined by inspectors before being slaughtered, and the meat is likewise inspected with a view of detecting some diseases that cannot be discovered while the animal is on the hoof. In the United States the inspection has been at government expense since 1906. In that country the annual slaughter of cattle is 5,750,000; sheep, 9,125,000; and swine, 30,850,000. About two-fifths of the slaughtering is done in Chicago.

MECCA (mĕk'kà), or **Mekka**, an ancient city of Arabia, capital of the province of Hedjaz, noted as the birthplace of Mohammed. It is located in a valley about 65 miles east of Jiddah, its seaport on the Red Sea, and is surrounded by hills and sandy plains. The adjacent hills form a natural protection and make it impossible to see the city until the traveler is near its confines. Stone and brick enter largely into the architecture, the buildings are mostly from three to four stories high, and the newer structures

have windows that open toward the streets. Very little paving has been done, thus leaving the streets dusty in summer and muddy during the rainy season. The only drainage provided is on the surface, though it has several streets that are regular in construction and contain handsome buildings ornamented with paintings. Provisions of all kinds are carried to the city by camels and vehicles, this being necessitated by the barren character of the surrounding country. The size of the city is to be attributed wholly to its being the birthplace of Mohammed, by virtue of which it is the holiest city of the Moslem world, and to it are attracted vast numbers of pilgrims from all parts of the Mohammedan countries.

El-Haram, or the house of God, is situated in the center of the city, in which the Kaaba is kept and which has been a center of attraction for ages. The Kaaba contains a small meteoric stone, which is securely built into the southeast corner and forms the Black Stone or fetich. Nineteen gates admit pilgrims into the El-Haram. It has room for 35,000 persons. Once within its confines, the pilgrims do not leave until they kiss the Black Stone. Another attraction is the so-called Southern Stone, which has a traditional power when touched, while an inclosure within the building is supposed to contain the remains of Hagar and Ishmael. The interior is decorated elaborately with precious stones, silver and gold, and fine drapery, and the wealthy Moslems journey there annually. Those who are unable to make the journey may send a substitute, defraying his expenses, but at the same time receiving the benefits. *Hadji*, or *Hajj*, is the term applied to those who make the pilgrimage.

Mecca has few noteworthy buildings aside from the El-Haram. The city is destitute of trees and has no verdure of any kind. Among the manufactures are textiles, clothing, jewelry, medicine, and embroidery. It is governed by a sherif under the Sultan of the Turkish Empire and entertains annually from 75,000 to 100,000 pilgrims. Mohammed conquered the city in 627, but in 930 it was sacked by the Karmathians, who carried the Black Stone with them and retained it for nearly a quarter of a century. In 1833 Mecca became a possession of the Pasha of Egypt, but was soon after made a part of Turkey. Population, 1906, 61,550.

MECHANICAL POWERS, the instruments or means by which heavy weights may be sustained, or material resistance overcome, by a small force. The important mechanical powers, one or more of which are necessary in the construction of machinery, include the wedge,

screw, inclined plane, lever, pulley, and wheel and axle.

MECHANICS (mê-kăn'iks), the branch of physical science that treats of the phenomena caused by the action of forces on material bodies. That branch of mechanics which investigates the effects of forces not in equilibrium, but producing motion, is termed *dynamics*. The division that investigates the relation between forces in equilibrium is called *statics*. *Pneumatics* is the special branch of hydromechanics that treats of gases.

MECHANICSVILLE (mê-kăn'iks-vîl), a village of New York, in Saratoga County, 18 miles north of Albany. It is on the Hudson River, the Champlain Canal, and the Boston and Maine and the Delaware and Hudson railroads. Waterworks, a public library, and several fine schools are among the noteworthy institutions. The manufactures include paper, lumber products, and clothing. Population, 1910, 6,634.

MECHANICSVILLE, Battle of, an engagement of the Civil War, fought at Mechanicsville, Va., on June 26, 1862. General McClellan attempted to approach Richmond and stationed General Porter with 5,000 Federal troops at Mechanicsville, about seven miles north of Richmond, where he was attacked by General Lee with a force of 10,000 Confederates. The Federals repulsed two attacks, but reinforcements arrived under the command of General Stonewall Jackson on the following day, when General Porter retreated to Gaines's Mill. In the engagement the Federals lost 360 and the Confederates lost 2,000 men. This battle is sometimes called the Battle of Beaver Dam Creek. It was the first engagement of the Seven Days' Battles of the Peninsular Campaign.

MECHLIN (mêk'lîn), or **Malines**, a city of Belgium, on the Dyle River, in the province of Antwerp, twelve miles northwest of Brussels. The city is well built, graded, and paved. It has fine avenues of trees, extensive gardens, and regularly platted streets, and is proverbial on account of its cleanliness and beauty. The manufactures include machinery, woolen fabrics, hats, laces, and various textiles. It has a large trade and communication by railroads and electric railway lines. Among the noteworthy buildings are the Cathedral of Saint Rombaud, the Church of Saint John, the townhall, the public library, and several colleges of industry, art, and science. Many statues adorn the public places. Mechlin dates from an early period and in the 14th century ranked as one of the leading manufacturing centers of Europe. Population, 1906, 58,803.

MECKLENBURG DECLARATION

(mêk'lên-bûrg), a solemn compact made on May 20, 1775, by a convention at Mecklenburg, N. C., in which the people declared their independence of Great Britain. The declaration did not become generally known until 1818 and the original documents were destroyed by fire several years earlier, in 1800. May 20 is a legal holiday in the State of North Carolina because of that day being the anniversary of the Mecklenburg Declaration.

MEDAL, a piece of metal cast in the form of a coin, and stamped with some figure or inscription to commemorate some illustrious person, or some remarkable deed. Medals are usually issued as a reward of merit, and differ from coin in that they are not current as money.

MEDEA (mê-dé'à), in mythology, a daughter of Aetes, King of Colchis, and the niece of Circe. She was famous for her skill in sorcery. It was through her instrumentality that Jason, with whom she had fallen in love, was enabled to possess himself of the Golden Fleece. After obtaining this prize, she fled with Jason to Greece, where she lived with him as his wife. At length she was deserted by her husband, who was fascinated by Creusa, the daughter of Creon, King of Corinth. In the fury of revenge she sent her rival a poisoned garment, which caused her death, and afterward she fled to Athens in a chariot drawn by a winged dragon. Afterward she was detected in laying snares for the destruction of Thesus, when she withdrew from Attica into Asia, where her son Medus became the founder of the Median nation.

MEDELLÍN (mâ-thâl-yên'), a city of Colombia, capital of the department of Antioquia, 40 miles southeast of Antioquia. It is situated on a high tableland and is surrounded by a farming and mining country. The chief buildings include a museum, a high school, and a public library. Chemicals, hardware, clothing, and machinery are among the manufactures. It has electric lights, waterworks, and railway connections with several inland cities. Population, 1908, 60,602.

MEDFORD (mêd'fêrd), a city of Massachusetts, in Middlesex County, on the Mystic River, five miles north of Boston. It is on the Boston and Maine Railroad and has communication by several interurban electric railways. The site has an area of nine square miles. Among the chief buildings are the public library, the city hall, the Tufts College, and the Cradock House, built in 1634. Brooks Playstead, Mystic Valley Parkway, and Middlesex Fells Park are fine public grounds. The manufactures include cotton and woolen goods, carriages, paper, machinery, flour, bicycles, mattresses, earthenware,

leather, and spirituous liquors. It has systems of pavements, waterworks, and sanitary sewerage. Medford was settled in 1630 and incorporated in 1892. Population, 1910, 23,150.

MEDIA (mē'dī-à), an ancient and powerful country of Asia, corresponding to the northwestern portion of Persia. Its boundary on the north was formed by the Caspian Sea, south by Persia, east by Parthia, and west by Assyria. The southern portion of that region is fertile and the northern part is mountainous. The inhabitants were called Medes. They were of the Aryan race and in language, religion, and manners were closely allied to the Persians. The Medes were not only skilled horsemen, but excelled in warfare and many of the arts of peace, especially in stock raising and agriculture. Assyria maintained some degree of sovereignty over them until 708 B. C., when they united and established their seat of government at Ecbatana and chose Kai Kobad as their chief. Shortly after they formed an alliance with Nabopolassar, King of Assyria, and overthrew the Assyrian Empire in 604 B. C.

In the 5th century the Medes conquered Scythia, much of Asia Minor, and parts of Egypt, but in 585 B. C. they were frightened into peace by an eclipse predicted by Thales. Their king Astyages was deposed in 560 by Cyrus of Persia, and from that time they are known in history as the Medes and Persians, but Cyrus styled himself King of Persia and emphasized his national descent. Cyrus took the treasures from Ecbatana to his own capital, but made it his summer residence, a custom followed by other Persian kings for many years. From the death of Alexander the Great, in 324, until the time of Augustus, Media constituted a separate kingdom, but a portion of it known as Great Media formed a part of the Syrian monarchy. Mithridates I. conquered Great Media and attached it to Parthia in 147 B. C. In the year 36 B. C. it was at war with Mark Antony. In the time of the Sassanain dynasty the whole of Media became a part of Persia, to which it has since belonged.

MEDICAL SCHOOLS, the institutions maintained to promote the professional training of physicians and surgeons. In ancient times comparatively little was done to further education in medicine, and dissection of the human body was practiced only at rare intervals prior to the 12th century. At that time laws were not enacted to regulate the practice of the healing art, hence numerous quacks and charlatans pretended to effect cures by methods and with drugs that have comparatively little healing value. One of the most famous medical schools of

the Middle Ages was located at Salerano, Italy, and it exercised a wide influence by sending its graduates to many parts of Europe and Asia. The University of Paris, founded in 1205, is a pioneer in the education of surgeons and physicians. Medical departments were established at an early date in the universities, such as are still maintained in the German institutions at Erfurt, Vienna, and Wittenberg.

Medical departments in colleges and universities are very common in England and the United States, though many of the medical schools are distinctly professional, teaching both surgery and the practice of medicine as distinct and exclusive branches. Chairs for the teaching of medicine have been maintained at the universities at Oxford and Cambridge since the time of Henry VIII. The first medical school in the United States was founded in 1765, when the medical department of the College of Philadelphia was established, which afterward became the University of Pennsylvania. Other institutions having well-organized medical departments include Columbia University, New York; Harvard University, Cambridge; Dartmouth College, Hanover; University of Chicago, Chicago; and a large number of others. The total number of these institutions is about 160. Canada has a large number of institutions at which medicine and surgery are taught, including the University of Toronto, Toronto; McGill University, Montreal; and Laval University, Quebec.

Admission to medical schools was formerly based upon a very low standard, but the requirements have been raised to a higher plane. At present it is required that those entering a medical school of recognized standing have certain literary attainments, such as graduation from academic or collegiate courses. The practice of medicine is protected by certain legal restrictions. Most states and provinces maintain examining boards for the examination of those who wish to enter the medical practice. Practically all of the departments and institutions devoted to the study of medicine are open to the admission of women, and some institutions of this kind are maintained for the instruction of women who desire to become surgeons or physicians. In 1850 the Woman's Medical College was founded at Philadelphia. Elizabeth Blackwell opened the Woman's Medical College of the New York Infirmary in 1868. Women are now engaged in the practice of medicine to a considerable extent, and one or more woman practitioners are located in nearly all of the cities and towns.

MEDICINE (mēd'ī-sin), the science which is concerned in the cause, prevention, and cure

of diseases. Medicine as a science investigates the structure and functions of the organs of the body, their liability to disease, how disease may be prevented, and the various remedial agents or antidotes that are to be prescribed for the alleviation or removal of disease. In early times diseases were attributed to supernatural forces. Then it was alleged that invisible beings would under certain circumstances affect the body and ultimately destroy it by death. Priests at first had charge of the medical and sanitary practice. Even at the present time there are superstitious views held by some of the people of Asia and other parts of the earth. For instance, it is not uncommon to pay from ten to twenty cents for a string to be worn about the neck by children as a preventive against disease, the price depending upon the length of time for which its virtues are guaranteed.

The skill possessed by the Egyptians in embalming their dead is taken as evidence that they knew and taught much in regard to the elements of anatomy. Aesculapius, a famous Grecian, who lived before the Trojan War, was one of the most eminent of early physicians and at his death became deified as the Greek god of medicine. Hippocrates, who lived about 1,000 years later, is known as the founder of Greek medicine. The science of medicine has been considered of importance from remote times by all classes, many savages possessing knowledge of the medicinal virtues of various barks, herbs, and plants, as well as different mineral substances. In modern times medicine has been considered one of the most important of sciences. It has had growing attention since the discovery of the circulation of the blood by Harvey, in 1616.

Many distinguished writers have classified medicines under three divisions: *Internal remedies*, such as are administered for their effect upon the system, both before and after absorption into the blood; *external remedies*, designed to act locally and not intended to affect the general constitution; and *chemical agents*, used for other than their medical properties. To administer the different remedies it is necessary to have a liberal knowledge of physiology, anatomy, hygiene, pathology, chemistry, and various allied subjects. The departments of medicine now commonly recognized include *surgery*, which relates to injuries and ailments visibly affecting the body; *medicine proper*, that department which belongs to the physician and embraces the care and administration of medicine in various forms of diseases; and *midwifery*, or *obstetrics*, the branch embracing diseases peculiar to women, childbearing, and ailments of

very young infants. Besides these are special fields for study, such as pertain to *dentistry*, dietetics, and diseases of the eye and ear, and those giving particular attention to special diseases.

Hygiene is the science of health; *pathology*, the science of disease; and *nosology*, the science which investigates the origin and symptoms of various diseases and aims at their proper classification. *Therapeutics* includes the treatment of general and special diseases, together with their character and the effects of remedial agents on the human organization, both in health and disease. *Pharmacy* involves a knowledge of the preservation of drugs and mixtures of medicines; *materia medica* embraces the whole science of medicine; and *clinics* is the teaching of medicine and surgery by examining and treating patients in the presence of students. The science dealing with the care of women during pregnancy and for a short time after childbirth is termed *obstetrics*. The mechanical alterations of structure, such as are employed in cases of deformity or abnormal conditions, are treated in the science known as *pathological anatomy*.

Many associations are maintained to promote professional fellowship, compare theories and modes of medical practice, and study measures by which the science of medicine may be improved and elevated. A majority of these organizations belong to the *allopathic* school, but there are large associations of the *homoeopathic*, *eclectic*, *osteopathic*, and other schools of medicine and treatment. The first society organized in America is the New Jersey State Medical Association, in 1766, and the chief national organization is the American Medical Association, organized in New York in 1846. At present the number of medical colleges in America is very large. They have an annual attendance of about 18,500 students. Those who graduate each year aggregate fully one-third of the number enrolled. These colleges are largely private enterprises, though there are some supported by public grants, and one-third are open alike to both sexes, while ten are exclusively for women. Admission to practice medicine is regulated by law. The tendency is to elevate the practice by requiring a continuous improvement of the courses of instruction and thorough preparation before admitting applicants to the profession.

MEDICINE HAT, a town of Canada, in the southeastern part of Alberta, about 300 miles southeast of Calgary. It is on the South Fork of the Saskatchewan River, on the Canadian Pacific Railway, and is surrounded by a fertile and grazing country. The climate is healthful. It has a considerable trade in mer-

chandise, grain, and live stock. It has several fine schools and churches. Population, 1901, 1,975.

MEDINA (mâ-dē'nâ), a city of Arabia, about 250 miles north of Mecca, regarded by the Moslem world as next holy to Mecca. The city is accorded this distinction for the reason that it was Mohammed's home while exiled from Mecca. It is fortified by a wall from thirty to forty feet high, having thirty towers, and has a strong Turkish garrison. The surrounding country is one of the most fertile regions of Hejaz and is devoted to agriculture and stock raising. A mosque is located on the place where it is thought that Mohammed died, in which visitors are shown the tomb of the prophet within a screen of iron filigree. The coffin is reputed one of much value, being cased with silver and ornamented with precious gems, and in it the body of Mohammed is believed to lie in a well preserved state. It is said that Europeans have never seen the coffin, but that it is the burial place of the prophet is reasonably certain. In 892 the mosque was rebuilt, having been destroyed previously by lightning. Many of the fabulous treasures that formerly marked the burial place have long since disappeared. In the 7th century Medina was the capital of Islam. It became famed for its institutions of learning and still possesses schools that are endowed by public grants. Many gardens, fountains, orchards, and a number of fine buildings are maintained in the city. Population, 1906, 48,050.

MEDINA, a village of New York, in Orleans County, on Oak Orchard Creek, forty miles west of Rochester. It is on the Erie Canal and the New York Central and Hudson River Railroad. The surrounding country is agricultural and in its vicinity are valuable sandstone quarries. The public library, the townhall, and the high school are among the chief buildings. It has manufactures of cigars, boots and shoes, flour, and machinery. The first settlement on its site was made in 1830 and it was incorporated in 1832. Population, 1905, 5,114; in 1910, 5,683.

MEDITERRANEAN SEA (mêd-î-têr-râ'-nê-ân), the great inland sea which is inclosed by Europe, Africa, and Asia, constituting the largest inland body of water in the world. The length from east to west is 2,275 miles, the general breadth is from 75 to 500 miles, but its greatest width in the Adriatic extension is fully 1,075 miles. The Strait of Gibraltar is its only connection with the Atlantic Ocean, from which it extends eastward to Arabia, and it is connected with the Red Sea and the Indian Ocean by the Suez Canal. Among the important inlets are the Adriatic Sea, the Aegean Sea, the Gulf

of Sidra, the Balearic Sea, the Ionian Sea, the Tyrrhenian Sea, and the Gulf of Cades. It is connected with the Black Sea by the Dardanelles Strait, the Sea of Marmora, and the Bosphorus Strait. Numerous islands abound, the most important being Sardinia, Corsica, Sicily, Crete, Cyprus, Malta, the Ionian Isles, the Balearic Isles, and Rhodes. Many important rivers discharge their waters into the Mediterranean, among them the Nile, Ebro, Rhone, and Po, but the evaporation is in excess of the natural inflow. If it were not for its connection with the Atlantic Ocean, its water would become more densely laden with salt, and finally would shrink into at least two smaller bodies; the division would come in a somewhat curved line between Italy and Tunis. On its shores and some of the islands are the most famous volcanoes in the world, including Stromboli, Vesuvius, and Aetna. Destructive earthquakes have occurred at various times. The general depth is from 30 to 2,125 fathoms. Fine corals, sponges, and fin fish abound in great quantities, while as a highway for traffic it is of vast importance. Many of the countries bordering on the Mediterranean have been prominent in the history and civilization of the world, among them Egypt, Greece, Italy, Asia Minor, and Palestine.

MEDULLA OBLONGATA (mê-dül'lâ öb-lön-gâ'tâ). See **Brain**.

MEDUSAE (mê-dû'sê), the name of certain species of jellyfish, so called from their resemblance to the head of the fabled Medusa. The body is formed like a disk, which has long trailing feelers or tentacles, at the end of which are stinging cells. They swim by means of contracting and expanding the body and kill their prey by emitting a poisonous substance. Some of the larger species of the Atlantic coast, especially in the tropical waters of South America, are sufficiently harmful to poison bathers. The food consists of small marine animals and plants, though chiefly of small fishes and cuttlefishes, which they paralyze by pricks of the barbed darts surrounding the mouth cavity.

MEERSCHAUM (mêr'sham), a compact, massive mineral with fine earthy texture, composed of 60.8 parts silica, 27.1 magnesia, and 12.1 water. When dry it floats on water. It was first discovered by a German who named it *meerschaum*, meaning *seafoam*, and was thought to be solidified froth made by the waves. It is found as a mineral in South Carolina, but particularly in Asia Minor, Spain, Moravia, Greece, and Turkey. Meerschaum is used principally in the manufacture of tobacco pipes. The best products represent much value. Cheaper grades

of pipes are made from waste material, which is ground and held together by a paste.

MEGAPHONE (mĕg'ă-fōn), a kind of speaking trumpet invented by Thomas A. Edison in 1878, by which it is possible to hear a whisper fully 1,000 feet. At one end is a tube to fit the mouth and the other end has a large funnel of tin or papier-maché. The construction of the funnel is such that the sound waves issue from it in approximately parallel directions. The best effect is secured by carefully grading the instrument to the voice of the user, since the size and shape determine the amount in which the sounds are strengthened. With this instrument it is possible to carry on a conversation at a distance of several miles, in which case it is necessary to use two megaphones.

MEGATHERIUM (mĕg-ă-thĕ'rĭ-ŭm), a genus of extinct edentates, of which remains have been found in the Tertiary, or pampas, deposits near Buenos Ayres and other parts of South America. These animals were mammals, had feet adapted for walking on the ground, and were allied to the sloths. In 1832 the remains of an animal of this class were found about nine miles from Buenos Ayres, which, in a mounted condition, give evidence that the animal was eight feet tall and the body was eighteen feet in length. The tail was six feet long. These animals lived on vegetables, which is evidenced by the size of their teeth and by the fore feet being adapted for scratching roots out of the ground.

MEKONG (mă-kōng'), or **Cambodia**, one of the largest and most important rivers in Southern Asia. It rises on the northern slope of the Himalaya Mountains, thence it flows nearly east, and after a bold turn has a southeasterly course, flowing into the China Sea by a delta. The length is about 2,650 miles. It courses through a fertile region, has many rapids, and is remarkable for the swiftness of its current. Large vessels navigate it only about 200 miles.

MELBOURNE (mĕl'bŭrn), a city of Australia, capital of Victoria, on the Yarra River, at the north end of Port Phillip Bay. It is the converging center of several railroads. The site is on the undulating region which extends along both sides of the Yarra River. The streets are regularly platted, crossing each other at right angles, and many of them are substantially paved with granite and asphalt. An extensive system of electric railways furnishes transportation facilities to all parts of the city and many interurban and suburban points. Water is conveyed from a point eighteen miles distant by the Yan-Yean waterworks, which are owned and operated by the city. Electric and gas lighting,

sanitary sewerage, and several public parks and botanical gardens are among the public improvements.

The architecture is modern and substantial. Many of the business blocks and office buildings range in height from ten to sixteen stories. The Parliament houses, erected at the cost of \$5,500,000, occupy an imposing and centrally located site. It is the seat of Melbourne University, one of the largest state endowed institutions of Australia. Other public buildings include an immigrants' home, the county and city courts, the public library, the customhouse, several orphan asylums, and a number of benevolent and scientific institutions. It has many fine churches and public schools.

The city is important as a manufacturing and commercial center. Along the north side of the Yarra River is an extensive wharfage, which is reached by vessels drawing 16 feet of water, and the outer harbor has a depth of 25 feet at low tide. The trade consists chiefly in grain, wool, fruits, live stock, machinery, and clothing. Melbourne has first rank among the colonial ports of Great Britain and the commercial centers of the Southern Hemisphere. It has large elevators, tanneries, flour mills, slaughterhouses, machine shops, woolen and cloth factories, and iron foundries. A large per cent. of the manufacturing and about six-sevenths of the commerce of Victoria is carried on at Melbourne. It has a large jobbing trade with interior points.

The first settlement on the site of Melbourne was made in 1835. Two years later it was named from Lord Melbourne. It was incorporated in 1842 and in 1851 became the capital of the colony of Victoria. The discovery of gold soon after caused it to grow rapidly in population and commercial importance. In 1888 it was the seat of an international exhibition to commemorate the founding of the first Australian colony in 1788. It was chosen as the temporary capital of the Commonwealth of Australia in 1901, but the capital was moved to Bombala, New South Wales, in 1903. Population, 1906, 526,395.

MELEGNANO (mă-lă-nyă'nô), a town of northern Italy, formerly called Marignano, about ten miles southeast of Milan. It is celebrated in history as the scene of an important battle, in 1815, when Francis I. of France defeated the Swiss troops under the Duke of Milan in a decisive engagement. About 20,000 men were slain. Another victory was gained at the same place by the French with a force of 16,000 men on June 8, 1859, defeating the Austrians with a loss of 1,400 men. The first

named battle is sometimes called the Battle of the Giants.

MELODEON (mê-lō'dê-ŭn), a wind instrument resembling a piano in appearance, but constructed so that music is produced by means of bellows and reeds. The principle employed is the same as that of the accordion, pressure on the key driving down the pin and the valve, thus allowing passage to the air. The cabinet organ has generally superseded the melodeon, to which it is quite similar.

MELODRAMA (mêl-ô-drâ'mâ), a term now used to designate a play of strong situations, resembling the sensational drama. It is bold in its several parts and is not particularly artistic in finish. At various passages thrilling music is introduced to enliven the spectators. This class of drama is used most frequently in second-class theaters, in which sentiment is exaggerated and the situations presented are distinctly striking.

MELODY (mêl'ô-dÿ), in music, a rhythmical succession of single tones, so related together as to form a musical whole. Melody ranges principally within a given key. It is pleasing to the ear and has a characteristic expression. A mere succession of sounds without form, rhythm, and symmetrical arrangement cannot be called a melody. *Harmony* differs from melody in that it is an agreement of tones, while *melody* is a rhythmical succession of single tones.

MELON (mêl'ŭn), a favorite annual fruit which is cultivated extensively in the Temperate Zone. It is thought to be native to the Kalmuck country in Tartary, but its present great variety of species and valuable qualities are due to cultivation and scientific propagation. It is known that melons were cultivated by the early Egyptians. They were mentioned by Theophrastus, Hippocrates, Pliny, and other Greek writers. The melon is herbaceous, has a climbing or trailing vine, and bears most successfully in a sandy loam. Both the *muskmelon* and the *watermelon* are cultivated to be eaten fresh and as preserves. However, these grow on widely different vines and the former includes the species known as *nutmeg* and *cantaloupe*. The watermelon is especially a favorite of warmer countries, where it is prized for its refreshing juice. Melon culture is very extensive in Europe and North America, large quantities being transported from the warmer sections to the cities farther north early in the season. However, the watermelon is produced more generally than the muskmelon.

MELOS (mê'lôs), formerly called Milos, or Milo, an island in the Grecian Archipelago, situated southeast of the Gulf of Aegina, belonging to the Cyclades. It is famous in Grecian

history. The island has an area of 64 square miles. Mount Saint Elias, the highest peak, has an elevation of 2,539 feet. Grain, grapes, and vegetables are the chief crops. The statue known as the Venus of Milo was discovered on the island in 1820 and is now in the Louvre at Paris. Melos was rich and populous in ancient times, but was devastated by the Peloponnesian War. Population, 1908, 5,345.

MELROSE (mêl'rôz), a city of Massachusetts, in Middlesex County, nine miles north of Boston, of which it is a suburb. It is on the Boston and Maine Railroad and on several electric railway lines. The noteworthy buildings include the public library, the city hall, and many schools and churches. Spot Pond is a large reservoir and Middlesex Fells is a reservation of 1,800 acres. The manufactures include sewing-machine needles, boots and shoes, silver polish, rubber goods, and machinery. It was settled in 1632 and incorporated in 1650, but did not become a city until 1900. Population, 1905, 14,294; in 1910, 15,715.

MELVILLE ISLAND, an island in the Arctic Ocean, located between Bathurst and Prince Patrick's islands. It was discovered by Captain Parry in 1819, while he was sailing in the Arctic off the shores of North America. The island is about 200 miles long and from 20 to 90 miles wide. It has deposits of coal and limestone.

MELVILLE PENINSULA, a point of land extending north of Hudson Bay, bounded on the North by Fury and Hecla straits, East by Fox Channel, and West by Boothia Gulf. It is connected with the mainland by Rae Isthmus. This peninsula belongs to Canada, forming a part of Kewatin.

MEMBRANE (mêm'brân), a thin and wide expansion of any tissue of the body, divided by anatomists into serous, mucous, and fibrous membranes. *Serous* membrane covers the joints of bones and the delicate internal organs, like the heart, their purpose being to prevent friction. *Mucous* membrane lines the internal passages, such as the throat, mouth, stomach, bowels, nose, and others, and may be seen at the lips, nasal passages, and eyelids. The function of the *fibrous* membrane is to strengthen articulations between tissues and membranous formations. Fluids are secreted whereby the membranes are kept moist, thus facilitating articulated motion. They serve to strengthen muscles, tendons, and the various organs. Those surrounding the brain are among the most important, and are called the *dura mater*, *arachnoid*, *pia mater*, and *falx*.

MEMORY (mêm'ô-rÿ), the power which

brings before the mind concepts of absent objects as they are or were and recognizes them. It is the conscious representation of past experience. This definition includes reproduction and recognition, and a complete act of memory takes place only when both occur. Frequently former concepts are brought before the mind by reproduction, but they are often not recognized as former concepts, in which case the act of memory is incomplete, as it includes only reproduction. Remembrance is usually regarded a generic term and is used to express any act of memory, while recollection implies an intentional act of memory and is properly specific. Recollection is the power the mind has to recall former concepts and is defined as voluntary remembrance.

MEMPHIS (mēm'fīs), a city of Tennessee, county seat of Shelby County, on the Mississippi River, 454 miles below Saint Louis, Mo. It is on the Illinois Central, the Missouri Pacific, the Saint Louis and San Francisco, the Louisville and Nashville, the Southern, the Chicago, Rock Island and Pacific, the Saint Louis Southwestern, and other railroads. Additional transportation facilities are afforded by urban and inter-urban electric railways and steamboat communication on the Mississippi. The site is on a series of bluffs that have an elevation of about 45 feet above high-water mark. It is well platted, has regular and well-improved streets, and contains much substantial architecture of stone and pressed brick.

The surrounding country being fertile, Memphis has a large trade in cotton, corn, wheat, lumber, wool, and live stock. It is the most important inland cotton market of North America and produces vast quantities of cotton goods. Other manufactures include machinery, cottonseed oil, furniture, flour, tobacco, lumber products, farming utensils, brick and tile, confectionery, clothing, railroad cars, saddlery, paper and pulp, and ironware. It has extensive railroad shops and roundhouses. The wholesale and jobbing trade in dry goods, groceries, shoes, and general merchandise is very large, supplying many towns and cities of the South and the Southwest.

Memphis has a public park with fine trees and shrubs in the heart of the city and the total park area is about 1,000 acres. The noteworthy buildings include the Federal customhouse, the county courthouse, the Cotton Exchange, the Cossitt Library, the Auditorium, the Lyceum Theater, the Masonic Temple, the Grand Opera House, the Odd Fellows' Building, and many business and office buildings. Among the charitable and educational institutions are

the Saint Joseph's Hospital, the Christian Brothers' College, the Le Moyne Normal Institute, the Hannibal Medical College, and the Memphis Hospital Medical College. The National Cemetery contains 14,039 graves.

The French built a fort on the site of Memphis in 1698 and the Spaniards occupied it in 1794. Andrew Jackson and a number of others founded a permanent settlement here in 1819. It was incorporated as a town in 1826 and became a city in 1849. The Federals held it during the greater part of the Civil War. In 1878 the yellow fever epidemic became widespread, but since then extended sanitary reforms have been effected and Memphis is now a healthful city. It has a vast system of subsoil drainage, sanitary sewers, substantial paving, electric lights and street railways, and a fine supply of city water. Population, 1910, 131,105.

MEMPHIS, an ancient city of Egypt, about ten miles south of Cairo, capital of the old Egyptian empire. It was founded by Menes, the first King of Egypt, on the banks of the Nile, and this first historical king changed the main channel of the river by building embankments to protect the city. It is evident that Memphis was a city of much importance from a very early period. As early as 1500 B. C. it contained many public buildings, fortifications, and great temples. Among the places of worship were the Temple of Serapis, the Temple of Phra, and the Temple of Ptah. The trade extended through many centuries and was furthered by water communications with the Mediterranean and the Red Sea. It had many educational institutions, making it the center of Egyptian learning for nearly ten centuries. In the time of Alexandria's greatest prosperity Memphis was the second city of Egypt, and at the time of the Moslem conquest it still had importance, but was in a state of decline. After its fall and destruction, many of the materials were carried to build up other cities, but there still remain a number of relics of interest, among them the great statue of Rameses II., the pyramid of Cheops, and numerous ruins of temples and palaces. All the remains were covered more or less with a sandy soil, but many of them have been excavated. The village of Mitrahenny now stands on the site of the city. In the Old Testament Memphis is mentioned as Noph and as Moph.

MEMPHREMAGOG (mēm-frē-mā'gōg), a lake of North America, extending from Quebec into Vermont. The length is thirty-five miles and the width is from two to five miles. It contains a number of picturesque islands. Fine timber is found on the islands and in the vicin-

ity of the lake. Its abundance of food fish and beautiful scenery make it a popular summer resort. Mount Oxford is near the lake and has a height of 3,500 feet above its surface. It discharges by the Magog River, through the Saint Francis, into the Saint Lawrence.

MENAI STRAIT (mĕn'ī), a channel extending between Wales and the island of Anglesea, connecting Saint George's channel with the southeastern part of the Irish Sea. The length is fifteen miles and the breadth is from about one-fourth of a mile to two miles. It is utilized extensively for navigation. Several substantial bridges cross the strait, of which the most important is the Britannia tubular iron railway bridge built in 1850.

MENAM (mā-nām'), an important river of Southern Asia, having its source in the Laos country. It flows in a southerly direction for 900 miles and discharges into the Gulf of Siam fifteen miles below Bangkok, to which city it is navigable by large steamers.

MENASHA (mĕ-nāsh'ā), a city of Wisconsin, in Winnebago County, on Lake Winnebago, at the mouth of the Fox River, seventeen miles north of Oshkosh. It is on the Wisconsin Central, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads. The place has fine buildings and is popular as a summer resort. It has a growing trade in produce and merchandise. Among the manufactures are furniture, paper, farming machinery, cigars, and flour. Menasha was settled in 1847 and chartered as a city in 1874. Population, 1910, 6,081.

MENDICANT ORDERS (mĕn'dī-kant), a class of Roman Catholic religious associations, which hold to the principle of self-humiliation and religious poverty. They subsist upon alms, basing their tenets upon the words of Jesus expressed in Matthew xix., 21-30, and devote every effort of their life to religious teaching. At present the mendicant orders include the Dominicans, Franciscans, Carmelites, and Augustinians. The members of these orders and the Friars are forbidden to possess personal property as well as real estate.

MENDOZA (mān-dō'zā), a city of Argentina, capital of the province of Mendoza, 160 miles East of Valpariso, Chile. It is located on the eastern slope of the Andes and has railway connections with the important trade centers of the country. Electric lighting, street railways, and waterworks are among the public utilities. It is the seat of an agricultural college, two normal schools, and a convent. The surrounding country is fertile, but is subject to earthquakes. Mendoza was first settled in 1560 by the Spaniards. Population, 1906, 32,610.

MENHADEN (mĕn-hā'd'n), a fish found in abundance off the Atlantic coast of North America, often called whitefish, hardhead, and bony fish. It is allied to the herrings, but differs from them in having a deep notch in the upper jaw, and is one of the most valuable fish caught in Canada and the United States on account of its extensive yield of oil and manures. The length is about thirteen inches, the color is greenish-brown, and the body is elongated and compressed. Nets are used in catching the menhaden. After the oil is extracted, the remaining portions are used in preparing manures, which are shipped extensively to various countries for fertilizing. The rich oils prevent the menhaden from being used extensively for food, though considerable quantities are consumed for that purpose and for bait. It is canned like sardines to a considerable extent. Menhaden oil is useful in dressing leather. The annual production exceeds in value the yield from the whale of American fisheries.

MENINGITIS (mĕn-ĭn-jī'tis), an inflammation of the membranes which envelop the brain and the spinal cord. These membranes, known as the *meninges*, are three in number, including the pia mater, the dura mater, and the arachnoid membranes. The disease is designated as cerebral, spinal, and cerebro-spinal, depending upon whether the inflammation is located in the cerebrum or brain, in the region of the spinal cord, or in both the brain and spine. It more frequently affects the convexity of the cerebral hemisphere than the base. In its earlier stages it is characterized by headache and later by heaviness and vomiting. The two forms of the malady are the *acute* and *chronic*. A severe case of acute meningitis generally terminates in death, while the chronic form may develop into maniacal symptoms and finally into idiocy. Improved hygiene, diet, and skillful medical treatment are essential.

MENNONITES (mĕn'nōn-īts), a class of Protestants founded by Menno Simons (1492-1559) in the Friesland province of Holland. He became a priest in 1516, but a careful study of the New Testament caused him to withdraw from the established church and preach the reformed faith. The first permanent congregation was formed at Zurich, Switzerland, in 1525, where he was joined by Conrad Grebel, and the followers soon became numerous. The organization now has a large number of communicants in Europe and North America. Russia granted them immunity from military service to induce them to settle in that country, but in 1871 they were deprived of that privilege by the Czar. Immediately a large emigration of Men-

nonites began to the United States. Settlements of large numbers were founded in Minnesota, the Dakotas, Nebraska, and Kansas, and some were attracted by liberal offers to settle in Canada. The Menmonites hold firmly to the New Testament, deny original sin, condemn infant baptism, observe foot washing, baptize believers by pouring water on their heads while kneeling, hold to lose communion, and do not take official oaths. The congregation selects the pastors, who serve without pay, and usually several ministers are selected for each congregation. At present there are 12,000 communicants in Canada and 64,500 in the United States.

MENOMINEE (mĕ-nŏm'ĭ-nĕ), a tribe of Algonquin Indians, formerly found in the northern part of Michigan and Wisconsin. The name means wild rice men and was applied to them because of their using the wild rice which is native to the country they inhabited. Missions were established among them by the French in 1670. They fought against the English in the French and Indian wars. At the present they are confined to a reservation near Green Bay, Wis. The total number is about 1,400, most of whom have made material advancement in educational and industrial arts.

MENOMINEE, a city in Michigan, county seat of Menominee County, on Green Bay, at the mouth of the Menominee River. It is on the Wisconsin and Michigan, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads. The river is crossed by a number of bridges, connecting it with Marinette, Wis. Among its principal buildings are the county courthouse, the public library, the high school, and the Saint Joseph's Hospital. The manufactures include flour, carriages, machinery, clothing, lumber products, and earthenware. It has a large trade in lumber, iron, marble, and agricultural products. The vicinity was settled in 1799 and the city was founded in 1832. Population, 1904, 11,096; in 1910, 10,507.

MENOMONIE (mĕ-nŏm'ŏ-nĕ), a city of Wisconsin, county seat of Dunn County, on Red Cedar River, 24 miles west of Eau Claire. It is on the Chicago, Milwaukee and Saint Paul and the Chicago, Saint Paul, Minneapolis and Omaha railroads. The chief buildings include the county courthouse, the Stout Training School, the public library, and a teachers' normal school. It has a large trade in farm produce and merchandise. Among the manufactures are brick and tile, carriages, flour, earthenware, machinery, cigars, and lumber. It has sewerage and public waterworks. The Dunn County Asylum is near the city. Population, 1910, 5,036.

MENSURATION (mĕn-shŭ-rā'shŭn), the

branch of mathematical science that relates to finding the length of lines, the area of surfaces, and the volume of solids. Since the area of a *triangle* is found by multiplying the base by half the perpendicular height, the area of a *plane rectilineal* figure may be found by dividing it into triangles, and then taking the sum of the area of the triangles as the total area of the figure. The area of a *trapezium* is equal to half the sum of two opposite sides multiplied by the distance separating them. The area of any *parallelogram* is equal to the area of a rectangle having the same base and height. To find the circumference of a *circle*, multiply the diameter by 3.14159; to find the area of a *circle*, multiply the square of the radius by 3.14159; to find the diameter of a circle, divide the circumference by 3.14159; to find the radius, take half the diameter. The volume of any *rectangular solid* may be found by multiplying together the length, height, and width. Volumes of similar solids are to each other as the cubes of like dimensions.

MENTONE (mĕn-tŏ'nă), or **Menton**, a city of France, in the province of Alpes-Maritimes, on the Mediterranean, twelve miles northeast of Nice. It is connected by railway with many cities of France and Italy, has a fine location near the Alps, and is a favorite resort for invalids. The surrounding country is fertile, containing many beautiful gardens and orchards. In recent times it has enjoyed the impetus that comes from large productions of crops. Near the city are a number of remains of antiquity. Population, 1906, 12,806.

MENTZ (mĕnts), or **Mainz**, a city of Germany, in Rhenish Hesse, on the Rhine, near its confluence with the Main. It has extensive railroad connections, paved streets, electric lights and street railways, and systems of sewerage and waterworks. The parks are beautified by statues, including one of Gutenberg by Thorwaldsen. It has many fine buildings, such as the Church of Saint Stephen, the Gutenberg Museum, the public library, the city hall, and the central railroad station. The library has more than 180,000 volumes. Among the manufactures are toys, carriages, hardware, furniture, musical instruments, tobacco, cotton and woolen goods, and machinery. Mentz is a city of considerable antiquity, but since the explosion of a great powder magazine, in 1857, it has been rebuilt on modern plans. In the time of Roman occupation, it was a place of considerable importance, but barbarians destroyed it in 406. By the 13th century it again rose to importance as the head of the Rhenish League of towns. The Emperor of Germany fortified it in 1871

and it now forms one of the military strongholds of the empire. Population, 1905, 91,179.

MERCHANT MARINE, the persons and vessels employed in commerce, taken collectively, either of a particular nation or of the world. The largest commercial interests have universally been represented in the cities that are located where extensive and well-protected harbors are available, and where inland routes of travel connect the port cities with a large interior country. This is especially true of the Mediterranean Sea, where Carthage, Venice, Phoenicia, and Alexandria continued as commercial centers throughout ancient and mediæval times. During the Middle Ages the Hanseatic League was an important factor in developing the trade of Western Europe, when Hamburg, Antwerp, Bremen, and Bruges played an important part in controlling the trade of Europe. The discovery of America and the development of the East Indies caused a rivalry in trade and an interest in the acquisition of territory, through which great strides were made in commercial development by the French, Dutch, English, Portuguese, and Spanish traders. In the rivalry for trade and territory England exceeded the other nations, and the commerce of Great Britain is larger at present than that of any other country in the world.

The great forests of America stimulated an interest in shipbuilding at an early date in the Colonial times. Many vessels serviceable in mercantile enterprises were constructed at Quebec in the 17th century and shipyards were established at Boston, New York, and Philadelphia. The superiority of the American ships and the greater efficiency of their sailors made them dangerous commercial competitors to those of England and France, hence the British government began to enact navigation laws as early as 1645, with the view of requiring that all importations into the colonies were to be carried in English or Colonial-built vessels. While this legislation tended to restrict trade, it fostered shipbuilding. At present the merchant marine of the United States is second only to that of Great Britain, having a total of about 6,875,000 tons, while that of Great Britain has about 17,140,000 tons. At the time of the Civil War, in 1861, the tonnage was 5,539,813, but during the war and for some time after it declined materially, due to the fact that income taxes and heavy taxes on gross receipts greatly handicapped shipowners. Germany holds third rank, having a tonnage of 4,500,000. Norway has a tonnage of 2,150,000; France, 1,950,000; and Italy, 1,250,000.

MERCURY, the planet nearest to the sun,

unless it can be definitely established that the supposed Vulcan really exists. The most ancient account that we have of this planet is given by Ptolemy, who speaks of its location on the 15th of November, 265 B. C., and the earliest Chinese account of it describes its location on June 9, 118 A. D. Its rapidity of flight caused the ancients to name quicksilver after it. Mercury has an average distance of 35,550,000 miles from the sun and is 3,100 miles in diameter. Its volume is about one-eighteenth that of the earth, but its density is one-eighth greater. The inclination of the orbit of Mercury to the ecliptic is $70^{\circ} 0' 8''$. Its sidereal revolution around the sun occurs in 87.96 days and a synodic revolution requires about 116 days. The greatest distance from the earth is 136,000,000 and its least distance is 47,000,000 miles. The rotation on its axis was formerly thought to be completed every 24 hours, but astronomers now agree that it turns on its axis only once in going around the sun. For this reason the year and the sidereal day are equal in length. It has no moon to light the sky at night. In the spring and autumn Mercury is visible to the naked eye before sunrise and after sunset. Its greatest distance from the sun is 43,000,000 miles and the least distance is 30,000,000 miles; thus, there is about double the amount of light and heat derived from the sun when it is in perihelion as when in aphelion, these positions being occupied every 44 days. Transits of Mercury occur more frequently than those of Venus and take place at intervals of from three to thirteen years, having occurred in 1832, 1845, 1848, 1861, 1868, 1881, 1891, 1894, etc. The transits occur only in May and November and the greatest length can be only seven hours fifty minutes, though the majority are of much shorter duration. A transit to occur in 1924 approaches near the longest period of duration.

MERCURY, or **Quicksilver**, a metallic element known from the earliest historical times, the only liquid metal at ordinary temperatures. It freezes at 39.5° Fahr. below zero, gradually expands when heated, and boils at 357.25° . At 360° it rises in fumes and becomes gradually converted into a red oxide. At the ordinary temperatures it has a silvery-white color, runs in separate round drops with a smooth surface, and if impure the drops are somewhat elongated. Mercury occurs in a pure state, but is found most frequently in the form of sulphide, or cinnabar, and is mined in that form in California, Austria, Germany, Italy, Mexico, Peru, China, Borneo, and other countries. It is extracted from the sulphide by roasting the ore in a furnace, thus causing the sulphurous acid to escape,

while the mercury is condensed in a chamber. Mercury is used in the preparation of the most powerful poisonous compounds and serves many useful purposes in medicines. In thermometers it is employed to indicate the temperature of the air, its high state of expansibility ranging between the boiling and freezing point, while in barometers it is used to ascertain the weight of the atmosphere. Alloys in which mercury is used are called *amalgams*. An amalgam of tin and mercury is of value in preparing mirrors, while others are useful in filling and gilding teeth. It enters largely into the chemical laboratory, in making physical instruments, and in imparting a degree of softness and fusibility to other metals.

MERCY, Sisters of, an organization of the Roman Catholic Church. It was founded at Dublin, Ireland, by Catherine Elizabeth McAuley in 1827. The original organization was designed to provide relief for orphans, destitute women, and others, but it soon assumed a religious character. In 1834 it was approved by Pope Gregory XVI. The organizer became the first mother superior of the associations, and before her death there were 43 branches of the order. Bishop O'Connor introduced the order into the countries of North America in 1839. At present communities of Sisters of Mercy are distributed widely in America, Australia, Europe, and other grand divisions. The two classes of sisters are known as choir and lay-religious, and are bound by vows to seek the betterment of conditions for the ignorant, poor, and sick.

MERCY SEAT, the name of the covering of the ark of the covenant, called *Kapporeth* by the Jews. It was 27 inches wide and 45 inches long and was made entirely of gold. At each of the ends was a figure of gold, called the *cherubim*, and a wing of one met that of the other so as to cover the *Kalloreth*. The high priests entered the holy of holies on the day of atonement, when incense was burned and the blood of the sacrifice was sprinkled on the mercy seat as an atonement for the sins of the nation.

MER DE GLACE (mâr de glâs), a celebrated glacier of Switzerland. It descends from the slopes of the range of Mont Blanc and is formed by the confluence of three large glaciers, known as Lechaud, Géant, and Talèfre. The different tributaries form far up in the mountain range, descend slowly until they merge into the Mer de Glace, or Sea of Ice, which descends a long distance into the fertile valley below, carrying with it large quantities of bowlders from five to thirty feet in diameter, vast crevasses appearing at various bends in the course. The frozen mass of ice descends into regions studded

with fine fields and orchards, but is at last melted and flows in a stream as a clear current of water.

MERGANSER (mër-găn'sēr), the name of a small subfamily of ducks, of which the *goosander* is the largest species. The bill is narrow and slender, ending with a sharp hook at the tip, and the edges are serrated. The flesh of most species is not favored for food, since they live chiefly upon fish, but the *hooded merganser* is hunted as a table duck. Both the male and female have a crest, which in the male is quite large and circular in form. This species and the *red-breasted merganser*, or *sheldrake*, which has no true crest, are widely distributed in Europe and America.

MÉRIDA (mër'î-dâ), a city of Mexico, capital of Yucatan, 25 miles from the Gulf of Mexico and about that distance south of Progreso, a seaport town. It has good railroad connections and several public schools, and is the seat of a museum, a conservatory of music, a public library, and a university. The streets are regularly platted and contain modern municipal improvements, such as sanitary sewerage and brick and asphalt pavements. It has manufactures of cigars, sugar, clothing, spirituous liquors, soap, machinery, leather, and fabrics. Mérida was founded by the Spaniards in 1542. Population, 1906, 44,360.

MÉRIDA, a city of Venezuela, capital of the state of Los Andes, about sixty miles south of Lake Maracaibo. It is located on an elevated plateau and is surrounded by a farming and mining country. The chief buildings include a cathedral and a university. Among the manufactures are carpets, machinery, and cotton and woolen goods. Earthquakes partly destroyed the city in 1812 and in 1894. Population, 1906, 12,424.

MERIDEN (mër'î-den), a city of Connecticut, in New Haven County, eighteen miles north of New Haven. It is on the New York, New Haven and Hartford Railroad and on several electric interurban lines. The noteworthy buildings include the Curtis Memorial Library, the Meriden Hospital, the Connecticut School for Boys, the city hall, and many schools and churches. It has the Meriden Britannia Company, which is reputed the most extensive silver-plating establishment in the world. The general manufactures include steel pens, glassware, musical instruments, hardware, machinery, iron and brass castings, textile fabrics, and cutlery. Originally it was a part of Wallingford, but became a separate town in 1806 and was chartered as a city in 1867. Population, 1900, 24,296; in 1910, 27,265.

MERIDIAN (mê-rîd'î-an), a city in Mississippi, county seat of Lauderdale County, 85 miles east of Jackson. It is on the Southern, the Mobile and Ohio, and the Queen and Crescent railroads. The chief buildings include the county courthouse, the public library, the Meridian Academy, the East Mississippi Female College, and the Lincoln School. Among the manufactures are cotton and woolen goods, furniture, farming implements, lumber products, flour, and tobacco. Meridian is the second city of the State in population and is rapidly increasing its municipal facilities and commercial trade. General Sherman captured it in 1864 and destroyed the stores and railroads. Population, 1900, 14,050; in 1910, 23,385.

MERIDIAN, the great circle passing through the place where the observer stands and through both poles. Properly, there are as many meridians as places on the earth's surface. It is mid-day or noon at any place when the sun reaches that place. Longitude may be reckoned in degrees, minutes, and seconds east or west of any given meridian, but in geography the degrees of longitude are indicated east or west of some particular meridian. No place can have a location higher than 180° east or west, since distance is measured only one-half around the earth from the meridian taken as a basis. Books and maps used in the United States indicate distance east and west from both Washington, D. C., and Greenwich, England, but a convention held at Washington in 1884 decided that the meridian of Greenwich, England, should be taken as the basis for the world, and that the astronomical day should begin at noon from and after Jan. 1, 1885. Celestial meridians are imaginary circles that pass through the poles of heaven and the zenith of any locality on the surface of the earth.

MERINO (mê-rê'nô), a breed of domestic sheep, originally reared in Spain, but now acclimated in North America, Australia, and other grand divisions. This grade of sheep is noted for its excellent wool. It has long legs, is rather small in size, and its flesh is not highly esteemed. The males are horned and somewhat larger than the females.

MERLIN (mêr'lin), a bird of the falcon family, differing from the genus *Falco aesalon* in having longer and more slender tarsi and toes. It is bold in habits and from ten to twelve inches in length. The color of the males is somewhat variegated, having a bluish-gray tail, reddish-brown feathers on the back of the neck, bluish-gray on the head, and reddish-yellow on the breast and lower parts. The females are uniformly of a bluish-ash color. The merlin

builds its nest on the ground and is sometimes used in hawking larks, quails, partridges, and other small game. Several species have been described. The common merlin of Europe resembles the American pigeon hawk.

MERMAID (mêr'mād), a fabulous marine creature, having the upper half of the body like that of a woman and the lower like a fish. It is associated with the *merman*, the male corresponding to the mermaid. These beings are represented as having their home in the sea. They are described in the legends of Northern Europe and of other regions, and have entered extensively into poetry. It is thought that the dugong, a sea mammal, has been observed in its characteristic habit of holding its young while suckling at its breast and displaying its fishlike tail when diving, and thus gave rise to many of the early legends. Mermaids are frequently represented in paintings in the attitude of combing their long and beautiful hair while seated on a rock amid the dashing waves, and stories tell of their forming marriages with men, remaining faithful wives and mothers. In some of the legends it is represented that they live for a time on land and afterward entice their husbands to occupy ocean homes in unison with them. Many of the early traditions and legends are very beautiful and teach lessons of devotion and faithfulness quite as distinctly as the traditions and folklore of heroes and early myths.

MERRILL (mêr'rîl), a city in Wisconsin, county seat of Lincoln County, on the Wisconsin River, sixteen miles above Wausau. It is on the Chicago, Milwaukee and Saint Paul Railroad and is a market for lumber and farm produce. The principal buildings include the high school, the public library, the opera house, and many churches. Among the manufactures are clothing, lumber products, machinery, flour, cigars, utensils, and ironware. It has systems of sewerage and waterworks. Merrill was settled in 1875 and incorporated in 1880. Population, 1905, 9,197; in 1910, 8,689.

MERRIMAC (mêr'rî-māk), a river of New Hampshire and Massachusetts. It is formed by the confluence of the Winnipiseogee and Pemigewasset rivers at Franklin, N. H., flows almost due south into Massachusetts, thence has a northeasterly course, and discharges into the Atlantic Ocean near Newburyport. It is navigable to Haverhill, about sixteen miles. The Merrimac is noted for its important fisheries and supplies an abundance of water power. Among the thriving cities on its banks in New Hampshire are Concord, Manchester, and Nashua. The cities in Massachusetts include Lowell and Lawrence.

MERRIMAC, the name of a collier sunk by Lieutenant Hobson on June 3, 1908, at Santiago de Cuba with the view of making it impossible for the Spanish fleet to escape. Those on the vessel were captured and held prisoners by the Spaniards until July 6. This vessel was named after the *Merrimac*, a famous frigate of the Civil War. The latter had been abandoned by the Federals on Hampton Roads, but was reconstructed and renamed the *Virginia* by the Confederates. At Newport News it destroyed the *Congress* and the *Cumberland*, but was attacked by the *Monitor* on March 9, 1862, and was compelled to withdraw. In May of the same year the vessel was destroyed by the Confederates shortly before they evacuated Norfolk. See **Monitor**.

MERSEY (mēr'zī), a river of England, having its source by a union of the Etherow and Goyt in Derbyshire, and flowing, after a course of seventeen miles, into the Irish Sea near Liverpool. It courses through a fertile country and has been made navigable by a canal to Manchester. A tunnel passing under it connects Liverpool with Birkenhead. Sandbars at the mouth of the river were removed in 1895, and it is now possible for large vessels to enter the river when at low-water mark. The entire length is 68 miles.

MERTHYR-TYDFIL (mēr'thēr-tīd'fīl), a city of Glamorgan County, Wales, on the Taff River, 24 miles north of Cardiff. It has extensive railroad connections and is important principally on account of its extensive coal and iron mines. The streets are improved by paving, electric lighting, and waterworks. It is the seat of many important educational institutions and numerous churches. It has a large export and import trade. Population, 1906, 71,046.

MERV (mērf), an oasis of Asia, located in Turkestan, near the northeastern boundary of Persia. It is watered by the Murghab River, is sixty miles in length and forty in width, and has been improved by vast irrigation canals constructed under Russian supervision. The climate is favorable to the production of cotton, sugar, silk, wheat, and many varieties of fruit. Among the manufactures are cotton, woolen, and silk fabrics, carpets, and utensils. Domestic animals, such as cattle, horses, camels, and sheep, are reared. Considerable interest is taken in the mining of silver. General Skobelev captured the oasis in 1881 and since 1883 it has been Russian territory. A railway line has been built across Merv, which extends from the Caspian Sea to within a short distance of Chinese territory. Merv is the principal town. It is located on the railway line and river and has important trade and manufacturing facilities. The

inhabitants consist largely of Mongols, Arabs, Turkomans, and Russians. Merv, the capital, in 1908, had a population of 9,345.

MESENTERY (mēs'ēn-tēr-ŷ), the broad double fold of the peritoneum, by which the small intestine is attached to the spinal column. It incloses the nerves and blood vessels that supply the intestines. Between its folds are numerous lacteals and lymphatics as well as the ganglia known as the *mesenteric glands*. These glands are about the size of an almond and number from 100 to 150. The mesentery extends nearly the entire length of the intestine and is nearly four inches wide.

MESHED (mēsh'ēd), or **Meshid**, a city of northeastern Persia, capital of the province of Khorassan. It is celebrated as the sacred city of the Shiites, an important sect of Mohammedans. The city has one of the most noted mosques of the Moslem world, is surrounded by a wall, and has several sepulchers, among them those of Nadir Shah, Haroun-al-Raschid, and the Persian poet Firdusi. It is the seat of many schools, several minor mosques, public buildings, and a number of theological and secular colleges. The manufactures include clothing, jewelry, silk and cotton goods, rugs, velvets, carpets, sword blades, cutlery, and utensils. It has an important overland trade, being connected by caravan routes with Khiva, Bokhara, Herat, and Kerman. In its vicinity are productive turquoise mines. Population, 65,500.

MESMERISM (mēz'mēr-iz'm), a name originated from Friedrich Anton Mesmer, used to describe peculiar conditions produced by one individual on the nervous system of another. Mesmer believed that the stars exercise an influence over man, but later was persuaded to produce what he called *animal magnetism* by stroking the bodies of patients, thereby effecting peculiar sensations on the nervous system of those who came for treatment. In doing so he attracted general attention to the arts pursued by different individuals in early ages. Many of his followers became able to effect similar phenomena and later he reduced the system to a science. Such terms as *hypnotism*, *odylic force*, *electrobiology*, and *animal magnetism* imply practically the same art as mesmerism and are effected in substantially the same manner. Among the conditions necessary are that the person to be mesmerized gaze fixedly at some bright object, or at some individual, and that the hands of the mesmerizer be passed over him according to some fixed rule, or by having the eyes fixed steadily on some object and the operator completing the operation by breathing on the person. The patient is caused by these

means to pass into a state resembling sleep and while thus affected he remains unconscious.

Various stages in mesmerism are recognized, the highest being the state of muscular rigidity. During such a state the muscles are set rigidly as in a severe case of catalepsy, and the patient may be lifted by taking hold of his feet and head, the muscular rigidity holding the body in a horizontal position. When in this state, the patient is devoid of sensation and is insensible to pain, but during a state of being slightly hypnotized he may be made to imagine various things, such as believing himself a different individual, seeing peculiar things, feeling uncommon sensations, or smelling peculiar odors. Mesmerism has been successfully employed as a therapeutic agent in various diseases, especially in sleeplessness and several others resulting from nervous derangement. Some have gone so far as to profess that they possess power to communicate with persons at a distance, to forecast the future, and to produce various other phenomena. However, these claims must be taken with some allowance. Phenomena of a similar character are attributed by some to spiritualism, by others to clairvoyance, and still others to mind reading.

The theories of spiritualism attribute the various phenomena of mesmerism to spiritual influences, while *clairvoyance* is held to be a natural trance condition, thus differing from the artificially induced mesmerism or hypnotism. *Mind reading* in the ordinary instances of contact is usually explained by *muscle reading*, but in cases of absence it is attributed to spiritual influences. *Odylic forces* is a term applied by Baron von Reichenbach to influences which he claimed exist, and by reason of them mesmeric and kindred phenomena are to be explained. *Electrobiology* attributes them to electricity produced in the body. Many scientific investigations have been made in recent years, especially of the art known as hypnotism, and much attention has been directed to it and kindred subjects at accredited institutions. Dr.-Heidenhain, of Breslau, Germany, is one of the most eminent men of recent times to give the subject attention. In his work, known as "Animal Magnetism," he expresses the view that mesmeric and similar influences are brought about by producing temporary suspension of the brain forces that control voluntary motion, and that when such control is suspended it is possible to influence the senses so that involuntary movements may be produced.

MESOPOTAMIA (mēs-ō-pō-tā'mī-ā), the name applied anciently to the region between the Euphrates and Tigris rivers, but at present

it is used by Asiatic people to designate only the northern part. Anciently the entire region was associated with the monarchies of Babylonia and Assyria, when it was improved extensively by irrigation and navigation canals. The soil is naturally fertile, but the limited amount of rainfall renders it unproductive unless artificially watered, and on that account it is used at present principally for pastoral purposes. The entire region includes about 54,500 square miles. After its conquest by the Turks, in 1515, the systems of irrigation were interfered with to some extent, on account of which much of it has fallen back to its original barren state. The principal industry is the rearing of sheep, camels, goats, and cattle, but in some localities the cultivation of tobacco, cotton, millet, barley, wheat, hemp, and fruits is the leading industry. Nineveh and Harran were among the ancient cities. The region passed successively under the dominion of Assyria, Babylonia, Persia, Greece, Rome, and Arabia. At present it is a part of the Turkish Empire.

MESOZOIC (mēs-ō-zō'īk), the name commonly applied to the geological period between the Paleozoic and the Cenozoic. The epoch is sometimes termed the Secondary period. It includes the age of reptiles. The rocks are known as Triassic, Oölitic, and Cretaceous.

MESQUITE (mēs-kē'tā), a small shrub or tree native to North America, allied to the acacia. In some localities it is known as the honey pod and the honey locust. The seeds are eaten and the pods are used for stock food and for making a drink. In size the mesquite varies from a small thorny shrub to a widely branching tree fully fifty feet high. The wood is used as fuel and in some places for posts and building. The bark and wood are rich in tannic acid, hence are of value in tanning hides. Many regions of Texas, California, and Mexico have mesquite trees. Related species are found in some parts of South America, especially in Chile and Argentina.

A number of tufted grasses are known as mesquite. They are abundant in the southwestern part of the United States, where they are of much value for grazing. Since mesquite does not grow tall, it is seldom cut for hay, but it matures standing, hence furnishes excellent fodder late in the fall and during the winter, unless rotted by rains.

MESSENIA (mēs-sē'nī-ā), or **Messena**, a region of ancient Greece, in the southwestern part of the Peloponnesus, famous for its fertility and production of wheat. In the early history of Europe it possessed great opulence and power, but was vanquished by two wars with Sparta,

known as the Messenian wars, the first of which took place from 743 to 724 B. C. and the second from 685 to 668 B. C. Both wars terminated in defeat to the Messenians, after which they emigrated largely to Sicily, and from them the present Messina received its name. Messenia is now the name of a Grecian nomarchy, which has an area of 1,225 square miles and a population of 196,350.

MESSIAH (mēs-sī'ā), a term identical with the Greek word *Christos*, meaning the Anointed. Its equivalent, as for instance the Hebrew *mashiackh*, was applied to various gifted leaders of different nations, both Jewish and Gentile, especially those anointed with holy oil and whose reign was marked with the greatest prosperity. The prophet Daniel mentions a Messiah who was to appear and rebuild Jerusalem, but the city was to be destroyed by foreign invaders. The Jews applied the messianic prophecies as foretelling of a temporal king, who they thought would rise to liberate them from the oppression of foreigners. Jesus Christ affirmed himself to be the Messiah of Daniel's prophecy, and especially declared that the kingdom of God, based upon the truth taught by him, shall never be destroyed. All Christendom has acknowledged the claim, but according to Jewish belief the Messiah is still to be expected.

MESSINA (mēs-sē'nà), a city of Sicily, capital of a province of the same name, on the Strait of Messina, 59 miles northeast of Catania. It has a beautiful location, is well built, and contains a number of modern municipal improvements. The railroad conveniences and the commodious harbor have been instrumental in developing a large trade. Fully 3,650 vessels enter its harbor annually. The manufactures include principally silk, cotton, and woolen goods, clothing, hardware, machinery, coral products, and fruit essences. It has a large trade in fresh and salt fish, fruit, pottery, cereals, and merchandise. The city has good schools, a cathedral founded in 1098, and a university established in 1548. The university has a library of 60,000 volumes and is supplemented by a number of academies, seminaries, and colleges. Emigrants from Messenia founded the city in 732 B. C. Subsequently it passed into possession of the Carthaginians, Romans, Saracens, Normans, Spaniards, and Neapolitans. In 1861 it was made a part of Italy. Several severe earthquakes damaged it severely, particularly in 1908, when the larger part of its business section and many lives were destroyed. Population, 1906, 152,468.

MESSINA, Strait of, a narrow channel between Sicily and Italy, connecting the Ionian

and the Tyrrhenian seas. It is from two to twelve miles wide and twenty-six miles long. At some places it is very deep. The tide is irregular and the current is swift, hence navigation is somewhat dangerous. Messina and Reggio, two important ports, are located, respectively, on its western and eastern shores. Both were greatly damaged by an earthquake in 1908. See **Scylla and Charybdis**.

META (mă'tà), a river of South America, which has its source in the Andean Mountains. It flows northeast a distance of 700 miles and joins the Orinoco in Venezuela. The larger portion of its course is through Colombia. The valley of the Meta is noted for its fertility and luxuriant vegetation.

METALLURGY (mět'al-lûr-jÿ), the art of economically extracting metals from ores, including smelting, reducing, refining, alloying, and kindred processes. The methods employed in extracting metals from ores differ somewhat. Various metals are found in a pure state. Such is the case with gold, silver, platinum, and many others, when they are said to be *virgin* or *native*, and are washed in troughs to separate them from other substances. This process was employed quite generally in early mining in California, Australia, and, Alaska, but in the larger mining enterprises the metals are found mostly in combination with various ores, such as chlorine, oxygen, sulphur, and others, and to secure the ores it is necessary to employ vast boring machinery and powerful explosives.

After being brought to the surface, the ores are taken to a crushing mill, where they are ground by large rollers into small particles, and afterward the different metallic substances are separated by machinery. In some localities the stamping mills are used instead of crushing rollers to reduce the ore to fine particles, which is usually the method of treating tin ores, as they need to be reduced to a fine powder. In stamping mills heavy pieces of iron are lifted to some height above the ores, which, in falling by their own weight, crush the substances like hammers. After the ore has been reduced to a state sufficiently fine, it is sifted on a jigging sieve to separate the finer portions that include the more valuable metals, and these portions are next washed in water. It is apparent that the heavier metals will sink more quickly than the lighter; thus, the more valuable form a layer at the bottom of the water, while the lighter and less valuable make up a layer at the top. The latter are raked off, while the lower and purer are ready for smelting, a process of calcination or roasting by which volatile constituents are expelled.

Gold and silver ores are sometimes treated by a process known as *amalgamation*, in which these metals are dissolved out by mercury and are afterward separated from the amalgam by distillation. In the *cyanide process*, which is used for low grade ores, the ores are crushed and treated by a solution of cyanogen and afterward the metals are secured by various processes. Lately *electrolysis* has been adopted extensively in metallurgy, the process of treating the ores being somewhat similar to the essentials of electrotyping. Various other methods are in use, depending upon the kind and character of the ores in which the metals are found.

METALS, the elementary substances that form a base by combining with oxygen, and which are distinguished by chemists from other elementary substances known as *metalloids*, or *nonmetals*. It is difficult to form a definition that embraces all the metals and excludes all nonmetallic substances, for the reason that the two classes approach each other by various characteristics in which the marks of distinction become peculiarly imperceptible. Chemists usually place fourteen elements in the list of non-metallic substances. These include one liquid, five gases, and eight that form solids at ordinary temperatures, as follows: oxygen, hydrogen, nitrogen, sulphur, selenium, tellurium, phosphorus, chlorine, bromine, iodine, fluorine, carbon, boron, and silicon. However, hydrogen is considered a metal by some chemists, since it is chemically similar to the metals in its nature.

Among the principal characteristic properties of metals are opacity, metallic luster, solidity, except mercury at ordinary temperatures, insolubility in water, capability of forming salts when in a state of oxide, and the capacity of conducting heat and electricity. Many metals possess a ductility sufficient to admit them to be drawn out into wires, while some have a malleability that renders them capable of being rolled or beaten into thin sheets. Chemists usually regard 48 elements as metals, which they divide into the light and heavy classes, and according to this classification there are various subdivisions. The light metals are subdivided as follows: *true earth metals*—aluminum, cerium, didymium, erbium, glucinum, lanthanum, terbium, thorium, zirconium; *alkaline earth metals*—barium, calcium, magnesium, strontium; and *alkali metals*—caesium, lithium, potassium, rubidium, sodium. The following is a subdivision of the heavy metals: *metals whose oxide may be reduced by heat*—gold, iridium, mercury, osmium, platinum, palladium, rhodium, ruthenium, silver; *metals whose oxide forms weak bases*—arsenic, antimony, columbium or niobium, molybdenum, tan-

talum, titanium, tin, tungsten, vanadium; and *metals whose oxides form powerful bases*—bismuth, cadmium, cobalt, copper, chromium, iron, lead, manganese, nickel, thallium, uranium, zinc.

Besides the 48 named, there are several others regarded metals by some writers, but which have not been included. The ancients knew of only six metals, the list including gold, silver, copper, tin, iron, and lead, and their properties gave shape to the idea of a metal. Owing to the fluidity of mercury, it was not originally accepted as a metal, but, when it was found that it is hard and malleable in a frozen condition, its metallic property was admitted. In later times the isolation of the bases of the alkaline earths introduced among the metals elements that were not heavy, so that an exact scientific definition became impossible. Besides, several metals discovered in recent times exist in such small quantities that they are detected only by spectrum analysis, and it is quite likely that others will be added to the recognized list of metals. The different classes of metals unite with sulphur, oxygen, and chlorine, thus forming *sulphides*, *oxides*, and *chlorides*. Numerous combinations are possible with iodine, fluorine, and bromine.

METAMORPHIC ROCKS (mēt-à-môr'-fîk), a term applied in geology to rocks originally deposited in layers, but afterward so changed by the action of heat as to lose all traces of stratification. Metamorphism is caused by heat acting under pressure in the presence of moisture, and consists principally of a rearrangement in the chemical constituents of the rocks. Most of the metamorphic rocks are non-fossiliferous, but in some species all the traces of fossils have not been destroyed. They occur in various periods and consist principally of gneiss, schist, eurite, serpentine, quartz rock, clay slate, and crystalline limestone. Some of the metamorphic rocks have lost all traces of stratification, though others show evidences of having been formed by sedimentary deposits.

METAMORPHOSIS (mēt-à-môr'fô-sîs), a transformation in the character, structure, form, or shape of anything. It is applied in entomology to the series of transformations which insects undergo in their process of development from the egg to full maturity. In zoölogy the term has reference to the changes that take place from the time that an animal is excluded from the ovum or egg until sexual maturity is attained. In chemistry it refers to the chemical action caused by the presence of a peculiar substance, as a ferment, resulting in the decomposition of a compound. In botany it is applied

to the modification of one organ into another, as petals into stamens and stamens into pistils.

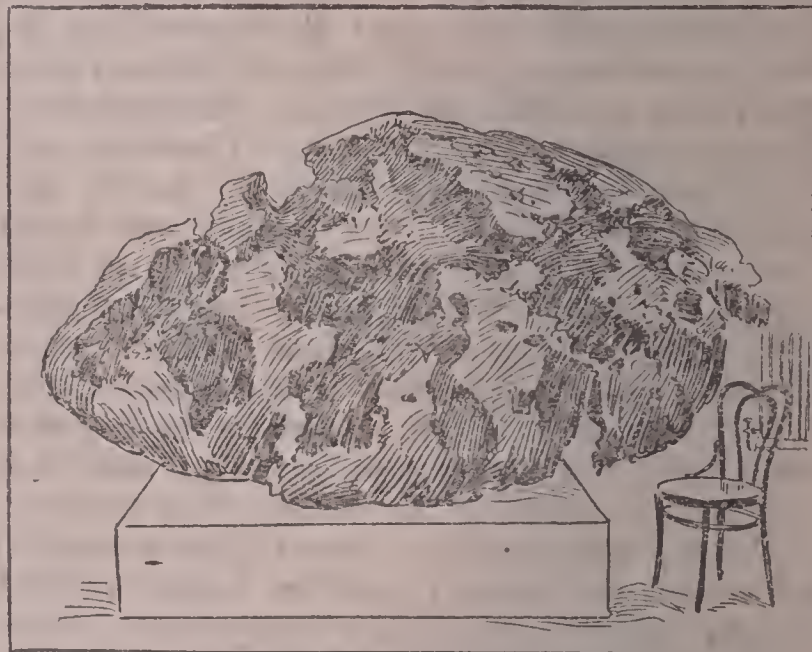
METAPHOR (mĕt'á-fēr), a figure of speech in which one object is likened to another. It is used for the purpose of implying that characteristics possessed by the one to which it properly belongs are possessed in at least some measure by the person or object to which it is applied. In the expression used by the Psalmist describing God's law as "a light to my feet and a lamp to my path," the use of metaphors is finely illustrated. The expressions "He was a lion in the fight" and "That man is a fox" take advantage of metaphor. In the expressions "He fought like a lion" and "That man is like a fox" similes are used, a simile differing from a metaphor in that a word of likeness is always expressed in the former.

METAPHYSICS (mĕt-á-fĭz'ĭks), a term first applied by Aristotle to a group of philosophical dissertations of which the ultimate principles of being, the science of the first principles of knowing, and the knowledge of God, as the prime cause of all things, were made the basis. The term is now employed to designate the science which treats of subjects that are incapable of being dealt with by physical research. In this acceptance it embraces that branch of philosophy which deals with the conceptions or principles at the basis of all phenomena, including *being, substance, time, motion, space, reality, change, identity, difference, cause,* and many others. Metaphysics is now divided into general and special. *General metaphysics, or ontology,* relates to the science of being in general. *Special metaphysics, or pneumatology,* embraces natural theology; *rational cosmology,* the science of the origin and order of the world; and *rational psychology,* which treats of the nature, faculties, and laws of the human mind. See **Psychology**.

METEOR (mĕt'ĕ-ēr), a small particle of matter that is thought to have its origin in disintegrated comets and moves around the sun in an orbit of its own. It is thought that there are many millions of meteors promiscuously distributed through space. They are variously known as shooting stars, aërolites, fireballs, meteoric stones, meteorolites, and falling stars. However, our knowledge of these bodies is confined to the relatively few which collide with the earth, or pass through the earth's atmosphere. When moving through space, their appearance is that of dark bodies, but, when coming in contact with the atmosphere, they become suddenly converted into heat by the friction resulting from passing swiftly through it. Generally the entire meteor is vaporized by the

friction, the exterior being brushed off by the air as soon as melted, often leaving a visible train in the sky.

Meteors rarely appear more than 100 miles above the surface of the earth, and generally become dissipated before coming within 25 miles of the surface. It is certain that the speed with which they pass through space is controlled by the sun, for the reason that this speed is comparable with the speed of the earth round the sun. It has been well established that meteors have regular orbits and that they originate from comets, this being demonstrated by groups of meteors that exist where formerly comets moved in fixed orbits. These meteors now travel in the same track, a fact especially true of Swift's comet, known since 1862, when it was established conclusively that meteors now occupy the orbit of that comet. Meteors consist



WILLAMETTE METEORITE.

of various known chemical elements. About one-third of all the elemental substances found in the earth's crust have been discovered, among them iron, sulphur, sodium, calcium, chlorine, carbon, and many others. Those that fall usually abound in stone, but in some instances there is a mixture of stone and iron, and in rare cases iron predominates. The fall of a meteor is accompanied by a peculiar noise as it passes through the air, and an explosion frequently results when it reaches the ground. At night and sometimes in daytime a long train of light is seen to follow its trail.

The most remarkable meteor observed in recent times fell in Iowa on May 10, 1879, in the vicinity of Storm Lake, the heaviest stone weighing 437 pounds. A meteor found in Texas weighs 1,635 pounds and is now a part of the Yale collection. A meteor weighing 1,400 pounds, now at the United States National Mu-

seum, Washington, was found near Tucson, Ariz., and one in the Amherst collection, taken from Colorado, weighs 435 pounds. The famous Willamette Meteorite, now in the American Museum of Natural History, New York City, was found in Oregon. Remarkable meteors fell in Alsace in 1492, in Normandy in 1803, and in New York in 1860. Showers of meteors occur most frequently in August and November. The Leonides group of meteors, which is calculated to have a revolution around the sun every 33 years, is seen in November. It appeared with unusual brilliancy on November 13, 1833, and again in 1866, but in 1899 it was less brilliant. Many other groups of meteors exist, the most important being the Lyraids, that appear in April; the Pagasids and Perseids, in August; the Andromeds, in November; and the Orionids, in October and November. Astronomers have estimated the number of meteors that traverse the atmosphere daily, including only those that are large enough to be visible to the naked eye on a dark clear night, at no less than 7,500,000.

METEOROLOGY (mē-tē-ēr-ōl'ō-gy), the science or department of natural philosophy that treats of the phenomena of the atmosphere. It relates especially to weather and climate, traces their relations to each other, and investigates the laws by which they are governed. This branch of study has come down from remote antiquity, but it did not take on its present extensive form and utility until the construction of telegraphic communication. Observations of weather and climate were made by the early Egyptians, whose general discoveries were gathered by Aristotle and published in connection with his own observations. Later Theophrastus, a pupil of Aristotle, classified many of the accepted signs that indicate stability or changes of weather and give evidence of approaching rain and storm. When such instruments as the thermometer, barometer, and hydrometer were invented, great strides of progress were made in meteorology, which, together with extensive explorations of the continents and oceans, facilitated the publication of observations that soon reduced the study to a science. When printing was invented, reports of the climatic conditions of different countries began to be published, and with the construction of telegraphic and telephonic communication it became possible to communicate impending changes of weather and climatic conditions to remote localities, thus furnishing security against many of the damaging effects of tornadoes on land and sea.

Societies for the investigation of laws that regulate meteorological variations were formed

in the early part of the last century, and toward the latter half of that century many of the leading governments began to establish public observatories. Since all the climatic phenomena are due to the action of the sun, but are variously affected by the altitude, size of land masses, proximity to the sea, winds, and character of the soil, it has been the purpose to make observations in relation to the various characteristics of weather and climate in different localities at the same time, and to make a record of variations at different times in the same locality. The former serve to secure intelligence regarding changes in the weather generally, while the latter aids in obtaining knowledge of the mean average rainfall and temperature of particular places. Many countries have taken special means to study the direction, locality, and probability of winds and to place the results, together with other valuable observations, on tabulated weather charts and meteorological maps. Such charts and maps are generally distributed by the government and are posted daily in public places.

Benjamin Franklin was among the first to make careful observations of meteorological phenomena in America. He was one of the earliest to call attention to the fact that storms of the northern states come largely from a westerly direction. Thomas Jefferson began taking observations at different points in 1772, for which purpose he established several stations, the two most important being at Monticello and Williamsburg, Va. Prior to that observations were made in particular localities, but Franklin led the way in making simultaneous investigations. However, the results were not communicated extensively until after the telegraph was invented. The United States Weather Bureau was originated in 1870 and in 1891 was placed under the direction of the Department of Agriculture. This bureau publishes forecasts of the weather twice daily, and causes them to be telegraphed to the various stations at which signals are displayed for the benefit of the public. It issues annually weather maps and numerous publications of a varied character. The forecasts made of the weather usually extend from 20 to 36 hours in advance. Canada and Newfoundland likewise have an efficient meteorological service. Observing stations are maintained at numerous points in all the provinces and in Yukon.

METER. See *Metre*.

METHANE (mēth'ān), or **Marsh Gas**, the name of a gas resulting from the decay of vegetable matter under water. It is found in the stagnant water of marshes, in many coal mines,

and in petroleum wells. This gas is colorless and odorless and when lighted burns with a bluish flame. Explosions of methane in coal banks is dangerous to the workmen. A similar gas in such places is called fire damp. See **Fire Damp**.

METHODIST (mĕth'ō-dĭst), one of the largest branches of the Protestant Church. It was organized about 1727 at Oxford, England, under the leadership of George Whitefield and John and Charles Wesley. Originally John Wesley called those who constituted the church the *United Society*, but students of Oxford originated the name *Methodist* in reference to the strict and methodical teaching of Charles Wesley. The denomination became independent of the Church of England in 1784, but even before that time promoted missionary work. The first society of the Methodist Church in North America was founded in New York City in 1766 and the first conference was held in Philadelphia in 1773, when 1,106 members attended for general deliberation. At a conference in Baltimore, in 1784, the main body formally adopted the name *Methodist Episcopal Church*.

Methodism is at present classified into seventeen denominations. The statistics of 1909 place the total membership of the world at over 18,500,000. While the communicants are widely distributed in the grand divisions, they are most numerous in the English-speaking countries. Among the organizations to promote religious influence are the American Bible Society, the Epworth League, the Woman's Home and Foreign Missionary societies, the Sunday School Union, and the Board of Church Extension. Many periodicals, institutions of learning, and thoroughly organized forces of missionaries are maintained. In 1908 there were 300,000 Methodists in Canada and they had 3,850 churches. The United States in the same year had 7,500,000, of which about half belonged to the Methodist Episcopal Church. The Methodist denominations of the United States are the most numerous among the Protestants. In 1909 the total membership was reported at 6,875,500, when they had 43,000 ministers and 63,500 churches. This total included 3,850,000 members of the Methodist Episcopal Church, which is the strongest body, and 1,850,000 communicants of the Methodist Episcopal Church, South. In the same year the Methodist Protestant Church had 190,000 communicants. Other denominations include the Free Methodists, the Primitive Methodists, the African Methodists, the Wesleyan Methodists, and the Congregational Methodists.

METHUEN (mĕ-thū'ĕn), a town of Massachusetts, in Essex County, two miles northwest

of Lawrence. It is on the Spicket River and on the Boston and Maine Railroad. It has the Nevins Memorial Library and a number of fine schools and churches. The manufactures include boots and shoes, cotton and woolen goods, machinery, cordage, and hats. An electric railway system connects it with neighboring cities. Methuen was settled in 1641 and incorporated as a town in 1725. Population, 1910, 11,448.

METHYL ALCOHOL (mĕth'ĕl). See **Alcohol**.

METONIC CYCLE (mĕ-tōn'ĭk sĭ'k'l), a cycle of nineteen years invented by Meton, a Greek astronomer, who flourished at Athens about 432 B. C. The year of this cycle consists of 235 lunar months, or 6,940 days, after which space of time the new moon occurs on the same day of the year on which it occurred at the beginning of the cycle. The eclipses may be reckoned in about the same order. Time was reckoned by the Greeks in lunar months, the year consisting of 354 days, 8 hours, 48 minutes, and 33.3 seconds, and upon this system of calculation depended the recurrence of many religious festivals and rites. However, some of the rites were fixed upon the recurrence of the seasons, hence they sought to bring their year in accord with the solar year, which consists of 365 days, 5 hours, 48 minutes, and 46 seconds. Certain inaccuracies in their calculations were afterward corrected by Callippus in the 4th century B. C. The *golden number*, which is indicated in most of the modern almanacs, is the number of any year in the cycle. In the Gregorian calendar the golden number of any year is reckoned from 1 B. C., since a new moon occurred in January 1 of that year. The golden number of any year may be found by adding one to the year and dividing the sum by 19, the remainder being the golden number. If the year plus 1 is divisible by 19 without a remainder, the year is the last of a cycle and the golden number is 19. Thus, 10 was the golden number of 1909.

METONOMY (mĕ-tōn'ĭ-mĭ), the exchange of names between things related. It is a figure of speech, consisting in the naming of a thing by one of its attributes, as substituting the material for the thing made, or the inventor for the thing invented. For example, we say a man keeps a good table, or we have read Virgil, meaning in the first case that the food is good and in the second that we have read the writings of Virgil.

METRE (mĕ'tĕr), or **Meter**, a term used in prosody to designate the succession of certain groups of syllables. The metre in classic languages depended upon the way in which long and short syllables succeeded one another, but

in English the metre depends upon the arrangement of accented and unaccented syllables. In each metre there is one accented syllable and one or two unaccented. Metre is also a name applied to a metrical measure of length, which equals 3.28 feet, or 39.37 inches.

METRIC SYSTEM (mĕt'rik), a system of measurement adopted in France by a convention in 1795. It bases all measures of capacity, weight, length, and area upon the value of a quadrant of the meridian measured between the Equator and the poles. The system is a great improvement over all other systems for the reason that it is purely decimal. It has been adopted in many of the European countries for all purposes of measurement, and obtains in the coinage and money systems of the United States and Canada. Though rarely used in ordinary business transactions in the United States, it is employed extensively by government officials and scientific men. The *meter* is the standard of the metric system, which was supposed to be one ten-millionth of the distance from the Equator to the Pole, measured on the earth's surface at the sea level. It is 39.37 inches long. The *liter* is the unit of measures of capacity, both for solids and liquids, and equals the cube of one-tenth of a meter, or 61.027 cubic inches, or 1.76 pints. The *gram* is the unit of weight. It is equivalent to about 15½ grains troy weight, and equals the weight of a cubic centimeter of distilled water at a temperature of about 39° Fahr. The following are the tables:

LONG OR LINEAR MEASURE.

10 millimeters (mm).....	=1 centimeter (cm)
10 centimeters.....	=1 decimeter (dm)
10 decimeters.....	=1 meter (m)
10 meters.....	=1 decameter (Dm)
10 decameters.....	=1 hectometer (Hm)
10 hectometers.....	=1 kilometer (Km)
10 kilometers.....	=1 myriameter (Mm)

MEASURES OF CAPACITY.

10 milliliters (ml).....	=1 centiliter (cl)
10 centiliters.....	=1 deciliter (dl)
10 deciliters.....	=1 liter (l)
10 liters.....	=1 decaliter (Dl)
10 decaliters.....	=1 hectoliters (Hl)
10 hectoliters.....	=1 kiloliter (Kl)

MEASURES OF WEIGHT.

10 milligrams (mg).....	=1 centigram (cg)
10 centigrams.....	=1 decigram (dg)
10 decigrams.....	=1 gram (g)
10 grams.....	=1 decagram (Dg)
10 decagrams.....	=1 hectogram (Hg)
10 hectograms.....	=1 kilogram (Kg)

METRONOME (mĕt'rō-nōm), an instrument for denoting the speed at which a musical composition is to be performed. It consists of a pendulum swung on a pivot, below which is a fixed weight and above it is a sliding weight that regulates the velocity of the oscillation by the greater or less distance from the pivot on which it is adjusted. The motion

is obtained by clockwork in most instruments, but some are impelled by the touch. The invention of this instrument is ascribed to Johann Maelzel (1772-1838), a native of Ratisbon, Germany.

METZ (mĕts), a fortified city in Germany, at the confluence of the Seille and the Moselle, in the imperial territory of Alsace-Lorraine. It is partly on islands in the two rivers and on several railroad and electric railway lines. The noteworthy buildings include the Church of Saint Vincent; the Gothic cathedral, the Church of Saint Constance, the palace of justice, the post office, and the central railway station. Among the manufactures are leather, cottons, hosiery, clothing, silk and woolen goods, musical instruments, machinery, toys, and earthenware. Metz was known as an important town during the Roman occupation, became a part of Germany by the division of Charlemagne's empire, and in 1552 was captured by the French. In the Franco-German War of 1870-71 it formed the principal stronghold of France on the northeastern boundary. It was held by a large military force under Bazaine, but was captured on Oct. 27, 1870, after a siege of the German army, when 180,000 men became prisoners of war. Since the annexation of Lorraine to Germany, Metz has been greatly strengthened as a fortified city and has developed materially in commercial and manufacturing enterprises. Population, 1905, 60,419.

MEUSE (mūz), a river of Europe. It rises in the Côte d'Or Mountains of France, thence flows northward through Belgium, and, after entering the Netherlands, it becomes known as the Maas River. The entire course is 565 miles, of which 430 miles are navigable, or to Verdun. It enters the North Sea by several mouths. Many thriving cities are on the river, including Rotterdam, Liege, and Sedan.

MEXICAN WAR, the war between Mexico and the United States, which extended from April, 1846, to September, 1847. Texas had seceded from Mexico and applied for annexation to the United States, which naturally caused the Mexicans to become apprehensive, but the desire of the proslavery party to extend the slavery territory in the United States had much to do with the creation of a hostile feeling between the two countries. In 1837 the United States recognized Texas as an independent government and it was annexed in 1845, which gave rise to a dispute concerning the boundary between Texas and Mexico. Texas, as a state of Mexico, had been bounded on the south by the Nueces River, but claimed the Rio Grande as the southwestern boundary. When James K.

Polk became President, in 1845, he favored the Rio Grande as the natural boundary between the two countries and directed that General Taylor proceed to occupy the disputed territory with a force of 3,000 Americans. In the spring of 1846, in obedience to further orders, he advanced to the Rio Grande. An engagement occurred between United States troops and a force of Mexicans on April 23, 1846, in which the former were defeated and a part of the force was captured. A message was promptly sent to Congress by President Polk, in which he declared that Mexico had invaded the territory of the United States. To this Congress at once responded that "by the act of the Republic of Mexico a state of war exists," and authorized the President to call for 50,000 volunteers. This bill passed both branches of Congress by an almost unanimous vote, and that body authorized the expenditure of \$10,000,000 for the prosecution of the war.

General Kearny marched into New Mexico and conquered the entire region, over which he raised the United States flag. He sent Colonel Doniphan to take possession of Chihuahua, while he himself proceeded to California, which was speedily conquered with the aid of Lieutenant Frémont. In the meantime General Taylor entered upon a plan to invade Mexico. The first important battle of the war occurred on May 8, 1846, at Palo Alto, where 2,300 Americans under General Taylor defeated 6,000 Mexicans under General Arista. The Mexicans retreated to Resaca de la Palma, where they were defeated the following day, and they retired in confusion to Matamoros, many drowning in crossing the Rio Grande. General Arista evacuated Matamoros May 17th and Taylor crossed the river and occupied that place the following day. In September he marched against the Mexicans at Monterey, where the latter had taken a strong position, but the place was captured on September 24, after a siege of three days.

A large part of Taylor's army was placed under command of General Scott, while the former retained his headquarters at Monterey. General Santa Anna, having learned of the condition of Taylor's army, decided to operate against him with 20,000 men. He took a position near Saltillo and on Feb. 22, 1847, began the Battle of Buena Vista. The Mexicans, though having a vastly superior number, were defeated after an engagement lasting two days. In the meantime Scott proceeded against Vera Cruz, where he landed an army early in March, and the city was captured on March 29, 1847. Scott soon after left Vera Cruz to march against the City of Mexico. At Cerro Gordo, a distance

of sixty miles from Vera Cruz, he was met by 12,000 Mexicans under Santa Anna, but they were defeated with a loss of 1,000 men and 3,000 prisoners. The Americans won successes in rapid succession at Puebla, Contreras, San Antonio, and Churubusco. The final movement to capture the City of Mexico began early in September. Molino del Rey was captured in a hand to hand fight on September 8 and the castle of Chapultepec was stormed and captured on the 13th. The Mexicans evacuated the City of Mexico on the 14th and General Scott at once took possession of the capital, where he established his headquarters.

The Mexican War is usually looked upon as one of unjust aggression on a minor power, with the object of winning more territory. It ended by the Treaty of Guadalupe Hidalgo, which was signed Feb. 2, 1848. It provided that the government of the United States assume the payment of \$3,250,000 debts due from Mexico to citizens of the United States and that the sum of \$11,000,000 be paid for the territory ceded. This cession of territory included what now comprises California and the portion of Arizona and New Mexico not included in the Gadsden Purchase.

MEXICO (mĕks'ĩ-kō), a city of Missouri, county seat of Audrain County, 105 miles northwest of Saint Louis. It is on the Wabash, the Chicago and Alton, and the Chicago, Burlington and Quincy railroads, and is surrounded by a productive farming and dairying country. Among the chief buildings are the Missouri Military Academy, the Hardin College for Women, the high school, and a number of county buildings. The manufactures include flour, wagons, machinery, and earthenware. It has systems of sanitary sewerage and waterworks. Mexico was settled in 1833 and incorporated in 1852. Population, 1019, 5,939.

MEXICO, the capital and largest city of Mexico, in a beautiful valley about 7,350 feet above sea level, in the south central portion of the country. It is located in the Federal District, a tract of 463 square miles, but the area of the corporation is about 22 square miles. Surrounding the city are a number of hills and in its vicinity are several lakes, of which Lake Texcoco is the most important. It is regularly platted, has well graded and paved streets, and is beautified by avenues of trees and public parks. Substantially paved highways and interurban electric railways extend many miles into the country. Several railroad lines connect the city with all parts of the country and with portions of the United States and Central America. It has a fine system of public waterworks,

gas and electric lighting, street railways, public schools, colleges, and a central university.

The architecture differs from that of most large cities of America in that it is not as high, which is accounted for by the occurrence of earthquakes at various times. In the center of the city is a magnificent cathedral, founded in 1573, which is 426 feet long and was built at a cost of \$2,500,000. The national capitol, on the east side of the Plaza de Armas, is 675 feet long and contains the government offices. The National Museum of Natural History and Antiquities has a valuable collection of Aztec relics. Other buildings include the city hall, the Church of the Jesuits, the national library of 225,000 volumes, the Mexican School of Mines, the Iturbide Hotel, the post office, and many schools and hospitals.

Mexico ranks as the most important commercial city of Latin North America. It has a large wholesale and jobbing trade and contains many railroad shops, cotton and woolen mills, brick and tile yards, banks and commercial associations, and meat curing and packing establishments. Among the general manufactures are cigars, jewelry, machinery, carriages, fabrics, laces, spirituous liquors, and earthenware.

Mexico is situated on the site of Tenochtitlan, an ancient city of the Aztecs, which was founded by them in 1325. It was the capital of the Montezumas and was captured by the Spanish under Cortez in 1521. The ancient city possessed vast wealth and much beauty at the time of the conquest, but was destroyed, and Mexico was founded in its place with the assistance of a large force of natives. For about 300 years it was one of the most noted cities of imperial Spain, became the capital of Emperor Maximilian, and has been the seat of the republic since its establishment. The inhabitants are mostly native Mexicans, but include many French, Germans, English, and Spaniards. Population, 1908, 358,422.

MEXICO, a republic of North America, located between Central America and the United States. It is bounded on the north by the United States and the Gulf of Mexico, east by the Gulf of Mexico, the Caribbean Sea, and British Honduras, south by Guatemala and the Pacific Ocean, and west by the Pacific Ocean. The length from north to south is about 2,000 miles, the breadth is from 125 to 1,600 miles, and the area is 767,316 square miles. Its boundary with the United States has a length of 1,833 miles, a large part of which is formed by the Rio Grande. The narrowest point is between the Gulf of Campeche and the Gulf of Tehuantepec, east and north of which is the peninsula

of Yucatan. In the western part, west of the Colorado River and the Gulf of California, is the peninsula of Lower California. The Tropic of Cancer divides it into almost equal portions, thus placing it partly in the North Temperate and partly in the Torrid Zone. It has a coast line of about 6,000 miles, including 4,574 miles on the Pacific Ocean. A number of small but fertile islands lie off the coast, including Cozumel Island in the Caribbean, Island de Cedros in the Pacific, and Angel de la Guarda in the Gulf of California.

DESCRIPTION. The greater portion of the surface is an elevated tableland, much of which is fully 8,000 feet above sea level. It slopes quite abruptly toward the Gulf of Mexico, except in the broad depression of the Rio Grande, and somewhat less steeply toward the Pacific. The mountains are a continuation of the Cordilleras of North America and include ranges known as the Sierra Madre, Sierra Madre del Sur, Sierra de Tarahumare, and Sierra de Navarit. The ranges trend almost uniformly from southeast toward the northwest and include a number of lofty peaks and volcanoes, though most of the latter are dormant or entirely extinct. Orizaba, the highest peak, has an elevation of 18,250 feet, and is situated on a line drawn between Vera Cruz and the City of Mexico. Popocatepetl, 17,784 feet, is an active volcano with a crater 250 feet deep. Other vast elevations include Ixtaccihuatl, 16,950 feet; Nevado de Toluca, 14,945 feet; Malinche, 13,450 feet; Cofre de Perote, 13,400 feet; Colima, 12,970 feet; and Jorullo, 4,330 feet. Many of the peaks extend above the snow line, which is about 15,000 feet high, hence they give rise to numerous glaciers and rapid-flowing mountain streams. Jorullo, though not greatly elevated, is noted as an active volcano and is said to have risen above the surface during an eruption in 1759. The mountains enumerated are located in the southern part of the country, but elevated ridges trend northward and a range of mountains traverses Lower California. A large part of the interior, though highly elevated, has a level surface.

The Rio Grande, which forms the boundary between the United States and Mexico, is the most important river. Within the country it receives few tributaries, the only one of note being the Rio Conchos, which enters the Rio Grande at Presidio del Norte. The Rio Salado, whose waters are made saline by their slow passage through shallow basins, joins the Rio Grande at Guerrero. In the eastern part is the Rio Pánuco, which flows into the Gulf of Mexico at Tampico. The Usumacinta enters the country from Guatemala, having its source in

Lake Petén, and flows northward into the Gulf of Campeche. Among the rivers of the western section are the del Altar, the Sonora, the Yaqui, and the Mayo, flowing into the Gulf of California, and the Rio de las Balsas and the Larma, or Santiago, flowing into the Pacific. In the course of the last mentioned, about fifteen miles from Guadalajara, are the beautiful Falls of Juanacatlan. The country has many small lakes, but few are of importance. Lake Chapala, located chiefly in the state of Jalisco, is the largest inland body of water. It discharges through the Larma River.

The climate is greatly diversified in different sections and as a whole it is warm and healthful. Along the coast the climate is hot, farther inland it is temperate and equable, and the higher elevations are somewhat cold. The regions lying from 3,000 to 6,000 feet above sea level are the most healthful, while the lower coast plains are quite unhealthful, though systematic drainage of the swamps has improved the conditions materially. The mean annual temperature along the coast is about 80°, but the temperature frequently rises to 100°, and in some places, as at the port of La Paz, the thermometer rises to 104°. In the moderately elevated sections the annual temperature ranges from 60° to 70° and in the higher altitudes, from 50° to 60°. A large portion of the interior has a scant rainfall, ranging from 18 to 25 inches, while in some sections of the coast lands it is 125 inches. At the City of Mexico the mean rainfall is 30 inches per year. Though subject to earthquakes, comparatively little damage is done by these disturbances.

FLORA AND FAUNA. The vegetation differs greatly according to climatic influences. In traveling a few hours it is possible to observe great differences in the growth and classes of plant life. Those riding on trains in some sections may observe the wheat just coming above the ground, while in others the fields are ripening, and in the lower lands the grain is being threshed. Many varieties of trees abound, though some of the mountains have been cut over to supply material for fuel and timber for the mines. The lowlands have fine forests of mahogany, rose wood, gum trees, palms, and oil-bearing trees. In the higher altitudes are oaks, pines, and firs.

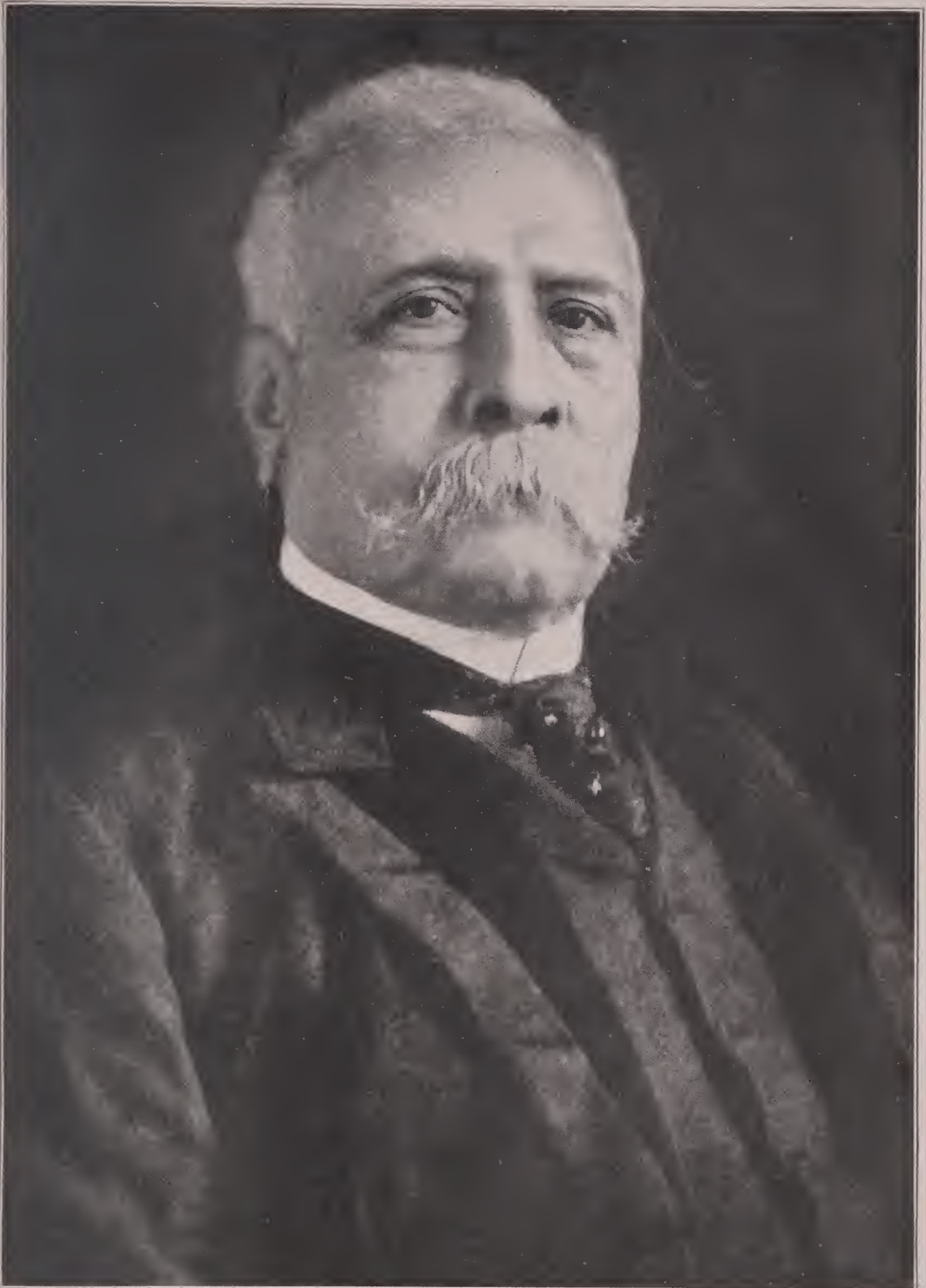
The mountains are frequented by many wild animals, such as the puma, bear, ocelot, jaguar, and peccary. The tropical forests have many species of monkeys and the sloth. Squirrels, hares, otters, deer, and beavers are widely distributed, and the rattle and coral snakes are well represented. The birds native to Mexico in-

clude vultures, parrots, humming birds, turkeys, and many songsters native to the warmer climates.

MINING. Mexico is one of the richest mining countries of the world, though the fields have not been developed to the extent of their possibility. Iron deposits of great value are found in Durango, Michoacan, and Jalisco. It is estimated that the famous Cerro del Mercado, a hill of magnetic iron ore, 1,100 feet wide, 4,800 feet long, and 650 feet high, contains 300,000,000 tons of ore above the general surface of the district, but the deposits likewise extend below the plain. Deposits of silver and native copper abound in the vicinity of the city of Guanajuato. Gold is found principally on the slope toward the Pacific. In 1909 about 1,200 mines were in operation, with an output of ore valued at \$125,000,000. The annual output of silver is \$75,500,000 and gold \$20,000,000. Coal occurs in veins ranging from four to sixteen feet in thickness, including both bituminous and an excellent grade of anthracite, but the production has not been materially large, owing to inadequate railroad facilities. Formerly the supply of coal was imported largely from England and the United States, but the fields of Sonora, Oaxaca, and Michoacan are being developed with a view of both supplying domestic consumption and furnishing material for exportation. Building stone, such as granite and limestone, are very abundant. Other minerals worked more or less extensively include salt, copper, lead, cobalt, sulphur, and quicksilver.

AGRICULTURE. Few countries are equally well adapted to the growth of valuable plants. Coffee is grown extensively for exportation and both yield and quality take high rank. Cotton is an important crop in the states bordering on the Pacific and the Gulf of Mexico, but the quantity produced is consumed largely by the local mills. This is true to about the same extent of sugar, which is made from cane grown chiefly in the lowlands of the southern part. Wheat is the most important of the cereals, being cultivated in nearly all parts of the country, and the cultivation of corn is carried on throughout the temperate region. Other crops include rice, tobacco, barley, beans, and many varieties of tropical fruits. Dye plants and aloes are grown profitably.

Stock raising is one of the important industries, especially in the savannahs of Vera Cruz and Tabasco, where cattle are reared and fattened by feeding on nutritious grasses. The ranches are known as *haciendas*, at which large herds are in charge of herders known as *vaqueros*. However, the cattle are rather inferior in



PORFIRIO DIAZ.

Porfirio Diaz, President of Mexico, was born at Oaxaca, Mexico, September 15, 1830. He first studied law and then joined the Mexican army, with which he distinguished himself in the war with the United States. In 1863 he was made military governor of Vera Cruz, serving until 1876, and in the meantime rendered valuable service in the military operations against France. He was proclaimed President by Congress in 1877, serving until 1880, and was elected to the presidency in 1884. President Diaz is serving his eighth term in the presidency, having occupied that position continuously since 1884.

quality, being of the long-horn type. Considerable interests are vested in rearing sheep, both for the wool and for mutton. The horses grown are quite hardy but of small size. Steers are used to some extent as animals of draft, but they are being displaced by horses and mules. Poultry is grown profitably in all sections of the country.

MANUFACTURES. Recent years have witnessed a noticeable improvement in the volume and class of manufactures, especially textiles, cigars, and machinery. Cotton manufacturing was not introduced until 1834, but at present a large number of cotton spinning and weaving mills are operated, many of which are propelled by water power. Sugar is one of the important manufactures, but the output does not materially exceed home consumption. Many tobacco factories are operated, producing snuff, cigars, and pipe tobacco. The national beverage of Mexico, known as *pulque*, is produced in large quantities from a species of the agave. Other manufactures include carpets, flour, drugs, leather, embroidery, feather work, clothing, beer, and whisky. Home industries are encouraged by the government through a protective tariff system, nearly all imported goods being taxed according to their value.

TRANSPORTATION AND COMMERCE. The first railroad was built in 1854 from Guadalupe to the City of Mexico, a distance of three miles. The construction of railroads has been rapid since 1870 and important trunk lines are now operated in most sections of the country. The total lines aggregate 15,750 miles. Three lines connect the principal trade centers with points in the United States, and a line crosses the narrow strip of land lying between the Gulf of Campeche (Mexico) and the Gulf of Tehuantepec. Electric railways are operated in many of the cities and through some of the more densely populated rural districts. The country has 2,500 post offices, 30,500 miles of telephone lines, and 46,500 miles of telegraph lines. An extensive coast facilitates communications by water, but few of the rivers are navigable, including only the Colorado and the Rio de las Balsas.

The commerce of Mexico is increasing rapidly and the exports somewhat exceed the imports. Foreign trade, in the order of importance, is with the United States, Great Britain, Germany, France, and Spain. The leading commodities exported are silver, gold, coffee, woods, copper, hides, tobacco, and fruits, and the chief imports embrace coal, machinery, and manufactured articles. The annual imports aggregate \$75,800,000 and the exports, \$95,200,000. The

United States is the chief market for the products of Mexico, and is likewise the source from which the greater part of its foreign supplies are obtained.

EDUCATION. All the states maintain a system of public schools at which attendance is free and compulsory, but the school attendance laws are not strictly enforced. More than half of the people are unable to read and write. Educational advancement is confined largely to the whites and those of mixed bloods, while illiteracy prevails generally among the Indians. About one-half of the schools are managed by the federal and state governments, and the remainder are either maintained by the municipalities or by religious bodies. Special schools of law, medicine, engineering, and the practical industries are supported by the government. About 750 newspapers, including dailies and weeklies, are published. The country has 175 public libraries, including the national library at the City of Mexico, which contains 225,000 volumes. In literary and scientific advancement the people of Mexico occupy the first stage in the Spanish-speaking countries of America and a number of their authors, painters, and sculptors have produced works of high rank.

The religion is largely Roman Catholic, but since 1857 there has been absolute religious freedom for all classes and the church is divorced entirely from the state. The total number of churches is placed at 10,375, which includes about 200 Protestant places of worship. A large number of missions and religious schools are maintained. The larger number of Indians still hold to pagan worship, though Christianity has been adopted by many.

GOVERNMENT. Mexico is divided into twenty-seven states, three territories, and the federal district comprising the capital of the republic, to which is joined a small adjacent territory. It is governed under a constitution that dates from 1857, which is modeled after that of the United States. The president is chosen indirectly by the electors for a term of six years and is eligible to reelection from time to time. In case there is a vacancy in the presidency, it devolves upon congress to choose an acting president. The chief executive is assisted by a cabinet of seven secretaries, who are at the heads of the departments of the interior, foreign affairs, colonization and industry, justice and public instruction, finance and public credit, communication and public works, and war and marine. The legislative power is vested in a congress constituted of a senate and a house of representatives. Members in both branches are chosen by indirect ballot, the representatives for

two and the senators for four years. Half of the senators are elected every two years, the representation in the senate being by two senators from the federal district and from each of the states. The judicial power is vested in circuit and district courts, which are subordinate to the supreme court of the nation. Each state has its own legislature, courts of justice, and a resident governor.

INHABITANTS. The inhabitants consist principally of descendants from early Spanish settlers and Indians. Spanish is the official and spoken language, but a number of different dialects are used. Many branches of business are monopolized by foreigners, principally by the English, Germans, and French. Immigration is encouraged by the government, under which a large number of agricultural colonies have been established. Mexico, the capital and largest city, is located in the south central part. Other cities include Puebla, León, Vera Cruz, Guadalajara, San Luis Potosí, Monterey, Pachuca, Durango, Zacatecas, Mérida, Querétaro, Oaxaca, Morelia, Aguascalientes, Toluca, Colima, and Jalapa. Population, 1908, 15,503,892.

HISTORY. Much of the early history of Mexico has been gathered from tradition and the hieroglyphics found on its monuments. According to the best authorities its early history is divided into the two periods of the Toltecs and Aztecs. The Toltecs are thought to have occupied a large region in the center of Mexico, extending from the Gulf of Mexico to the Pacific Ocean. They not only possessed a knowledge of agriculture, but constructed highways, founded cities, built temples, and erected monuments and pyramids, many of which have thrown much light upon their customs and industries. In about the 11th century they occupied Yucatan and portions of Central America, and by the early part of the 13th century the Aztecs moved southward and into the regions of the City of Mexico, on whose site they founded the ancient city of Tenochtitlan in 1325. It is thought that the Aztecs were constituted largely of a mixture of Toltecs and of other North American Indians, and it is certain that they possessed less advancement in civilized arts than the earlier occupants of Mexico.

In 1519 Cortez landed with a force of Spaniards in the region now occupied by Vera Cruz and two years later the country was conquered, when Cortez named it New Spain. He officiated as the captain general until in 1535. The method of Spain, like that of most countries pursuing policies of foreign conquest, was directed with a view of utilizing the natives as slaves in the development of mines and plantations and

to monopolize its trade. Under this policy Mexico remained oppressed for more than 300 years, or until 1821, when the last of 57 imperial viceroys was compelled to surrender Spanish authority. The rebellion properly started in 1808, while Spain and France were at war, the Mexicans thus profiting by complications in the mother country. A chief of the insurgents, General Iturbide, became emperor on May 18, 1822, assuming the title of Augustine I., but the republican forces under Gen. Santa Anna remained active and forced the emperor to abdicate in 1823. He was shot after attempting to recover his possessions the following year.

Interior complications continued to disturb Mexican politics for some years. In 1836 Texas was separated by declaring its independence, and, after forming a republic, was admitted to the United States in 1845. The following year a war began with the United States on account of a boundary dispute, but Mexico lost in every battle, and in 1848 concluded peace by ceding about 500,000 square miles of territory. After the war with the United States, the government was represented largely by Santa Anna until in 1861, when General Juarez became its president. Soon after the country became involved in a war with France, Spain, and England, which countries sent allied troops to Mexico for the purpose of opening a way for internal improvements, and to invalidate the confiscation of church property and the separation of church and state, which had been made by General Juarez. The difficulties were first terminated by a treaty of peace with Spain and England, but France dissented and took possession of the City of Mexico by a military force in 1863. Archduke Maximilian of Austria was induced by Napoleon III. to become emperor of Mexico, a course against which the United States government remonstrated. However, General Juarez defeated the imperial forces. Maximilian was taken a prisoner and shot in 1867. General Juarez was elected president of the newly formed republic, a position he held until his death in 1872. He was succeeded by General Tejada, but in 1876 a revolution brought General Diaz into the presidential office. He administered the government with eminent ability, and in 1880 was succeeded in the office of president by Manuel Gonzalez. Diaz was again elected president in 1884, and on account of his vigorous and popular administration was reelected in 1888, 1892, 1896, 1900, and 1906. Under his administration the country has been signally successful, progressing educationally and industrially.

MEXICO, Gulf of, the most important inlet from the Atlantic Ocean in North America, sit-

uated south of the United States and east of Mexico. It has an area of 716,200 square miles. The general shape is circular. The greatest length from southwest to northeast is about 1,115 miles. At its entrance from Florida to Yucatan it is about 500 miles wide, and midway between the two points is the western extremity of Cuba. Within the gulf are a number of small islands. The coastal lands are quite low. Among the principal rivers that flow into it are the Mississippi, Rio Grande, Colorado, Brazos, Apalachicola, Mobile, and Usumacinta. The Gulf Stream enters it through Yucatan Channel and passes out through the Straits of Florida. On or near its shores are the cities of Key West, Mobile, Matamoros, Galveston, and Vera Cruz.

MEZZOTINT (mĕz'zō-tĭnt). See **Engraving**.

MIAMI (mĭ-ām'ĭ), a river of Ohio, which has its source in Hardin County, and after a course of 150 miles toward the southwest discharges into the Ohio River twenty miles west of Cincinnati. It flows through a rich agricultural country, furnishes valuable motive power, and for seventy miles is paralleled by the Miami Canal. The Little Miami River is about 25 miles east of the Miami. It has a course of 100 miles almost parallel to it, and flows into the Ohio River six miles above Cincinnati.

MIAMI INDIANS, a tribe of Algonquin Indians who inhabited a region extending along Green Bay and Lake Superior, where they were found by the French in the 17th century. At that time they occupied palisaded villages, but in 1721 large numbers of them scattered to different parts of the valleys of the Miami and Wabash rivers. Their hostility to the Iroquois induced them to show a spirit of friendship toward the English in 1755-60, but later difficulties arose between them and the settlers. Under the leadership of their chief Little Turtle they defeated General Saint Clair in 1791. Gen. Anthony Wayne was sent against them in 1794 and the following year they concluded a treaty of peace. Their lands from the Ohio to the Wabash were ceded in 1809. In the War of 1812 they fought against the Americans. They removed to Indiana in 1818, and in 1846 the tribe was transferred to a reservation in Kansas. The Miamis lost their identity by intermarrying with the Peorias and Pawpaws. The recent government reports show only 86 distinct Miamis.

MICA (mĭ'kà), a group of minerals having certain allied characteristics, the most common being that they have a perfect basal cleavage, affording thin, tough scales. These scales or sheets may be so thin that it takes from 1,000 to

10,000 to equal an inch, this depending largely upon the class of mica. Some writers who have recently investigated this difficult group of minerals class them all with the monoclinic system, that is, crystallines possessing one symmetrical plane and dipping in only one direction from the axis of elevation. Some species of mica are brittle and break into small sheets or plates, but others are tough and occur in large plates fully twenty inches in diameter. They vary from colorless to jet black and from transparent to translucent, and are of widely different chemical composition. The constituents of most micas are made up essentially of silicates of aluminum and an alkali, as sodium, potassium, or lithium. Extensive deposits are found in North Carolina, New Hampshire, Oklahoma, Peru, Siberia, the Scandinavian peninsula, and Russia.

Among the different varieties are *paragonite*, or sodium mica; *muscovite*, or potassium mica; *sinnwaldite*, or lithium-iron mica; *lepidolite*, or lithium mica; *lepidomelane*, or iron mica; *phlogopite*, or magnesium; *biotite*, or magnesium-iron mica; and *roscoelite*, or vanadium mica. The principal use of mica is for lights in lanterns, stoves, and windows, its transparent quality making it of value for these purposes. It is less liable than glass to breakage by sudden change of temperature or discharge of large implements of war, on account of which it is employed extensively on battleships as a substitute for glass.

MICHIGAN (mĭsh'ĭ-gan), a north central



state of the United States, popularly called the *Wolverine State*. It is located in the region of the Great Lakes and consists of two peninsulas,

known as the Upper and Lower. The two peninsulas are separated by the Straits of Mackinac. The Lower Peninsula is the larger and is bounded on the east by Lake Huron, the Saint Clair River, Lake Saint Clair, the Detroit River, and Lake Erie; south by Ohio and Indiana; and west by Lake Michigan. The Upper Peninsula is bounded on the north by Lake Superior; east by Saint Mary's River, which separates it from Canada; south by lakes Huron and Michigan and the State of Wisconsin; and west by Wisconsin and Lake Superior. Its length from north to south is about 340 miles and the average width is 185 miles. About 200 islands are included with the State, among them Drummond in Lake Huron, Beaver and North Manitou in Lake Michigan, and the Apostle Island in Lake Superior. The area is 58,915 square miles, including 1,485 square miles of water surface,

DESCRIPTION. The State has a coast line of 1,625 miles, being larger in proportion than that of any other State. Among the inlets on its coast are Saginaw and Thunder bays in Lake Huron, Green and Grand Traverse bays in Lake Michigan, and Keweenaw and Whitefish bays in Lake Superior. The Thumb, between Saginaw Bay and Lake Huron, and the Keweenaw peninsula in Lake Superior are the principal projections. In the Upper Peninsula the surface is hilly and rugged and at various points reaches altitudes of 1,500 feet. Porcupine Mountain, 2,022 feet, is the highest elevation in the State. It is located in a ridge known as the Porcupine Mountains, which include the famous Copper Range and extend toward the southwest into Wisconsin. In the Lower Peninsula the surface does not rise more than 600 feet above the lakes and the mean elevation above the lake level is about 200 feet.

The drainage is chiefly toward the south. In the northern part the rivers are comparatively small. They include the Ontonagon and the Taquamenon, draining into Lake Superior, and the Escanaba and the Manistique, draining into Lake Michigan. The Menominee, which forms a part of the boundary of Wisconsin, flows into Green Bay. In the southern part are the Grand, Manistee, Muskegon, Kalamazoo, and Saint Joseph rivers, flowing into Lake Michigan; the Au Sable, Cheboygan, and Saginaw, flowing into Lake Huron; and the Huron and Raisin, flowing into Lake Erie. The State has a great many lakes, including about 5,000 of considerable size, and many of them have no visible outlets. Among the larger lakes are Torch, Higgins, Hubbard, Houghton, Gogebic, Cheboygan, Otsego, and Michigamme. On the eastern boundary are the Detroit and Saint Clair rivers, which

connect Lake Saint Clair with lakes Huron and Erie and separate Michigan from Ontario. The Saint Mary's River forms part of the eastern boundary of the Upper Peninsula.

The climate is much more severe in the north than in the south. As a whole the summers are cool and the winters are severe in the north, where the snowfall is very heavy. In the south the climate is mild, being modified by the prevailing winds from the southwest and the proximity of three of the Great Lakes. At Ann Arbor, in the southern part, the snowfall is 30 inches, while at Houghton it is 130 inches, the heaviest in the United States. In the south the rainfall is about 30 inches, and the precipitation is quite evenly divided throughout the year. At Lansing the average temperature is about 46°, with extremes ranging from 100° in July to 20° below zero in winter. In the Keweenaw Peninsula the thermometer frequently falls to 30° below zero. All of the northern section is subject to frequent cold waves.

MINING. Michigan ranks second in the production of copper. The annual output is 115,500 long tons, fully thirty per cent. of the total output for the United States, and this yield is exceeded only by the State of Montana. The Calumet and Hecla mines continue to yield over one-half of the total production in the State. In the output of iron, which next to copper is the chief mineral, Michigan also takes second rank and is exceeded only by Minnesota. At present the yield of iron per annum is 10,500,000 long tons, valued at \$22,500,000. Michigan was the leading salt-producing State until 1893, in which year it was displaced by New York until 1901, when Michigan again reclaimed its place as the leading State in salt production. The yield per annum is 9,200,000 barrels, about 38 per cent. of the output of the United States. In the production of gypsum Michigan holds first rank, producing annually an output valued at \$275,000. Bituminous coal of a superior grade is mined profitably. Other minerals include gold, commercial clays, and mineral waters. Large quantities of building stones occur, including granite, limestone, and sandstone.

AGRICULTURE. The southern part is fertile and its surface has been cleared largely of its forests and rendered suitable for cultivation. About one-half of the area is included in farms, which average 86 acres each. The central part of the State has a sandy soil and tracts of sandy land extend along various portions of the lakes, especially along Lake Michigan. Corn is grown extensively in the south, while wheat, oats, barley, buckwheat, and vegetables thrive in all parts of the Lower Peninsula. Michigan usually has

second rank in the production of sugar beets and is celebrated for the quality and quantity of its peaches, apples, plums, and cherries. About ten million peach trees bear fruit and the number of bearing apple trees is somewhat larger. The State has a large production of celery, peppermint, potatoes, chickory, and beans.

Cattle raising for meat and dairy products is an important enterprise, much of the product being sold in the larger cities of the State and in Chicago and Indianapolis. The live-stock industry is favored by the growth of nutritious grasses, the acreage of which is about equal to that of both corn and oats. Horses of a superior grade are grown for local use and for exportation. In the number of sheep it is exceeded only by one State east of the Mississippi, the State of Ohio, and it has almost equally large interests in rearing swine. Poultry is grown extensively and large interests are vested in rearing mules.

MANUFACTURES. Michigan possesses a variety of materials useful in manufacturing enterprises. In the northern part are large forests of pine, beech, elm, hemlock, oak, and other valuable woods. Lumber and timber products take rank among the leading manufactures of the State. The flouring and grist mill industry is likewise important, and the milling is done largely at points where water power and superior shipping facilities are available. Grand Rapids and Detroit have extensive interests in meat packing. Large furniture factories and machine shops are located in several cities. It holds a particularly high rank in the output of machinery, beet sugar, and automobiles. Kalamazoo is a center for the manufacture of paper and wood pulp. Other products include chemicals, farming implements, steel and iron, clothing, and tobacco products. Large quantities of fruit are canned or cured for the market and several cities have manufactures of foodstuffs, such as postum, shredded wheat, and oat meal. The fisheries of the lakes yield many varieties of fresh-water fish, large quantities of which are marketed fresh or as canned products.

TRANSPORTATION AND COMMERCE. All parts of the State have extensive railroad facilities, but the larger systems are represented in the southern part. These lines furnish direct communication through the southern section from Chicago to points in Eastern Canada and the United States, both by the way of Detroit and Cleveland. The railways aggregate a total of 8,500 miles. Though the rivers furnish an abundance of water power, they supply only a limited amount of navigation facilities. Being located on four of the Great Lakes, it has unusual ad-

vantages in communication by water. Several excellent canals have been provided, including Saint Clair Canal, completed in 1871, and Saint Mary's Ship Canal, an important improvement on the Saint Mary's River, the latter having greater transportation interests than the Suez Canal of Africa.

The State occupies an important position in domestic and foreign commerce. Large quantities of lumber, iron ore, fruit, and salt are exported. These exports have a wide sale in various parts of the United States and foreign countries, especially iron ore, which is taken to the smelters of Illinois and Ohio. Other exports include machinery, paper, leather, and furniture. Considerable quantities of food products and clothing are imported. Detroit and Grand Rapids have large jobbing and wholesale establishments.

EDUCATION. The educational system of Michigan consists of (a) the public schools under the three subdivisions: primary districts, graded schools, and city districts; (b) the State normal schools as follows: the State Normal College at Ypsilanti, the Central Michigan Normal School at Mount Pleasant, the Northern State Normal School at Marquette, and the Western State Normal School at Kalamazoo; (c) the University of Michigan at Ann Arbor. In addition to these institutions, the law provides for country normal training classes for teachers in the primary school districts. Forty counties have established these classes and enroll about one thousand pupils annually. The foregoing institutions are all public and are sustained by taxation.

The educational system is so arranged and adjusted that pupils may begin their work in the primary districts, whence they pass through the articulated courses of the high schools and enter the normal schools and the university. This system is not only closely articulated, but it is made effective for all classes of people. In addition to the State educational institutions that are for all children, the State maintains a public school for dependent children, industrial schools for boys and girls, and institutions for the instruction of the deaf and blind. Sixteen thousand teachers are employed in the public schools and 7,270 school districts are maintained, including the primary, graded, and city districts. One hundred of these are incorporated cities. In the Upper Peninsula the township district prevails, while in the Lower Peninsula the primary district system is maintained. The State agricultural college, situated near Lansing, is the first one of the kind established in the United States and is at present the largest

institution of this class in the country. Other institutions of higher learning include Adrian College, Adrian; Battle Creek College, Battle Creek; Detroit College, Detroit; Hope College, Holland; Kalamazoo College, Kalamazoo; Hillsdale College, Hillsdale; Alma College, Alma; Olivet College, Olivet; and Benzonia College, Benzonia.

Penitentiaries are located at Jackson and Marquette, a house of correction is at Ionia, the industrial school for girls is at Adrian, and the industrial school for boys is at Lansing. Grand Rapids has a State soldiers' home and Lapeer has an institution for the feeble-minded. Coldwater is the seat of a school for feeble-minded children and Flint has a school for the deaf and dumb. Asylums for the insane are maintained at Newberry, Kalamazoo, Pontiac, and Traverse City.

GOVERNMENT. The constitution was originally adopted in 1835, but it was materially revised at various times since, particularly in 1850 and in 1900. By it the chief executive authority is vested in the Governor and the Lieutenant Governor, who are elected for terms of two years. Other State officers include the secretary, auditor, treasurer, attorney-general, and superintendent of public instruction, all serving for two years. The legislative authority is vested in the General Assembly, which consists of 32 senators and 100 representatives, all of whom serve for two years and may be reelected. Sessions of the Legislature are held biennially. A chief justice and eight associates constitute the supreme court, all of these judges being elected for terms of eight years. The circuit judges, who preside over the circuit courts, are elected for six years. Each county has a court of probate and each township may have not to exceed four justices of the peace. The local government of cities and towns is administered by a mayor and a city or town council.

INHABITANTS. The State has 42 persons to the square mile, but the southern part has the greater share of the inhabitants. However, there has been a steady increase of the population of the northern part, owing partly to the construction of railways and extensive developments of the iron and copper mines. The foreign born inhabitants consist largely of Canadians and Germans. Lansing, in the south central part, is the capital. Detroit, Grand Rapids, and Saginaw are the largest cities. Other important cities include Bay City, Jackson, Kalamazoo, Muskegon, Port Huron, Battle Creek, Ann Arbor, Manistee, Flint, and West Bay City. The largest cities of the Upper Peninsula include Laurium, Ishpeming, Menominee, Mar-

quette, Hancock, Escanaba, and Ironwood. In 1900 the State had a population of 2,420,982. This included a colored population of 22,419, of which 6,354 were Indians and 15,816 were Negroes. Population, 1910, 2,810,173.

HISTORY. The region occupied by Michigan was first visited by the French in 1610. It was explored by French Jesuits in 1641. Father Marquette founded a mission at Sault Sainte Marie in 1668, and three years later a settlement was established on the present site of Mackinac. Detroit was founded in 1701, but the population did not increase rapidly until after the French surrendered their claim to the English by the Treaty of Paris. Mackinac was destroyed and its garrison was massacred at the time of Pontiac's War, and Detroit was besieged for five months during these troubles with the Indians. The territory became part of Canada in 1774 and in 1783 it was ceded to the United States, though the English did not relinquish possession until in 1786. It was then known as the Northwest Territory, from which Ohio was set off in 1800. Two years later the Lower Peninsula was made a part of the Territory of Indiana.

Michigan was set off in a separate Territory in 1885, when William Hull was made Governor. It was the scene of British and Indian raids during the War of 1812, when Mackinac, Detroit, and Frenchtown fell into the hands of the British, who were later defeated by Commodore Perry on Lake Erie. Owing to a dispute in regard to the southern boundary, where a strip of land was claimed by Ohio, it was not admitted as a State until 1837. The capital was removed from Detroit to Lansing in 1847. Prohibition of the sale of liquor became a part of the constitution in 1853, but it was abolished in 1876, when a high license liquor law was enacted. For the past quarter of a century the State has grown rapidly in wealth, population, and educational development.

MICHIGAN, Lake, one of the five great lakes of North America, third in size of the group, and the only one that is situated wholly within the United States. It separates the two peninsulas of Michigan and extends between the states of Michigan and Wisconsin, forming also a part of the boundary of Illinois and Indiana. The length from north to south is 350 miles, the average width is 60 miles, and the area is 22,450 square miles. Few high bluffs characterize the shore, which is mostly low and sandy. In many places the sand hills a short distance inland have a height of 150 feet. The principal inlets include Grand Traverse and Green bays and the most important harbors are at Chicago, Milwau-

kee, Sheboygan, Michigan City, Muskegon, and Racine. Its greatest depth is about 1,000 feet and the elevation above sea level is about 581 feet. Numerous lighthouses and important fisheries are off its shores. Among the rivers that discharge into it are the Muskegon, the Saint Joseph, the Kalamazoo, the Grand, and the Manistee. Lake Michigan discharges into Lake Huron by the Strait of Mackinac, but some of the outflow is carried through the Chicago Drainage Canal into the Mississippi system.

MICHIGAN, University of, an educational institution at Ann Arbor, Mich. It was founded in 1837 on a tract of land set apart by Congress in 1826. In 1841 it was opened for instruction and the first class graduated in 1845. Originally a number of preparatory schools were affiliated with it, but these were discontinued or merged into high schools. The departments include those of engineering, law, literature, pharmacy, science and arts, dentistry, medicine and surgery, philosophy, and preparatory courses. A very high standard of efficiency and scholarship is maintained. It was made coeducational in 1870 and now has a large proportion of female students. The gross income is \$1,200,000, the property has a value of \$2,750,000, and the library contains 225,000 volumes. The average annual attendance is about 4,850 students.

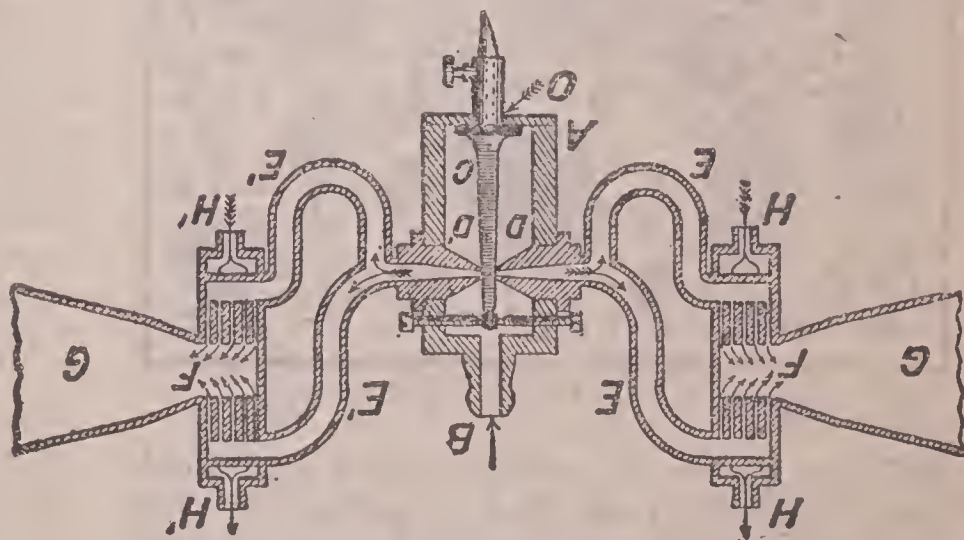
MICHIGAN CITY, a city of Indiana, in Laporte County, 38 miles southeast of Chicago, Ill. It is the only port on Lake Michigan in Indiana and is on the Michigan Central, the Père Marquette, the Lake Erie and Western, and other railroads. The chief buildings include the public library, the high school, the Federal life-saving station, the Northern Indiana State Prison, and the Saint Marie's Academy. Among the manufactures are furniture, cigars, boots and shoes, lumber products, bicycles, railroad cars, and machinery. It has a large trade in lumber, salt, grain, and iron ore. The place was platted in 1832 and incorporated in 1837. Population, 1900, 14,850; in 1910, 19,027.

MICROMETER (mī-krōm'ē-tēr), an instrument for measuring small distances accurately, or to obtain the measurements of the diameters of small spheres. Various forms of this device are in use. A simple micrometer consists of a U-shaped piece of brass or steel. Through one arm is fitted a screw, which is turned by means of a head. On the inner metal sleeve is a longitudinal scale and each end of the outer sleeve has a circular scale. The measurement is taken by placing the body between the screw and one arm of the instrument, and the diameter is

measured by reading both the circular and longitudinal scales. Another kind of micrometer is attached to a telescope or microscope, called a *position micrometer*, and is used to measure linear distances more accurately than is possible by using a simple rule or scale.

MICROPHONE (mī'krō-fōn), an instrument invented by Prof. Hughes in 1878, which is used to increase the intensity of low sounds. A number of forms have been constructed, but the essential feature in all is to carry faint sounds to a more sonorous body, which emits a more audible sound. This is effected by placing a piece of charcoal between two blocks of carbon and making connection with a telephone. The slightest sound made on the wooden support of the charcoal is magnified enormously. To a person placing the ear-piece of the telephone to his ear the tread of a fly becomes audible. The ordinary carbon telephone transmitter depends on the principle of the microphone.

In a new megaphone exhibited in the French Academy of Sciences, in 1908, the sound vibrations are transmitted to and from a convenient flame. Air and acetylene are used as burning gases. In the illustration, the distributing mechanism consists of a chamber, *A*, into which the combustible mixture is introduced under pressure through a conduit, *B*. A vane, *C*, supported on knife edges at *O*, is mounted at the bot-



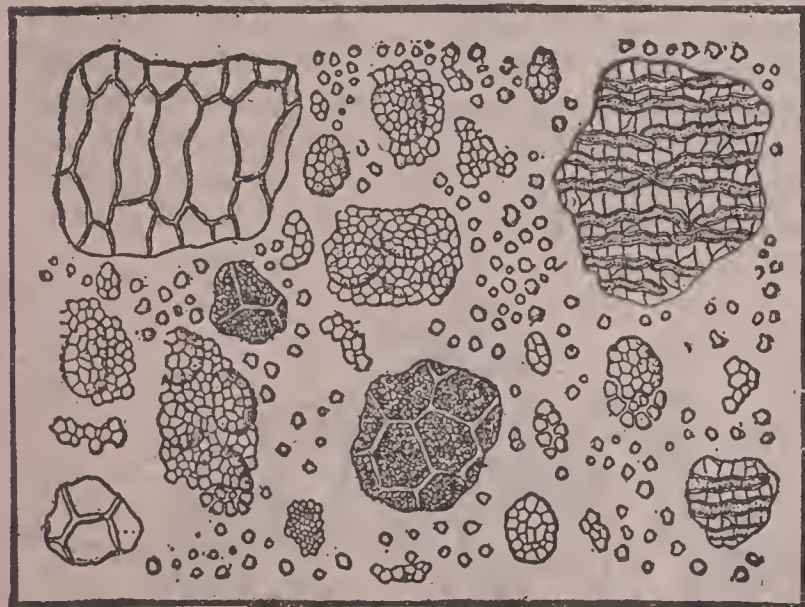
FLAME MICROPHONE.

tom of the chamber, *A*, an elastic ring being provided to insure airtightness in *O*. Any motion given to the pencil is transmitted to the vane, *C*, inside of the distributor. On either side of *C* openings, *D* and *D'*, are provided through which the gaseous mixtures are allowed to issue in respectively equal amounts as long as the vane is immovable. Any displacement of *C* will, however, result in an increase of the amount of gas issuing on one side, while the amount issuing on the other side is reduced. The total amount of utilized mixture remains

constant, and the pressure in the interior of the chamber is also unaltered.

The gases are collected and conveyed to the burners through a series of conduits, E, E, E', E' . The burners consist of a series of disks cooled by an air current, HH' , the gases being expanded and reduced to a temperature such that combustion always occurs in the chamber, FF' , just at the point where the gases escape from the openings of the burner. The apparatus further comprises two funnels, GG' . The power of the sounds obtained, which is truly remarkable, depends on the amount of gas mixture used and on the energy expended during its combustion.

MICROSCOPE (mī'krō-skōp), an optical instrument designed to examine minute objects or parts of objects, which so magnifies otherwise invisible or indistinct details that their structure or texture may be seen clearly. Simple forms of the microscope have been in use from an early period, perhaps prior to the Christian era, but the more powerful compound microscope is thought to date from 1590, when

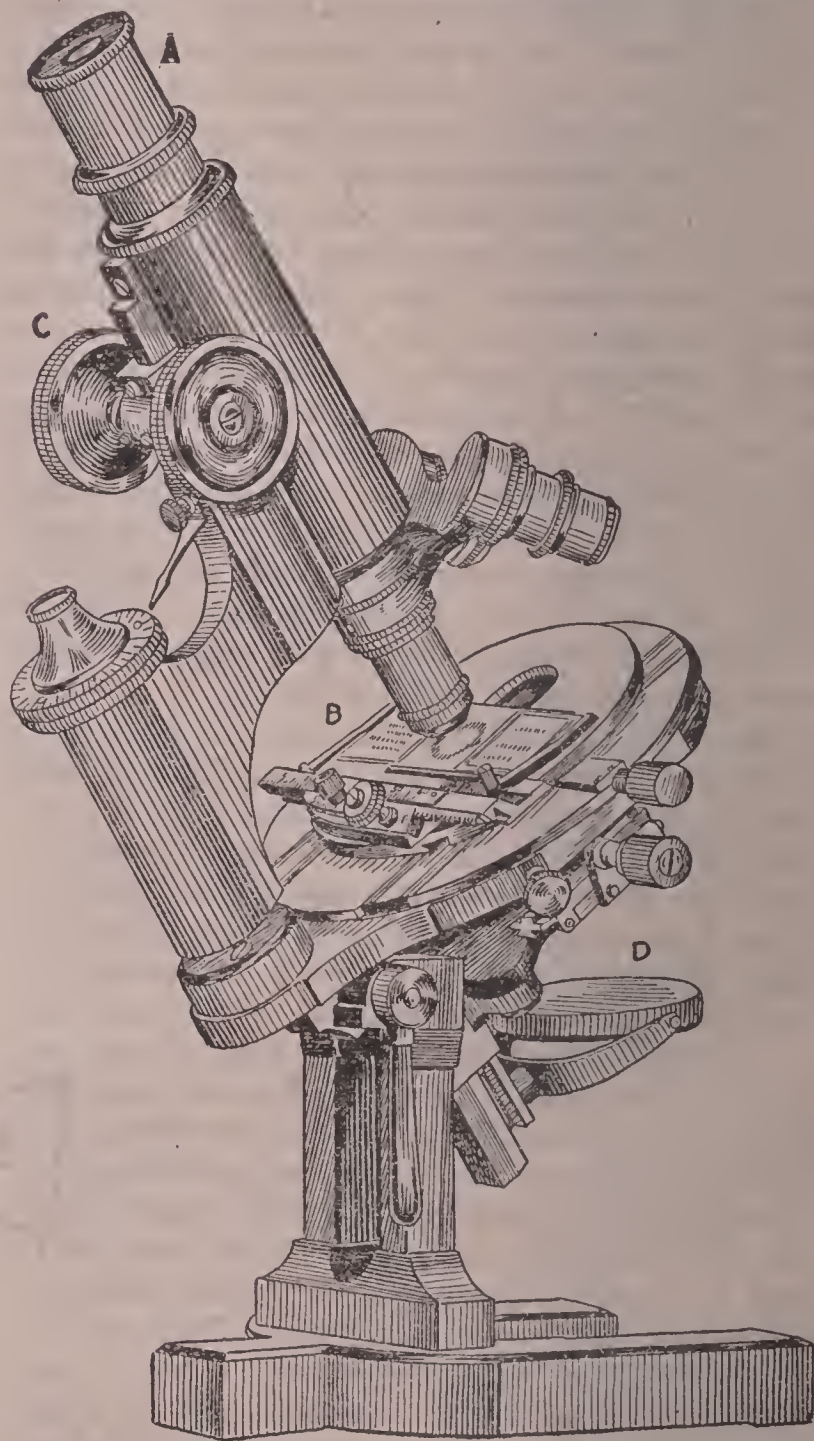


GRAINS OF RICE FLOUR (MAGNIFIED).

Zacharias Jansen, a spectacle maker at Middelburg, Holland, began their manufacture. The first modern specimen was brought to England in 1617 by Cornelius Drebbel, who came from Holland to serve as mathematician to James I. The principle involved consists of interposing between the eye and the object to be examined a magnifying lens, in the manner of a magnifying glass. It may consist either of a single lens or a number of lenses, but when the latter is the case the construction is such that they can be used as one or all in combination.

In the simple microscope the lens is formed of glass ground in such a way that when placed between the object to be examined and the eye it changes the direction of the rays of light,

with the effect that more are brought to bear upon the object, causing it to appear much larger than it really is. A compound microscope has a combination of lenses arranged so a magnified image of the object is projected by one lens in the manner of a magic lantern, and this image is further magnified by a second power, as in the simple microscope, thus producing results vastly more powerful. The first lens of a compound microscope is called the *object glass*, or *objective*, and the second is known as



MONOCULAR MICROSCOPE.

A, Eye-piece; B, Object glass; C, Screw to focus tubes; D, Mirror to reflect light on object to be examined.

the *ocular*, or *eyepiece*. The object glass is the more important, and the shorter its focus the larger is the image produced. A *monocular* microscope presents an image to only one eye and a *binocular* microscope is constructed for the use of both eyes. In the latter advantage is taken of several methods for dividing by prisms

the pencils of rays from the objective, which diverge to eyepieces properly placed. A *solar* microscope is one in which a lens condenses the sun's rays upon an object placed in its focus, and intense illumination causes the objective to project a greatly enlarged image. The *electric* microscope utilizes the rays from an electric light in a similar way, while the *lucernal* microscope employs a lamp to illuminate the object, and the *oxyhydrogen* microscope employs the light from lime made incandescent by the oxyhydrogen flame.

The first microscopes of a high character manufactured in the United States date from 1847. At present there are many periodicals and associations that are devoted exclusively to microscopic research. While the telescope has brought the heavenly bodies to us for examination, the microscope has enlarged and extended our vision so we may study myriads of forms in and about us that formerly were wholly unknown. The microscope is used in many fields of investigation. It has aided in the study of plants, minerals, and animals, and is the medium that brought about the achievements of Koch, Darwin, and Pasteur. With this instrument it is possible to magnify objects several thousand times. By the use of the most powerful instruments minute particles, equaling the one-millionth of an inch, can be seen.

MIDDLE AGES, or **Mediaeval Period**, a period of history which extends from the decline of the Roman Empire until the revival of letters in Europe. It is sometimes extended to embrace the entire period of time between the ancient and modern civilizations. Some writers place the beginning of the period at the time of the invasion of France by Clovis, in 486 A. D., and the end at the invasion of Naples by Charles VIII., in 1495. Others fix the beginning at the overthrow of the Western Roman Empire, in 476, by Odoacer and some writers at the time when Charlemagne became emperor of the West, in 800, while its end is placed by these writers at the close of the Reformation in Germany, the invention of printing, the discovery of America by Columbus, and the Peace of Westphalia in 1648. Some writers term this period the Dark Ages and make it include the time between the classical literature of Greece and Rome and the literature of modern Germany, a period when learning was at its lowest ebb. Among the noteworthy incidents of interest occurring in the Middle Ages are the widespread establishment of the feudal system, the rise of the Roman Hierarchy, the Crusades, the development of German, Italian, and French nationalities, the Norman conquest of England, and

the establishment of the Holy Roman (or German) Empire.

MIDDLEBORO (mĭd'd'1-bŭr-ō), a town of Massachusetts, in Plymouth County, on the Nemasket River, nine miles east of Taunton. It is on the New York, New Haven and Hartford Railroad and has communication by electric railways. The chief buildings include the town-hall, the public library, and several schools and churches. The picturesque scenery makes it an attractive summer resort. Among the manufactures are boots and shoes, woolen goods, lumber products, and straw goods. It has a growing trade in merchandise. The place was settled in 1662 and was incorporated in 1669. Population, 1905, 6,888; in 1910, 8,214.

MIDDLESBROUGH (mĭd'd'1z-b'rŭh), a city of England, in Yorkshire, near the mouth of the Tees River, 46 miles north of York. It is one of the modern cities of England, having been founded in 1829. Its prosperity dates from the discovery of immense deposits of iron ore in 1840. The city has a well-improved harbor and modern municipal facilities, including pavements, gas and electric lighting, sanitary sewerage, and street railways. The manufactures include ironware, rails, engines, boilers, pottery, steamboats, clothing, chemicals, and tubes. Among the noteworthy buildings are the customhouse, the public hall, the high school, and many fine churches. The place was incorporated in 1853, after which the harbor was greatly improved. Population, 1907, 101,783.

MIDDLETOWN, a city of Connecticut, county seat of Middlesex County, on the Connecticut River, fifteen miles south of Hartford. It is on the New York, New Haven and Hartford Railroad and on several interurban electric railways. The noteworthy buildings include the Wesleyan University, the Berkeley Divinity School, the Russell Free Library, an industrial school for girls, and an asylum for the insane. Portland, on the opposite side of the river, has extensive limestone quarries. Among the manufactures are flour, cotton and woolen goods, machinery, ironware, and clothing. It has a large trade by river navigation. Middletown was settled in 1650 and was chartered as a city in 1784. Population, 1900, 9,589; 1910, 11,851.

MIDDLETOWN, a city of New York, in Orange County, on the Wallkill River, 65 miles northwest of New York City. It is on the Erie, the New York, Ontario and Western, and other railroads, and is surrounded by a fine farming, dairying, and stock-raising country. It has a fine high school, a public library, and the State Hospital for the Insane. The manufactures include jewelry, condensed milk, hardware,

printers' supplies, hats, and clothing. It was settled before the Revolution, became a village in 1848, and was chartered as a city in 1888. Population, 1905, 14,516; in 1910, 15,313.

MIDDLETOWN, a city of Ohio, in Butler County, on the Miami River, 34 miles northeast of Cincinnati. It is on the Miami and Erie Canal and on the Cincinnati, Hamilton and Dayton, the Cleveland, Cincinnati, Chicago and Saint Louis, and other railroads. The noteworthy buildings include the high school, the public library, the Masonic Temple, and the opera house. It has a growing trade in farm produce and merchandise. The manufactures include tobacco, paper, flour, machinery, hardware, edged instruments, and utensils. It has systems of public lighting, waterworks, and sanitary sewerage. The vicinity was settled in 1794. Population, 1900, 9,215; in 1910, 13,152.

MIDDLETOWN, a borough of Pennsylvania, in Dauphin County, on the Susquehanna River, nine miles southeast of Harrisburg. It is on the Pennsylvania and on the Pittsburg and Reading railroads, and is surrounded by a farming and lumbering country. Among the chief buildings are the public library, the high school, and the Frey Orphans' School. The manufactures include stoves, chemicals, furniture, furnaces, railroad cars, engines, and hardware. It has electric lights and street railways, city waterworks, and well-graded streets. The place was settled in 1756 and incorporated in 1828. Population, 1900, 5,608; in 1910, 5,374.

MIDIANITES (mīd'ī-ān-īts), an ancient race of Arabia, according to Scripture, the descendants of Midian, the son of Abraham by Keturah. They inhabited a large area near the Dead Sea, in Syria, their possessions extending from the plains of Moab to the Red Sea. Their trade with Egypt was extensive, especially in live stock, cereals, and fruits. In the time of the Romans their mines possessed much value. The Scriptures mention the Midianites as being hostile to the Israelites. They were conquered by Gideon and worshiped Baal-Peor. The Midian sheik Jethro was the father-in-law of Moses, being a member of a Cushite tribe of the same name.

MIGNONETTE (mīn-yūn-ēt'), a plant native to the northern part of Africa, but now widely naturalized and cultivated for its highly fragrant flowers. The leaves are wedge-shaped, the flowers are whitish or greenish-yellow with fringed petals, and the seed vessels open at the top. In America it is an annual, but in the country of its nativity it is a perennial. The name by which it is known is from the French and signifies "Little Darling."

MIGRATION (mī-grā'shūn), a term applied to the act of migrating or removing from one region or country to another. Migration has been studied particularly in relation to periodical movements of animals from one region to another. Many genera and species of birds in all parts of the Temperate zones migrate at reasonably certain periods of the year to other parts. Most generally they spend the winter in the warm regions of the tropics and the spring and summer in the temperate portions of higher latitudes. Some of the birds, as the swallows, ducks, geese, cranes, swans, and many others, migrate in large bodies, while others move singly toward the point of destination. It has been observed that most birds prefer to pursue their flight against the wind, some even resting during the flight while the atmospheric movements are unfavorable. Many fishes move periodically into streams and fresh-water bodies from the sea to deposit their eggs and various classes of insects, such as the locusts, ants, and others, change localities by flight or by moving in vast colonies. The migratory grasshoppers of the United States have been studied with interest, as well as those of Eurasia and Africa. Many of the mammals are inclined to migrate, as, for instance, the bisons of North America in an early period, but most species of mammals rather make incursions than periodical movements.

Some writers have accounted for migration on the basis of instinct, but others ascribe the phenomenon in birds to the search for food, which has become exaggerated by the power of flight. Likewise, the migration of locusts is ascribed to hunger resulting from a lack of food in the vicinity long occupied. The migration of fishes is thought to be due to a desire to deposit their spawn in favorable localities. In botany, the term is applied to the tendency that feathery or downy seeds have to be carried by the wind, and in others to their transportation by streams and oceanic movements to regions far remote from the place of growth. Migrations of man have been directed chiefly by personal interest. They are governed largely by latitude, settlements being formed most generally in regions having a climate quite similar to those from which the emigration takes place.

MILAN (mī'lan), a city of Italy, on the Olona River, 25 miles south of Lake Coma. It is the capital of the province of Milan. The city is surrounded by three walls, which may be entered by twelve gates, and is now the most important railroad center of Lombardy. The streets are broad, well paved, and lighted by electricity. It has railroad facilities and an ex-

tensive system of electric street railways. Although the city dates from remote antiquity, it has few ancient buildings, owing to successive wars, but there are several dating from the Revival of Learning that take high rank for beauty and architecture. The most prominent building is the Duomo or Cathedral, a Gothic structure, which ranks next to Saint Peter's in Rome as the most excellent of Italy. Other noteworthy structures include the Church of Saint George, the Church of Saint Ambrose, founded in the 4th century, and the Church of Saint Nazaro, a modern structure of great beauty. The La Scala theater has accommodation for 3,600 persons and is the finest in the city.

Fine works of art are in many of the public places and in the historic buildings, among them products by Mantegna, Titian, Vandyck, and Raphael. The Ambrosian library contains 175,000 volumes and the national library at Milan has 190,000. It has many collections of engravings, paintings, and statues. Near the center of the city is an open space called the Piazza del Duomo, or Cathedral Square, in which is an amphitheater with a seating capacity for 30,000 persons. It has a number of excellent schools, hospitals, colleges, and universities. The manufactures include cotton, silk, and woolen goods, boots and shoes, lace, jewelry, carpets, cheese, tobacco, porcelain, hats, velvets, ironware, machinery, and railroad cars. It is a financial and banking center. Many large printing establishments, both of books and periodicals, are located here.

Milan has an interesting history, authentic dates occurring as early as 222 B. C., when it was conquered by a Roman army. Roman occupation caused it to rise as a center of wealth, literary taste, and political influence, and in the 4th century A. D., Maximilian made it the residence of the imperial court. The Huns under Attila sacked it in 452. Later it passed into possession of the Goths, Longobards, and Franks, and in 774 it became a part of the German Empire. Here Charlemagne was crowned and it was the place of coronation of the German emperors as kings of Italy. Milan was the head of the Lombard League in the 11th century. It was made the capital of the Ghibellines in 1395 and after 1545 the city passed successively to Spain, Austria, and France. Its fortune was that of various sovereigns and nations until in 1859, when the Treaty of Villafranca annexed it and the whole of Lombardy to Piedmont. Population, 1906, 493,241.

MILAN CATHEDRAL, one of the most famous Gothic cathedrals of the world, located

in Milan, Italy. It ranks next to Saint Peter's at Rome in size and importance as an ecclesiastical structure. The length is 486 feet; breadth, 287 feet; and height of the tower, 356 feet. It contains about 2,000 statues, besides a vast number of carvings and paintings. The building is mainly of Carrara marble. Gian Galeazzo Visconti laid the foundation in 1386, but many celebrated architects and artists contributed toward its completion. Napoleon was crowned King of Italy in this cathedral in 1805.

MILDEW (mīl'dū), a name for several diseases of plants, which are caused by fungous parasites. They include many minute and sometimes microscopic parasitical forms. The different species of plants are attacked by their own peculiar parasites, but there are several kinds of fungi that infest the same plant. Mildew appears most frequently at the time when the weather is unfavorable to the growth of vegetation. It is quite abundant on plants in a weakened condition and sometimes on fruits and clothing. About 150 species have been described, most of which belong to two classes, the *false*, or *downy*, mildews, and the *true*, or *powdery*, mildews. The *black mildew* common to corn, the *brown mildew* found in the pear, and the *destructive mildew* injurious to the barberry are among the most harmful. Sulphur is an effectual preventive and destroying agency.

MILE, a measure of length used in the United States and many other countries. The statute mile adopted in the reign of Queen Elizabeth contains 5,280 feet and is used at present in the United States and in Great Britain. The following table shows a comparison of the principal miles used in various countries:

United States and Great Britain statute mile.	= 1
Old Roman mile.	= 0.9193
Geographical or Nautical mile.	= 1.153
German mile.	= 4.611
German long mile.	= 5.753
German short mile.	= 3.897
Prussian mile.	= 4.680
Swedish mile.	= 6.648
Danish mile.	= 4.684
Scotch mile.	= 1.123
Irish mile.	= 1.273
Welsh mile.	= about 4 English miles

MILE END, a town of Quebec, in Hochelaga County, on the Saint Lawrence River, five miles from Montreal. It is on the Canadian Pacific Railroad, has electric railways, and is the residence of many Montreal business men. The buildings include a number of fine schools and churches. It has waterworks, electric lighting, and a public library. Population, 10,933.

MILETUS (mī-lē'tūs), an ancient city of Asia Minor, situated in Ionia, on the Meander River. It is noted principally because of its extensive colonies in the Crimea, on the Black

Sea, and other parts of Europe and Asia. Miletus had fully eighty different colonies, all of which contributed to the maintenance of a formidable fleet and took an active part in military operations against the Lydian kings. In 494 B. C. the Persians under Cyrus conquered the city, and later it was captured by Darius and nearly ruined. It fell a prey to Alexander the Great, and its final ruin was accomplished by the Turks. During its prosperity it was noted as a center for the manufacture of woolen goods, furniture, and carpets. At that time it had an extensive trade. Miletus was the birthplace of Anaximander, Thales, and many other important personages. The place was visited by Saint Paul.

MILFORD (mīl'fērd), a city of Massachusetts, in Worcester County, on the Charles River, seventeen miles southeast of Worcester. It is on the Boston and Albany and the New York, New Haven and Hartford railroads. Extensive granite quarries are worked in the vicinity. The noteworthy buildings include the public library, the high school, a memorial hall, and many churches. Among the manufactures are straw goods, boots and shoes, cement, ironware, machinery, elastic fabrics, and utensils. It has a considerable trade in merchandise. The place was settled in 1669 and incorporated in 1780. Population, 1905, 12,105; in 1910, 13,055.

MILITARY SCHOOLS, the institutions founded and maintained by states and countries for the purpose of training young men in the arts of war. This training is directed by instructors of recognized ability and embraces courses in all phases of military duties, such as military engineering, strategy, and discipline. The most important military school of the United States is situated at West Point, N. Y., known as the United States Military Academy. The Virginia Military Institute, located at Lexington, Va., was founded in 1839. It is the most notable military school maintained by a state and ranks next to the United States Military Academy. The Kentucky Military Institute, at Farmdale, has been in a flourishing condition since 1846. Military schools are maintained in a number of other states, especially in the Southern States, and some flourish as private enterprises, as several located in Massachusetts, New York, and Pennsylvania.

The Federal government of the United States has a body of detailed commissioned officers of the army for the purpose of instructing in military science and tactics at colleges and academies designated by the general government. In addition, military branches of instruction are a part of the courses of many state institutions.

The private institutions of higher learning have generally followed the plan of establishing such instruction. At present about 10,000 persons take training in military science annually in the United States. Admission to military schools is generally limited to young men of good moral character, physical perfection, and superior muscular skill. Several highly efficient royal schools of military instruction are maintained in Canada. These include the Royal School of Cavalry, Toronto; the Royal School of Instruction, Winnipeg; the Royal School of Artillery, Quebec; and the Canadian School of Musketry, Ottawa. Schools for military training are maintained by all civilized countries, those of France, Germany, Austria, England, and Russia being particularly efficient. See **West Point**.

MILITIA (mī-līsh'ā), in the United States, a volunteer military force regularly trained, but not forming a part of the standing army. This force is spoken of usually as the *National Guard*. It is subject to the call of the President and serves to aid the executive to execute the laws, suppress insurrections, and repel invasions. All able-bodied male citizens who have attained to the age of 18 years, and have not reached 45, are in a certain sense a standing militia, since they are subject to military service under certain conditions. The militia force of Canada is about 46,000, but in case of war it can be expanded to 150,000. In most countries of Europe the militia constitutes a body of men who have served for a period of years, and who are members of the military forces under compulsory requirements.

MILK, the whitish liquid secreted by the mammary glands of all female mammals for the nourishment of the young. It is an emulsion with a slight but pleasant odor and an agreeable, sweetish taste. Milk may be regarded a perfect food. It is consumed by the young mammal after birth, and enters largely into the food products essential to man. When subjected to microscopic examination, milk is found to consist of a clear fluid, in which minute globules are held suspended. Each of the globules appears as a separate body of oily matter enveloped by a thin coating of albumen. The globules rise toward the surface when the milk is at rest and form *cream*, the time required varying according to temperature. Under favorable circumstances about fourteen hours is required to accumulate practically all the cream. The milk may be agitated rapidly by churning, when the fat globules become broken and collect as butter in the form of a pasty mass. The milk of all mammals contains the same constituents, but differs considerably in the pro-

portion in which they are present in each kind. The following table contains an exhibit compiled by Charles A. Doremus:

VARIETIES.	WATER.	SOLIDS.	FAT.	CASEIN.	MILK SUGAR.	ASH.	NITROGENIZED.	NON-NITROGENIZED.
Women.....	86.73	13.26	4.13	1.99	6.93	0.20	1.99	11.06
Cows.....	84.28	15.72	6.47	3.57	4.34	0.63	4.35	10.81
Goats.....	86.85	13.52	4.34	2.53	3.78	0.65	3.79	8.12
Ewes.....	83.30	16.60	6.05	7.73	3.96	0.68	5.73	10.01
Asses.....	89.01	10.99	1.85	3.57	5.05	....	3.57	6.90
Mares.....	90.45	9.55	1.31	2.53	5.42	0.29	2.53	6.73
Buffaloes.....	80.64	19.36	8.45	4.24	4.51	0.84	4.24	12.96
Camels.....	86.34	13.66	2.90	3.67	5.78	0.66	3.67	8.68
Sows.....	81.80	18.20	6.00	5.30	6.07	0.83	5.30	12.07
Hippopotami...	90.43	9.57	4.51	4.40	....	0.11	....	....
Elephants.....	66.69	33.30	22.07	3.21	7.39	0.62	3.21	29.45

For three or four days after giving birth the milk secreted by the mother is a yellowish fluid, has a strong alkaline reaction, possesses purgative qualities, and is called *colustrum*. Milk of this kind is not considered a commercial product, but is fed to the young, and after about four days it becomes suitable for domestic use. Cheese is prepared by separating the casein into curds, which is done by coagulating the milk by a rennet or other agents, the rich character of the cheese depending upon the presence of large numbers of fatty globules. The thin fluid remaining after the milk has been coagulated is called *whey* and the whitish deposits form the *curd*. *Buttermilk* is the remnant left after churning and removing the butter. Both buttermilk and whey are used as pleasant drinks. The *rennet* used in coagulating milk is made from the fourth stomach of a calf. The principal adulterant of milk is water, which is added to increase its quantity, and frequently salt, sugar, carbonate of soda, and other substances are added for the purpose of preventing the milk from turning sour.

Cow's milk is the only kind utilized in the United States and Canada for making butter and cheese. It is practically the only class of milk used in America for culinary purposes, but in many countries of Europe and Western Asia the milk of goats, ewes, camels, and buffaloes is used extensively. *Condensed milk* is made by adding a small quantity of sugar and evaporating it in vacuum pans to about one-fourth its ordinary bulk. Reduction takes place rapidly under a temperature of 140°. The sugar used is the preservative, which keeps the condensed milk wholesome, the proportion being about one and one-fourth pounds to the quart of condensed milk produced, and in using it the

consumer adds a quantity of water. The production of milk is a vast industry, as is also the enterprise of furnishing the daily supply for the large cities. Strict regulations are now maintained in most cases whereby the consumer may feel assured that the cows producing the milk are in good health and that the milk is supplied to them in a pure state.

MILK, Condensed. See Milk.

MILK SNAKE, or House Snake, the name of a snake common to many parts of North America, so called from the belief that it is fond of milk. Some think that it frequents the yards where cows are kept for the purpose of sucking the milk, and this view seems to be founded upon fact, though it is not often that this occurs. The color of the snake is dark gray above and yellowish beneath, and on its back are large blotches of black. The food consists chiefly of insects and mice, for which it frequents houses and barnyards. This snake is entirely harmless.

MILKWEED, any plant of the genus *Asclepias*, of the milkweed family, so called from the milky juice that exudes from a wound. Many species are included in the family of plants, of which about forty are native to North America. The seeds are clothed with a tuft of long silky hairs, which gives rise to the additional name of *silkweed*. In most species the flowers are white, orange, or purple in color. They are large and ornamental. In some countries the milkweed is cultivated as a garden or an ornamental plant. Some species bear fibers that are of value in making paper, others have silky tufts and are used with cotton in spinning, but most are nothing more than obnoxious weeds in farm lands. When firmly rooted in the soil, the common milkweed is not easily destroyed. The common milkweed is the most widely distributed in America.

MILKY WAY, or Galaxy, a great belt or zone of light stretching in a vast circle across the sky at an angle of about 63° to the equinoctial, extending from one horizon to the other. The Milky Way arises from the blended light of countless stars which appear as a diffused light to the naked eye, but, when viewed with a powerful telescope, myriads of stars densely crowded together are observed. The stars are not distributed uniformly through its entire extent, and each is doubtless a sun of some system of planets. William Herschel estimated that 250,000 stars passed through the field of his great telescope in 41 minutes. With the powerful instruments now in use it is probable that many more can be seen. Other names applied to the Milky Way are Jacob's Ladder and the Way to Saint James.

MILL, the name used originally to designate a machine for grinding grain so as to reduce it to flour or meal. The term is now applied to divers complicated machinery for treating various materials so as to render them suitable for use in manufacturing or for immediate consumption. Grain was ground originally by placing it between two flat stones and rubbing one roughly over the other by hand. From this fundamental idea of a nether and upper stone used by hand originated the building of mills and devices for grinding grain, but at present the machinery used is such that the grain passes between rollers and is crushed by pressure. The different mills now employed in manufacturing are variously designated according to their particular purpose, as flour, meal, spinning, weaving, cider, coffee, cotton, oil, fulling, planing, saw, bark, lapidary's, and other mills.

MILLET, a grass which is cultivated for its grains and for forage. The species are numerous, most of which bear stalks and leaves of

value for feed in the green and dry state. The plants are wholesome as food products for cattle, sheep, horses, mules, and other domestic animals. Millet was cultivated by the ancients in the earliest times as a cereal, the seed being used as food by man. The *common millet* has a strong stem, about two to four feet tall, and produces a profusion of foliage. The



COMMON MILLET.

a and *b*, two views of the spikelet; *c* and *d*, two views of the "seed."

seed is still used extensively for making flour and to be eaten as rice in Italy, Turkey, Arabia, China, Syria, and other countries of Europe and Asia. Millet seed is of value as food for poultry and cage birds. Some species are widely distributed as obnoxious weeds in crops, such as the *foxtail millets*. Among the cultivated species are the common millet, the sorghum-millet, and the Hungarian millet, or Hungarian grass.

MILL SPRINGS, Battle of, an engagement

of the Civil War, fought at Mill Spring, Ky., Jan. 19, 1862. The Confederates under Gen. George B. Crittenden made an attack upon the Federals under General Thomas, but were unable to drive their antagonists from the field. Each army consisted of about 4,000 men. This engagement is sometimes called the Battle of Fishing Creek. A national cemetery occupies the battle ground, in which 725 soldiers lie buried.

MILLVALE, a borough of Pennsylvania, in Allegheny County, on the Allegheny River, opposite Pittsburg. It is on the Pennsylvania, the Pittsburg and Western, and other railroads, and has manufactures of ironware, lumber products, machinery, and spirituous liquor. Electric lighting, street railways, and waterworks are among the public utilities. Population, 1910, 7,861.

MILLVILLE, a city of New Jersey, in Cumberland County, on the Maurice River, forty miles south of Philadelphia, Pa. It is on the Pennsylvania Railroad and has communication by steamboats and electric railways. Among the chief buildings are the public library, the high school, the city hall, and many churches. Union Lake, situated near the city, is a fine sheet of water. The manufactures include cotton goods, glass, machinery, and canned fruits. It has systems of sanitary sewerage, waterworks, and street pavements. Millville was incorporated as a town in 1801 and became a city in 1866. Population, 1905, 11,884; in 1910, 12,451.

MILREIS (mīl'rēs), or **Milrea**, a coin and money of account used in Brazil and Portugal. It is divided into 1,000 *reis* and in Portugal it is known as the crown, or *corōa*. Estimated in the money of Canada and the United States, the milreis of Brazil is worth about 55 cents and that of Portugal is worth \$1.08. The milreis is issued both in gold and silver.

MILTON (mīl'tūn), a town of Massachusetts, in Norfolk County, on the Neponset River, seven miles south of Boston. It is on the New York, New Haven and Hartford Railroad and is an attractive suburb for the residence of many Boston business men. The chief buildings include the public library, the Milton Academy, the Leopold Morse Home, the townhall, and many schools and churches. It has manufactures of crackers, cement, chocolate, clothing, machinery, and granite products. An observatory and a station of the United States Meteorological Bureau is located near the place. Milton was settled in 1637 and incorporated in 1662. Population, 1905, 7,051; in 1910, 7,924.

MILTON, a borough of Pennsylvania, in Northumberland County, on the Susquehanna River, 66 miles north of Harrisburg. It is on

the Pennsylvania Canal and on the Pennsylvania and the Philadelphia and Reading railroads. The noteworthy buildings include the high school, the public library, and several churches. It has a public park, brick and macadam pavements, and systems of waterworks and sanitary sewerage. The manufactures include leather, machinery, hardware, textiles, railroad cars, and farming implements. Milton was settled in 1770 and incorporated in 1817. Population, 1900, 6,175; in 1910, 7,460.

MILWAUKEE (mīl-wā'kē), the largest city of Wisconsin, county seat of Milwaukee County, a port of entry on Lake Michigan. It is 85 miles north of Chicago, Ill., at the mouth of the Milwaukee River, which discharges into Milwaukee Bay. Two small streams, the Menominee and the Kinnickinnic, flow into the Milwaukee River within the city, which has a safe and spacious harbor. The site of the city is about 600 feet above sea level, rising from 80 to 130 feet above Lake Michigan, hence its location is sanitary and beautiful. The city occupies an area of about 25 square miles. It has regularly platted streets, many of which are substantially paved with granite and asphalt, and they cross each other at right angles in nearly all parts of the city. The business section, which occupies the district along the lake, is well built and has many modern and substantial business and office buildings. A large number of bridges and viaducts span the rivers.

DESCRIPTION. The city hall occupies a triangular block, near which are the county courthouse and the government buildings. The public library contains 120,000 volumes and has a number of branches to accommodate the patrons in the different parts of the city. A valuable art collection is located in the Layton Art Gallery, which was founded by public spirited citizens. Among the churches are many fine structures, and all the Christian denominations are well represented. The educational institutions include the Lutheran Concordia College, the Roman Catholic Marquette College, and the Milwaukee Downer College for women. It is the seat of a State normal school, two medical colleges, and many fine public and parochial schools. A large proportion of the inhabitants are German, hence many musical and *Turner* societies are represented in the club and social life. The city is beautified by many fine avenues and public parks, the latter including about 500 acres. Lake Park is noted for its fine drive and bicycle paths and is located along the lake shore in the northwestern part of the city. In the western part is Washington Park, which con-

tains many fine lakes and groves of shrubs and trees. In Juneau Park, on the lake front, is a statue of Solomon Juneau, the founder of Milwaukee. Other public grounds include Riverside, Humboldt, and Kosciusko parks, all of which are noted as attractive resorts. The principal statues include those of Bergh, Washington, and Leif Ericson. Forest Home Cemetery is one of several fine burial places.

INDUSTRIES. Milwaukee is important as a center of commerce and industry. It is the converging center of many trunk railways, by which it is connected with the chief cities of the United States. The principal lines include the Wisconsin Central, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads. Several of the lines have fine depots. It has additional transportation facilities by the Great Lakes, on which steamers ply regularly during the shipping season between it and the principal trade centers on these lakes, both in Canada and the United States. Large quantities of coal are unloaded at its docks, being shipped principally from points farther east. It is one of the great collecting and distributing centers of the northwest, having a large trade in farm produce and vast interests in jobbing and wholesaling. The manufactures include flour, machinery, leather, iron and steel products, boots and shoes, furniture, packed meat, and spirituous liquors. It is one of the chief centers in America for the manufacture of beer, consuming large quantities of hops and barley. Many smelters are maintained, the iron ore being shipped to this city from Minnesota and the northern part of Wisconsin. As a market for lumber it has long held an important position. The total manufactures have a value of \$265,000,000 per year. It is noted as a market for cereals, especially barley, oats, and wheat, large quantities of which are handled in its elevators. The slaughtering and meat-packing interests are likewise important.

INHABITANTS. The population of Milwaukee is very largely of foreign descent, but those of German extraction are greatly in the majority. It has large interests in the publication of German newspapers and books, and formerly the German language was spoken more generally than any other tongue. At the time of the Civil War a number of companies were formed entirely of German citizens, but at present other Europeans are largely represented in the city, including the Poles, Bohemians, and Scandinavians. The total foreign-born population in 1900 was 102,646. In the same year the total population was 285,315 and in 1910 it was 373,857.

HISTORY. A number of French immigrants

came to the present site of Milwaukee in 1790, when Jean Baptist Mirandea built a log cabin. Solomon Juneau, the founder of the city, established a trading station in 1818, but the town was not platted until 1835. Originally the place was called Juneautown, which comprised a small village, and the name was changed to Milwaukee in 1837. Kilbourntown, on the west side of the river, was annexed in 1839, and Waker's Point and several other settlements were soon after incorporated with Milwaukee, which was incorporated as a city in 1847, when Solomon Juneau became the first mayor. Its rapid growth may be said to date from that year, when the railway and manufacturing interests began to develop.

MIMICRY (mīm'ik-rŷ), a term applied in botany and zoölogy to an imitative resemblance of one plant or animal to another, or to some inanimate object, for which it may be mistaken. However, the term is applied most extensively in the animal kingdom. The phenomenon is thought to be entirely involuntary, depending particularly upon the conditions surrounding species of animal forms through many generations. This peculiar characteristic is one of the chief means of protection that some animals have, since they so nearly resemble the leaves or stalks of plants that their presence is not easily detected. In other cases the animals take advantage of this characteristic by quietly stealing upon their prey without being observed. Writers generally agree that mimicry occurs most commonly in animals which have been confined to the same country and practically to the same spot through many generations. Among the best examples of mimicry are those found in leaf insects, the walking stick, and many species of butterflies.

MINARET (mīn'ā-rēt), the slender tower constructed at the corners of a mosque. Some Mohammedan houses of worship have four or more minarets, and the large mosque at Mecca has seven. They are sometimes called light towers, from the circumstance that they are illuminated on the nights of feast days. They are constructed of brick or stone, usually polygonal or cylindrical, and have projecting balconies, from which the official, known as the *muezzin*, by the voice calls the people to prayer, instead of ringing a bell as is the custom in Christian churches. In the early history of Mohammedanism the mosques had no minarets. These towers were first erected in the 7th century. Some at Medina and in Constantinople, such as those of Saint Sophia, are graceful and form an ornamentation to the buildings. Ascent to the summit is made by a winding inner stairway, and

most of those found in the more valuable buildings contain several stories and are crowned by a small dome or pinnacle. In height they vary greatly, from about fifteen feet to several hundred feet. The minaret of the Hassan Mosque of Cairo, Egypt, is 280 feet high.

MINAS (mē'nāsh), or **Bello Horizonte**, a city of Brazil, capital of the state of Minas Geraes, sixty miles northwest of Ouro Preto, with which it is connected by railway. It is surrounded by a fertile farming country and has manufactures of clothing, machinery, and cotton and woolen goods. The streets are broad, well paved, and improved by sewerage and electric lighting. It has a public library, a Federal court and post office building, and several fine parks. Minas was founded in 1894 and the capital was soon after removed to it from Ouro Preto. Population, 33,680.

MINAS BAY (mī'nās), or **Basin of Minas**, an inlet from the Bay of Fundy, extending into Nova Scotia a distance of sixty miles. The inlet is properly divided into three parts, known as Minas Channel, Minas Bay, and Cobequid Bay. Minas Bay receives the inflow from the Avon River, which flows into it from the south. On its southern shore is the village of Grand Pré, famous because of its mention in Longfellow's "Evangeline." The tides rise very high in Minas Bay, sometimes from fifty to seventy feet.

MIND, a term employed to designate the entire psychical being of man, by virtue of which he is able to think, feel, and will. When used in this wide sense, the different powers of the mind are divided into three general classes: the intellect, the sensibility, and the will. The *intellect* comprises those powers by which we are able to know, the *sensibility* is that group of powers by which we feel, and the *will* is the power to choose and execute. Man is made up of mind and matter. We are equally unable to know the real constituents of mind or matter, but it is possible to study both by their effects and their relations to each other. Although we know nothing of human minds disconnected from bodies, yet many writers hold that the mind is a real thing, and that it does exist after the body is dead. It is certain that the mind and body are closely related and that manifestations purely mental, such as fear, joy, and anger, have a marked influence over the body. On the other hand, the conditions of health and disease have an equal influence in invigorating or weakening mental activity.

The science that investigates mental phenomena is called *psychology*, though sometimes it is spoken of as *mental science*, and, in a certain

sense, as *metaphysics*. Among the differences noted between mind and matter are that the former manifests itself only by its acts, while matter manifests itself only by its qualities. Matter never moves unless acted upon by some force, but mind originates its own activity. We cannot conceive of matter without realizing that it occupies space, while mind cannot be said to occupy space. Mind is characterized by consciousness, but there is no evidence that consciousness is found in matter. Mind has the power to know its own acts, and it alone knows the qualities of matter. Some writers regard animal mind as imperfectly corresponding with that of man, while others think that the lower animals have a sensitiveness and sensation correlated with impulse and retentiveness, and that it is also modified by animal emotions and affections.

MINDANAO (mĕn-dā-nā'ō), one of the largest of the Philippine Islands, next in size to Luzón. It is situated in the southern part of the Philippine Archipelago, is about 300 miles from north to south, and has an area of 36,237 square miles. The general outline is irregular, the coast containing many important inlets, among them Sarangani, Illana, Iligan, Davao, Butuan, and Sibuguei bays. Large portions of the interior are mountainous, but there are fertile valleys and extensive coast plains. The volcano Apo is among the highest peaks, being 10,312 feet above sea level. It has extensive forests of valuable timber, a diversity of mineral wealth, and several lakes, including lakes Mindanao, Malanao, Ligauasan, and Kabatuan. The products consist largely of lumber, live stock, cotton, coffee, cocoa, tobacco, sisal, and many varieties of fruit. Formerly the Spaniards occupied the northern part, while the other portions were under a Sultan. The inhabitants consist largely of Malays, Chinese, Japanese, and descendants from the Spaniards. Zamboanga, Surigao, and Butuan are among the principal towns. Population, 1908, 501,364.

MINDORO (mĕn-dō'rō), an island of the Philippines. It is separated from Luzón by Verde Island Passage. The area is 3,108 square miles. It is about 115 miles long and 50 miles wide. It is of volcanic origin. The coast line is quite regular and the surface is mountainous. It has a hot climate and an excessive rainfall. Among the products are lumber, iron ore, live stock, rice, sisal, tobacco, cereals, cinnamon, and fruits. Mount Halcon has an elevation of 8,865 feet above sea level. Calapan, situated on the northern coast, is the capital and principal seaport. The inhabitants consist largely of Malays and Mongolians. Population, 1908, 107,486.

MINERALOGY (mĭn-ĕr-ăl'ō-jĭ), the science that treats of minerals. The chief purposes of this branch of study are to point out the various means whereby to ascertain the chemical composition and the physical characters of inorganic substances, to classify them according to their specific relations, and to examine the manner in which they occur, together with substances associated with them, with a view of securing a comprehensive and systematic classification. Mineralogy is interested in treating of all inorganic substances found within the earth or on its surface. While geology treats of the constitution of the earth's crust and examines the history of the different strata or deposits, mineralogy investigates the separate constituents found in the crust of the earth and classifies their properties as separate constituents. It was known in comparatively early periods that simple and distinct minerals constitute the crust of the earth, but extended investigations were not made until in the 16th century.

Mineralogy is divided into various departments, including crystallography and physical, chemical, determinative, descriptive, and economic mineralogy. *Crystallography* treats particularly of mineral crystallization; *physical mineralogy*, of the cohesive, elastic, optical, electric, lustrous, and other physical features of the different species; *chemical mineralogy*, of the chemical properties; *determinative mineralogy*, of the special crystallographic, physical, and chemical methods of distinguishing species; *descriptive mineralogy*, of the classification and description of species with their associative minerals and geographical distribution; and *economic mineralogy*, of the uses of minerals in the arts, as for jewelry and various purposes of manufacture.

Among the discoveries leading toward the classification of well-defined characteristics of minerals were those of Nicolaus Steno, of Denmark, who, in 1669, announced that in crystals of quartz the angles of inclination of joining faces are constant and that, even if the size varies, the number of faces and their groupings were always the same. The double-refracting property of Iceland spar was observed in the same year. The Arabians had designated quartz as *crystal*, meaning clear ice, but Robert Boyle, in 1672, showed that it is more than twice as heavy as an equal bulk of water and that ice is lighter than an equal bulk of that liquid. Among the discoveries of the 18th century are that the various shapes of crystals of the same product are intimately related, that ten forms of crystallization are the true primitive forms from which all others can be derived, and that there

is a relationship in the structure of crystals between the secondary planes and the primitive form. Prof. Weiss, of Berlin, in 1809 announced the discovery of fundamental lines, which he called *axes*, and showed a relationship between the primitive forms and the secondary planes. His system includes four axial groups of crystallization. Later other systems of crystallization were worked out by the use of the reflective *goniometer*, an instrument employed to measure the angles between the faces of crystals.

The intimate relation that exists between the cleavage form of a mineral and its action upon light was pointed out in 1819 by Brewster, and, accordingly, he made a classification of crystals on optical grounds, which agrees with that of Weiss with the exception of two of the systems. From these discoveries the present six natural systems of crystallization generally recognized by writers were established, and these are held to include all possible crystal forms. Early in the study of mineralogy the classification was divided into earths, stones, and metals. Werner, in 1817, classified the different minerals as earthy, saline, combustible, and metallic. Much diversity of opinion still prevails as to the causes that produce minerals of different grades of hardness, but always after their own crystallized form, and also in the classification of the minerals as to their different properties.

Among the various characteristics that have led to the different classifications may be named *luster*, the light reflected from the surface; *streak*, the appearance of a furrow when cut by a hard instrument; *fracture*, the peculiarity of the surface when freshly broken; and *hardness*, the resistance to an attempt to cut or scratch the mineral. Mohs, a German mineralogist, originated a scale by which the various minerals were graded as to hardness from one to ten. A representative exhibit according to this scale may be given as follows: 1, talc; 2, gypsum; 3, calcite; 4, fluorspar; 5, apatite; 6, potash feldspar; 7, quartz; 8, topaz; 9, corundum; 10, diamond. When seeking to classify a mineral as to hardness, the experimenter will ascertain which of the above it will scratch. A mineral that will scratch quartz but not topaz, while it may be scratched by the latter, is classified in relation to hardness between 7 and 8.

Pseudomorphism is a peculiarity that occurs in nature from alteration through chemical change, as by loss, addition, or exchange of constituents. In that case the mineral is called a *pseudomorph*, since it possesses the external crystalline form of another mineral. This phenomenon likewise occurs by molecular change; by substitution, either partial or total, as when the

original crystal is dissolved out and the cavity filled by other material; and by superficial incrustation. In such instances the hardness is often different, the luster is absent or dull, and the weight is unlike that of the mineral simulated in form. Among the examples of pseudomorphism may be named petrified wood, which is formed by infiltrating the wood with water containing silicic acid, and, as the wood is dissolved away, the silica is substituted. Another example is found in cases where animal forms become buried and their molds are afterward filled by a mineral taking on the form common to the peculiar animal covered by the deposits. The list of famous mineralogists includes Mohs, Werner, Haüy, Agricola, and Dana. The last named writer is considered authoritative in the determinative mineralogy of America.

MINERAL WATER, a designation applied to the water of springs and wells which contains in solution an unusual proportion of sulphur, iron, sodium, magnesia, carbonic acid, etc. Mineral waters usually result from subterranean currents passing over deposits of iron, salt rock, sulphur, alkaline, and other mineral substances, thus dissolving and carrying with them a certain per cent. of mineral matter.

MINERAL WOOL, or **Silicate Cotton**, the threadlike filaments produced in blast furnaces by the action of steam or air under pressure upon slag when in the molten state. The slag is driven by pressure through an aperture, forming, when cooled suddenly, long filaments that appear like wool or cotton. Mineral wool is used as covering for boilers and steam pipes, being a nonconductor of heat, and serves as an effective barrier to the transmission of sound. It is particularly valuable for these purposes because insects find in it nothing to eat.

MINING, the art of conducting operations by which useful minerals are obtained from the earth's crust. The art of securing metals and other minerals of economic value either upon or underneath the surface has been practiced from remote antiquity. It is thought that turquoise mines were worked in the peninsula of Sinai as early as 3000 B. C. Tubal Cain is mentioned in Genesis as "an instructor of every artificer of brass and iron," and Job refers to mining and metallurgy. In the museum at Turin, Italy, is an Egyptian papyrus dating from 1400 B. C. in which a plan of gold mining is depicted. The Phoenicians are mentioned by Herodotus as being engaged extensively in mining in the mountains of the island of Thaso. They operated in other regions and carried on a large trade in tin and lead. The Romans conducted extensive

silver mining at Almaden, Spain, while they had possession of that portion of the Iberian peninsula. They had extensive mining interests in Britain, of which evidences still remain. Georgius Agricola, a Latin writer, published the first exhaustive treatise on mining in 1556. In 1620 gunpowder was introduced for blasting rock, which was soon followed by a complete revolution in the art of conducting mining for different minerals. The steam engine began to be employed in the 18th century. In 1815 the Davy lamp was invented, which has been of immeasurable utility in coal mines. Subsequently the methods of conducting the art as well as many new forms of useful machinery came into common use.

Mineral deposits occur in various forms, but they are usually classified under the two divisions known as *seams* or *strata*, and *lodes* or *veins*. The seams occur principally in horizontal deposits, as coal, iron ore, and salt, and they are parallel to the stratified rocks that are immediately below and above. Seams occurring in a nearly perpendicular form are due most generally to disturbances by earthquakes or volcanic action, the strata being thereby disturbed and set up more or less vertically. Lodes comprise mineral matter that was in a molten state and by internal pressure oozed out and completely filled a fissure that existed in the crust of the earth, gold and silver deposits often occurring in this manner. A large number of methods of prospecting for minerals are in use, although many of the rich veins and seams were discovered by mere accident. Gold was found in California by cutting a mill race and in Hungary by accidentally observing a bird picking up shining particles. However, there are localities in which the minerals project at the surface and in that case there is little difficulty in beginning operations. This is true particularly of coal, which is often found projecting at hill-sides, and of gold and silver lodes, but in the latter form the portions near the surface are not productive and extensive excavations need to be made to ascertain the general value of the lode to be developed. Where mineral deposits exist far below the surface, as is the case in coal and other deposits, it usually is deemed advisable to do prospective boring for the purpose of ascertaining the value and depth of the deposits, determining whether there are extensive water-bearing strata, and ascertaining whether the strata of rock immediately above the deposits will constitute a safe and durable roof.

In prospecting it is found profitable to use a diamond drill, and the operator keeps a careful memoranda of the exact composition of the va-

rious formations through which the drill passes. If paying quantities of mineral deposit and suitable conditions are found to exist, a trial shaft is sunk down to the depth at which the minerals are found. In excavating it is often necessary to employ powerful explosives for the purpose of penetrating through rocks, which is usually the case in most mines, particularly where it is sought to develop lodes. Shafts are commonly sunk through one or many hundred feet of valueless formations before reaching the mineral deposits. The method depends entirely upon the formations to be penetrated, but there is usually a plan of hoisting the loosened particles by horse or steam power. In such cases devices are used for properly ventilating the particular place occupied by the workmen, and safeguards are employed against an influx of excessive quantities of water. The latter is usually effected by water-tight boxes, but in larger enterprises by artificially freezing the water-bearing strata. The whole subject of mining is divided into four lines of study: mining geology, mining engineering, metallurgy, and mechanical engineering.

Mining is a more or less dangerous and unhealthful occupation, but with modern methods of performing the labor and ventilating the various departments of the mine it has become much more wholesome and agreeable. Two different methods of operating in strata are usually employed, especially in coal mining. The one is known as the *pillar and room* method, in which the roof is sustained largely by pillars of coal left for that purpose, while in the *long-wall* method, sustaining pillars of coal are left only near the shaft, and farther back the roof is sustained temporarily by props of wood, but later these are removed and it is allowed to settle down consecutively as the miners excavate the coal. Long-wall mining is by far superior in all cases where the conditions are favorable, since the settling roof causes the coal to break down as soon as it is undermined by the laborer or by a machine, and it is possible to utilize practically the entire deposit. Where the pillar and room method is employed the roof is borne up by pillars and wooden props, and in some cases it is possible to remove the pillars before abandoning the works, but often much of these are lost and usually the expense of blasting the coal is greater. The different waste materials are generally used to fill the portions from which the coal has been removed. The methods of operating in veins bearing metals are quite different from those common in coal mines, since the deposits are found most frequently in lodes running slightly inclined from

the vertical, or they occur in deposits of great thickness.

The size and depth of collieries differ greatly, as do also the methods of securing the ores, but it is generally aimed to utilize all the parts bearing sufficient value to be stamped and smelted, while the portions representing a value not sufficiently profitable are made use of, at least in some cases, for filling in excavated portions. Drills propelled by compressed air, steam, or electricity are used extensively, but in the smaller mines hand-drilling is universal. When the drill holes have been properly made, the explosives are placed into them and connected by fuse, and the opening is properly tamped by clay or some other agency. After all the necessary matters have been adjusted, the fuse is lighted, and the laborer steps to a place of safety until the explosion occurs. The amount loosened by a single explosion depends entirely upon the kind of mineral, its thickness, and the manner in which the explosive has been applied. Among the different agencies employed are blasting powder—which is still used largely in coal mines—gunpowder, gun cotton, dynamite, and nitrated gun cotton. In some mines electricity is utilized to fire the charge.

As above stated, many of the mines are operated with the level of the surface, or even some distance above the lower part of a hill, but the largest amount of mining is done far below the surface. A silver-lead mine at Przibram, Bohemia, has a depth of 3,435 feet and was long the deepest shaft in the world. The Calumet Copper Mine in the Lake Superior region of Michigan is 3,900 feet deep, and one in Prussia is 5,830 feet deep. The vast expense in building a shaft of great depth makes it necessary to hoist a large quantity of mineral products at one opening, but this is accomplished readily by use of modern hoisting machinery especially adapted for deep-mine working, the speed in many of them ranging from 3,500 to 5,000 feet per minute. Vast improvements have likewise been made in mine drainage, the use of compressed air and electricity, machinery for ventilation, and the treatment of ore products after they are brought to the surface.

The mining industry of the world is of vast importance, adding largely to the wealth of the nations annually and employing millions of workmen. Many of the leading countries of the world support schools and institutions devoted to disseminating knowledge of mining, thus placing the industry on a high and recognized basis of efficiency. The labor unions have tended to bring the workmen in connection with each other as sympathetic coöperators, and

thereby to increase their efficiency and knowledge of economic questions. The mining industry of Canada and the United States is of growing importance and yields vast quantities of all important minerals. Among the chief products are pig iron, bituminous coal, silver, anthracite coal, gold, copper, petroleum, lead, natural gas, zinc, brick clay, lignite coal, salt, aluminum, granite, phosphate rock, fire clay, borax, quicksilver, slate, marble, mineral paint, and mineral waters.

The minerals found on lands which belong to individuals are owned generally by the parties holding titles, but lands known to be mineral and whose title is still in the government may be preëmpted only by persons actually operating, for a nominal fee. In many countries all mineral titles are vested in the government, but in others absolute titles are given. Usually the quantity of mineral land that may be held is limited to a small tract, while certain rights are given to follow veins that lead into the possession of a neighboring claimant. In 1848 much excitement was occasioned by the discovery of vast gold fields in California. This was true also of Alaska and Yukon, where valuable discoveries were made in 1897. The leading schools of mining in the United States include the Stevens Institute of Technology at Hoboken, N. J.; the Sheffield School in Yale University; and the School of Mines, in Columbia College, New York City. The School of Mining at Kingston, Ontario, is affiliated with Queen's University and is the leading institution of the kind in Canada.

MINISTER (mĭn'is-tēr), an officer who is intrusted with the administration of national affairs, or one who exercises the chief directions of any department in a state. The persons who constitute the administration in many countries of Europe are collectively called the ministry or the cabinet. In countries like England, where only nominal executive power is vested in the crown, the Prime Minister is selected by the sovereign, while other members of the ministry are chosen by the Prime Minister. In Germany, Japan, and the republics of America the ministers are not responsible to the legislative department, but are chosen directly by the chief executive. The policy of the government of Great Britain is directed by the Cabinet of nineteen ministers, but the ministry proper includes, besides the members of the Cabinet, a number of undersecretaries, who are members of Parliament.

The delegates or representatives of a government to a foreign country are called ministers and are usually distinguished by the term *for-*

eign ministers. All independent states may send ministers to and receive from any other sovereign state ministers to treat of affairs concerning both states. These ministers are divided into three classes, according to the powers vested in them. An *ambassador extraordinary*, who occupies the highest rank, personally represents his state or sovereign. With this class are included the legates and nuncios of the Pope. The ministers of the second class are known as *envoys extraordinary*, *ministers plenipotentiary*, and *internuncios*, and the degree of their power and distinction is not equal to that of the former class. *Envoys*, *ministers*, *resident* and *chargés d'affaires* belong to the third class. *Consuls* are interested chiefly in matters of commerce. Those known as *agents*, or *residents*, represent the chief executive or his subjects in matters of a private character. Ministers sent by two nations to settle a dispute at a court or congress of a third power, or where several governments are interested, are known as *ministers-mediators*. *Commissioners* are representatives who are sent to settle disputes concerning territorial limits or the exercise of judicial functions.

MINK, the common name of several fur-bearing quadrupeds, allied to the polecat. Several species are native to America, Europe, and



EUROPEAN MINK.

Asia. The fur is a beautiful chestnut-brown, the tail is bushy, and the body is stouter than that of the weasel. It is from fifteen to eighteen inches long, including the tail, which is about nine inches. Minks have well-developed scent glands, and the secretion is almost as offensive as that of the skunk. The common American mink is found chiefly along ponds and streams,

where it pursues a semiaquatic life and preys upon fishes, crawfishes, frogs, and small mammals. It is hunted for its fur. Minks are commonly caught in traps, but some species have a rare intelligence in avoiding capture.

MINNEAPOLIS (mĭn-nĕ-ăp'ô-lĭs), the largest city of Minnesota, county seat of Hennepin County, at the Falls of Saint Anthony, on the Mississippi River, immediately above Saint Paul. The eastern limits coincide with the western limits of Saint Paul, with which it is connected by many railroad and electric railway lines, and the intervening space is occupied chiefly by gardens and residences so as to constitute practically one city. The two municipalities are popularly called the Twin Cities. A number of railways from the east and south have their termini in the city, including the Chicago and Northwestern, the Chicago Great Western, the Chicago, Rock Island and Pacific, the Chicago, Burlington and Quincy, the Wisconsin Central, the Minneapolis and Saint Louis, and other railroads. It has direct connections with the Pacific coast by the Northern Pacific, the Great Northern, and the Chicago, Milwaukee and Saint Paul railways.

DESCRIPTION. The city is divided into unequal portions by the Mississippi River, which is crossed by eighteen bridges. The Falls of Saint Anthony are in the center of the manufacturing district and supply an abundance of water power, and below them the Mississippi flows through a deep, rocky gorge. In some parts the site is gently rolling, while in others it is quite level, but all of it is more or less sandy, hence is easily improved for drainage and communication. Nearly all of the streets cross each other at right angles, and many of them are substantially paved with granite, asphalt, and macadam. The river divides the city into what is known as the East and West divisions, and both of these are divided into north and south sections. The West Division is the larger and is divided by Hennepin Avenue, and the East Division is divided by Division Street and Central Avenue. From these dividing lines, to which the north and south streets run parallel, the avenues are numbered east and west, while the streets running north and south are numbered in order from the river. The manufacturing and wholesale districts extend up and down both sides of the river, while the chief business streets for retailing are a short distance south of the Falls of Saint Anthony, especially on Nicollet and Hennepin avenues and the adjacent streets south of Washington Avenue.

PARKS AND LAKES. Minneapolis is located about 800 feet above sea level. Within the city

limits are a number of beautiful lakes, including Lake Harriet, Lake Calhoun, Lake of the Isles, and Cedar Lake. These lakes are surrounded by a boulevard that extends toward the south and east, connecting them with the fine drives along the Mississippi, Minnehaha Falls, and Fort Snelling. These lakes are connected by canals, making it possible for small boats and gasoline launches to pass from one lake to the other. Lake Minnetonka, the source of the Minnehaha Creek, lies 20 miles west of Minneapolis, and is celebrated for its beautiful resorts, summer homes, and yacht clubs. About 20 parks are maintained, comprising an area of approximately 1,600 acres. Minnehaha Park, a tract of 138 acres, contains the Falls of Minnehaha and adjoining this park are the Longfellow Gardens. Loring Park is near the center of the city and immediately west, across the street, is a large open space for games and out-door sports. This is known as The Commons and was donated to the city by the late Thomas Lowery. Riverside Park, one mile below the Falls of Saint Anthony, is a beautiful ground on the river bluffs. The State Soldiers' Home occupies a tract of 60 acres adjoining Minnehaha Park.

BUILDINGS. Many of the buildings are modern in architectural features and are constructed of steel and granite, or of steel and concrete. The county courthouse and city hall, erected at a cost of \$3,125,000, is built of Minnesota granite. The library, a Romanesque structure, contains 150,000 volumes and an art gallery. The University of Minnesota, one of the largest educational institutions in the United States, is located in the southeastern part of the city. The public school system includes 58 graded and five high schools and has a reputation for efficient and systematic instruction. Among the educational institutions are the Lutheran Augsburg Seminary, the Northwestern Conservatory of Music, and a number of private educational and charitable institutions. The larger buildings include the Masonic Temple, the Chamber of Commerce, the West and Radison hotels, the Lumber Exchange, the Armory, the Auditorium, Metropolitan Life Building, the Andrus Building, the New York Life Insurance Building, the Security Bank Building, and the West High School. All of the leading Christian denominations are well represented. The larger churches include the First Baptist, the Westminster Presbyterian, the Fowler Methodist, the Plymouth Congregationalist, the Christian Scientist, the First Unitarian, the Orthodox Greek Catholic, the Swedish Tabernacle, the Saint Mark's Episcopal, and the Church of the Im-

maculate Conception. The Roman Catholic Pro-cathedral, founded in 1907, is one of the largest and finest ecclesiastical structures in the north-west.

INDUSTRIES. Minneapolis has splendid water power facilities at the Falls of Saint Anthony, where are located the largest flouring mills in the world. The output of flour of all the mills is 88,175 barrels daily, and the product is shipped to the leading commercial centers of America and Europe. Timber products are next of importance, but the output has decreased on account of a diminution in the timber area of the north, whence large quantities of logs are rafted down the Mississippi. The manufacture of boots and shoes, farming machinery, furniture, underwear and knit goods, malt liquors, canned goods, and clothing yields large returns. It has extensive grain elevators and is the largest primary grain market in the world. The city has many wholesaling and jobbing houses, supplying a large scope of country with merchandise and manufactured products. This is made possible by its extensive network of railways and interurban lines. Transportation on the Mississippi, though important, is carried largely through Saint Paul.

HISTORY. The vicinity was first visited by Father Hennepin in 1680, when he discovered and named the Falls of Saint Anthony. In 1819 the United States government erected Fort Snelling at the mouth of the Minnesota, when the present limits of Minneapolis were included in the military reservation surrounding that fort. The first mill of large size was built in 1822 and settlements were made soon after on the lands adjoining. In 1856 the town was incorporated as Minneapolis and it became a city in 1867. Its early growth was due to the extensive milling interests. For a long time there was a rivalry with Saint Paul, but it surpassed that city in population about 1900. A large part of the inhabitants are of foreign descent, this element including principally Scandinavians. Population, 1905, 261,974; in 1910, 301,408.

MINNEHAHA (mĭn-nĕ-hă'hă), a small river of Minnesota, the outlet of Lake Minnetonka and other lakes, flowing into the Mississippi between Saint Paul and Minneapolis. In this stream are the celebrated Falls of Minnehaha, which constitute a sparkling cascade falling from a height of 58 feet. The vicinity has been beautifully improved as a park. Longfellow applies the name Minnehaha, meaning *laughing water*, to the principal female character of his "Song of Hiawatha."

MINNESINGERS (mĭn'nĕ-sĭng-ĕrz), the name for a class of German poets who were

popular in the higher grades of society from 1138 until 1347. They were so named from the Old German, the name meaning *singers of love*. It was their custom to write poetry and compose music devoted to love and devotion, and to visit the different castles and courts of princes and nobles. Fully 175 writers of note are represented in the productions of this period that are still extant. They include the excellent works from which Wagner drew inspiration in writing his compositions, among them being the "Nibelungenlied" and "Lohengrin." They likewise include the famous "Wachtlieder," in which splendid romances of praise and watch incidents are recited. After their decline came the Meistersingers, an order of men belonging to the artisan class, who formed guilds by binding themselves to observe certain arbitrary laws of rhythm. Nuremberg became the center of their guilds, whence they spread rapidly to all German-speaking countries, and the last of their guilds at Ulm was not discontinued until 1839. Their poetry was largely lyrical and was sung to music. The most celebrated of the guild was Hans Sachs, who composed 4,275 songs.

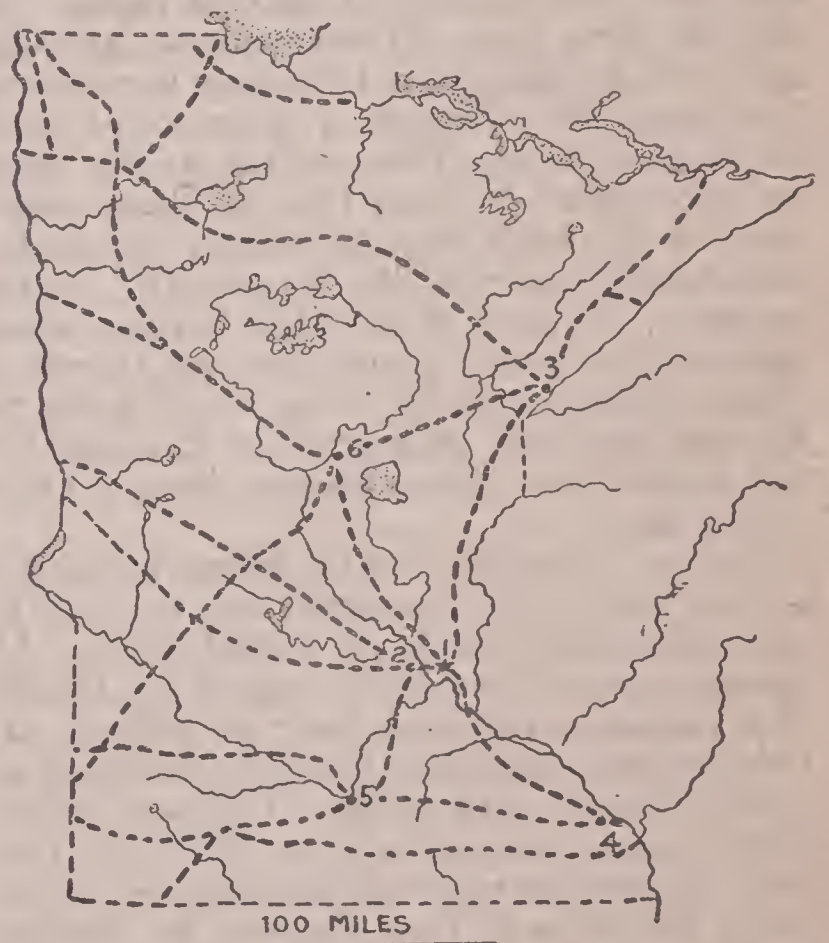
MINNESOTA (mĭn-nĕ-sō'tà), a river of Minnesota, which has its source near Lake Traverse, on the western boundary, and then widens into Big Stone Lake, a sheet of water about thirty miles long. After flowing from that lake, it passes Ortonville in a southeasterly direction, makes a bold curve near Mankato, and thence flows northeast into the Mississippi River near Saint Paul. The Minnesota has a total length of 460 miles. It is navigable about one-fourth of its course, and flows through a region possessing much agricultural wealth.

MINNESOTA, a north central state of the United States, the most northerly of the Union, popularly called the *Gopher State*. It is bounded on the north by Manitoba and Ontario, east by Lake Superior and Wisconsin, south by Iowa, and west by North Dakota and South Dakota. The western boundary is formed largely by the Red River of the North; the northern, by the Lake of the Woods, the Rainy Lake River, and Rainy Lake; and the eastern, by Lake Superior and the Saint Croix and Mississippi rivers. The length from north to south is about 400 miles, the breadth from east to west is from 240 to 300 miles, and the area is 83,365 square miles, including a water surface of 4,160 square miles.

DESCRIPTION. The surface is generally an undulating plain with an average elevation of about 990 feet above sea level. Through the north central part extends an elevated plateau, known as the Height of Land, which has an elevation of 1,750 feet above the sea. From it

the drainage is generally toward the southeast, but north of it the slope is toward the basin of the Nelson River. In the northeastern part is the Mesaba Range, located northwest of Lake Superior, where the highest summits are 2,200 feet. From the lowland in the vicinity of Lake Superior, where the altitude is about 600 feet, the surface rises to the Mesaba Range, whence it declines to the Mississippi basin, and then rises gradually toward the southwestern part, where the Coteau des Prairies have a general altitude of 1,800 feet. Along the rivers and streams are rolling lands, which have fine belts of timber, but practically all of the soil is fertile. In the northwestern part is the valley of the Red River of the North, which has a level surface, and level tracts characterize the lake region in the north central part.

The Mississippi River and its tributaries drain the larger portion of the State. This stream rises in Elk Lake and has a general course to-



MINNESOTA.

1, Saint Paul; 2, Minneapolis; 3, Duluth; 4, Winona; 5, Mankato; 6, Brainerd. Chief railroads shown by dotted lines.

ward the southeast. Its chief tributaries include the Saint Croix, the Crow Wing, the Minnesota, and the Zumbro rivers. The Otter Tail River drains a number of lake basins in the west central part and discharges into the Red River of the North at Breckenridge, on the western border. The northeastern part is drained chiefly by the Saint Louis River, which discharges into Lake Superior at Duluth. Sev-

eral small streams in the north, such as the Big Fork and Vermillion rivers, flow into Rainy Lake and Rainy Lake River, and the Rock River drains the southwestern corner through the Big Sioux into the Missouri. The State has about 6,000 lakes, ranging in size from ponds to beautiful and extensive sheets of water. The largest of these is Red Lake, which discharges through Red Lake River into the Red River of the North. Other lakes of considerable size include Millé Lac, Leech, Otter Tail, Minnetonka, Vermillion, and Winnebigoishish. Traverse and Big Stone lakes, the sources of the Bois de Sioux and the Minnesota respectively, are located on the western border. Many of the lakes are noted as summer resorts. They are skirted by timber and yield many species of edible fish.

Minnesota, being near the geographical center of North America, has a continental, temperate, and healthful climate. The winters are cold and the summers are hot, but the warm days are usually followed by cool nights. In the northern part the temperature averages about 10°, in January, and the mean temperature for July is 70°. There is a difference of about ten degrees in the temperatures in the north and the south. At Saint Paul the thermometer falls to 30° below zero in winter, and at the same place it rises to 95°, or even 100°, in the summer. All parts of the State have an abundant rainfall for the germination and growth of crops, ranging from 20 inches to 30 inches in the southeast, with an average of 25 inches for the entire State. Some sections have a heavy fall of snow.

MINING. The State has the largest iron mines in the world, and the output is over half of the entire production in the United States. Although iron was known to exist in the Mesaba and Vermilion ranges as early as 1860, no material progress was made in the developments of mining the ores until in 1884. The mean annual production at present is about 32,500,000 long tons. A very large part of the output is shipped from Duluth and Two Harbors to smelters located in the cities on the lakes, principally in Illinois and Ohio. Valuable deposits of granite are worked at Ortonville, Saint Cloud, and other points in the State, and brown sandstone is obtained in Pipestone County. Clays of value in the manufacture of brick and pottery are widely distributed, and slate for commercial purposes is quarried in the northern part of the State. Deposits of pipestone occur in Pipestone County, where it was quarried to some extent by the Indians for making pipes of peace. Other minerals include corundum, red jasper, and feldspar.

AGRICULTURE. Minnesota is noted as an agricultural State, and for many years has taken first rank in the production of certain crops. It holds first place in the acreage and production of wheat, second in the production of barley, and third in that of oats, though in these respects it is closely approximated by Kansas and North Dakota. Hay and forage crops rank next to wheat in acreage. Corn is grown extensively in the southern part, where the climate is exceptionally favorable to the growth of that cereal. Other crops grown extensively include hay, flax, rye, potatoes, and sugar beets. Small fruits, such as raspberries and currants, yield abundantly, and many species of plums and apples are grown for the market.

The State has large interests in raising cattle, both for meat and dairy products. It has a reputation for its fine grade of horses, which are grown to a large extent for the market. Other live stock includes swine, sheep, mules, and angora goats. Poultry of all kinds is grown profitably.

MANUFACTURES. The manufacturing enterprises have advanced materially the last two decades, both in the number of enterprises and in the aggregate of their output. These results have been obtained through its convenience in shipping facilities, both by railways and by transportation on the Great Lakes. Minneapolis, Saint Paul, Stillwater, and Duluth are the largest railway and manufacturing centers of the State. Another factor in the development of the manufacturing industry is its extensive water power, such as has been developed through the improvement of the Falls of Saint Anthony, at Minneapolis, and various places in the channels of the Mississippi, Saint Louis, and Pelican rivers. Flour and grist milling products comprise the largest item of manufactures, in which the State exceeds all others in the Union. Lumber and timber products hold the second place. This condition is due to a large acreage of forests, about 50,000 square miles, including spruce, pine, oak, maple, cedar, poplar, tamarack, and other species. Nearly half of the lumber is sawed at Minneapolis, being transported to that place by rafting on the Mississippi. Other milling centers of the lumbering industry are located at Brainerd, Little Falls, Stillwater, and Cloquet. The State produces large quantities of packed meats, butter and cheese, paper and pulp, malt liquors, linseed oil, building stone and monuments, boots and shoes, railway cars, furniture, farming machinery, and clothing.

TRANSPORTATION AND COMMERCE. Navigation is restricted to the Mississippi and the Great Lakes, the former furnishing a water route to

the south and the latter to the east. However, Lake Superior furnishes the most important waterway, hence Duluth has developed into one of the great shipping centers of the country. The development of mining is dependent to a great extent upon transportation by water, but cereals and lumber are likewise conveyed in large quantities by the route of the Great Lakes. Numerous trunk railway lines cross the State from east to west, furnishing ample facilities for transportation to Chicago and points east as well as to Canada and the Pacific coast. All of the counties in the southern part have railway conveniences, but a few in the northern section are sparsely settled and are not well supplied with transportation facilities. Saint Paul, Minneapolis, and Duluth are the chief railway centers. The lines aggregate a total of 7,750 miles. Electric railways are operated from many of the cities to suburban and interurban points.

The commerce of the State is very extensive owing to the fact that Minneapolis and Saint Paul are wholesaling centers and supply many parts of the northwest with manufactures of various kinds. Iron ore, grain, and lumber are shipped in large quantities from Duluth, and flour, lumber, and manufactures are distributed extensively from Saint Paul and Minneapolis. Clothing, coal, and food products are the principal imports.

GOVERNMENT. Minnesota is governed under a constitution which was adopted in 1857. The executive authority is vested in the Governor, lieutenant governor, secretary of State, treasurer, and attorney-general, all of whom are elected for two years, and the State auditor, who is chosen for four years. A superintendent of public instruction, appointed by the Governor for two years, has general supervision of the schools. The Legislature consists of a senate and a house of representatives, the former having 63 and the latter 119 members. Senators are elected for four and representatives for two years. They convene in the regular session of the Legislature biennially on the Tuesday after the first Monday in January. The State is divided into judicial districts, in each of which one or more judges are elected by popular vote for a term of six years. These courts are subject to the supreme court of five judges, who are elected by the voters of the State. Each county has a probate court, and the townships have justices of the peace. The county and township officers are elective.

EDUCATION. The statistics for 1908 show that the State has 7,691 school districts, including those known as common, independent, and spe-

cial. These contain 8,449 schools, presided over by 13,795 teachers. A *common* district is controlled by a board of three members; an *independent*, by one of six; and a *special*, by one of six or more. The schools of common districts are supervised by a county superintendent; independent and special districts have their own superintendents and, in the main, are not subject to the county superintendent. Schools are classified as rural, semigraded, graded, and high; the last two coming under the State high school board, a body of five members, including the president of the State University, the superintendent of public instruction, and the president of the State normal board. The five normal schools are located at Winona, Mankato, Saint Cloud, Moorhead, and Duluth. They are controlled by a board of nine, five of whom are resident directors. The University of Minnesota, situated in Minneapolis, is under the control of a board of twelve regents.

The public schools are supported by direct tax upon the property of the school districts, by a county one-mill tax, by a State mill tax, and by the income from the permanent school fund (amounting to \$18,500,000), with small fines accredited to it. In addition to these funds, the State distributes annually to such schools as reach a prescribed standard of excellence: \$50 to second-class rural schools, \$125 to first-class rural schools, \$250 to semigraded schools, \$550 to graded schools, and \$1,500 to high schools. The State encourages the establishment and maintenance of school libraries by annual appropriations, aiding each district with a sum equal to that raised in the district itself for library purposes, not exceeding \$20 on original and \$10 on subsequent orders. The normal schools are supported by appropriations of the Legislature. On the other hand, the university is maintained by a direct tax upon all the State property, special State appropriations, and aid from the Federal government. The State provides a fund for teachers' institutes and training schools, and out of this fund about 38 such schools are held annually, with an enrollment of over 5,000 teacher students. In addition, summer sessions of twelve weeks are held at each of the State normal schools. Examinations for professional certificates intended to represent a work of a full four years' college course are held twice each year; examinations for teachers' State certificates are held semi-annually in each county of the State.

The School of Agriculture of the University of Minnesota is situated on a tract of 250 acres, at Saint Anthony Park, and is one of the best in the world. Two subexperiment stations are

maintained in the northern part of the State. Besides these schools supported and controlled by the State, there are about fifty private colleges and academies. These include Gustavus Adolphus College, Saint Peter; Carlton College, Northfield; Shattuck School, Faribault; Hamlin University, Hamlin; Macalester College, Saint Paul; and Augsburg Seminary, Minneapolis.

The State maintains hospitals for the insane at Fergus Falls, Rochester, and Saint Peter, and has schools for the blind, deaf, and feeble-minded at Faribault. A State public school for dependent children is located at Owatonna and a State training school is maintained at Red Wing. The State prison is at Stillwater and Saint Cloud has a reformatory for criminals between the ages of sixteen and thirty years.

INHABITANTS. A large per cent. of the people are of foreign birth, or the direct descendants of foreign-born parents. Those born in foreign countries consist largely of Germans and Scandinavians, these including nearly one-fourth of the population. The Lutheran and Roman Catholic churches predominate. Other Christian denominations represented largely include the Methodists, Baptists, Presbyterians, and Congregationalists. Saint Paul, on the Mississippi River, is the capital. Other cities include Minneapolis, Duluth, Winona, Stillwater, Mankato, Saint Cloud, Red Wing, Faribault, and Brainerd. In 1900 the State had a population of 1,751,394. This included 4,959 Negroes and 9,182 Indians. Population, 1905, 1,997,401; in 1910, 2,075,708.

HISTORY. Minnesota was formed partly from the Northwest Territory and partly from the Louisiana Purchase. The region was first visited by French traders and priests in 1659. Duluth built a fort at the mouth of the Pigeon River, on the northern shore of Lake Superior, in 1678 and Hennepin discovered the falls of Saint Anthony two years later. The northeastern part was ceded by France to England in 1763 and was acquired by the United States in 1783. All of the section lying west of the Mississippi was secured from France in 1803. The first settlement was founded at Fort Snelling, near the mouth of the Minnesota River, in 1821. Other settlements followed soon after at Saint Paul and Stillwater. The Chippewa Indians surrendered the lands east of the Mississippi River in 1837. In 1849 it was organized as a Territory, but embraced the northern part of the region now included in the present state of North Dakota and South Dakota. Later it became a part of the Territory of Missouri and afterward of Iowa, and in 1858 was admitted as a State. The Sioux Indians raised a formidable revolt in 1862, when about 800 persons were killed. With-

in the last several decades the State has made remarkably progressive strides in education and industries. It is increasing rapidly in wealth and developing in educational and political influence.

MINNESOTA, University of, a coeducational institution of higher learning at Minneapolis, Minn., founded by the Territorial Legislature in 1851. It was reorganized in 1860 and dates its real foundation from 1868, when it was again reorganized. A limited amount of instruction of a very elementary nature was provided at first, as early as the fifties, and a private school was held for some time in the unfinished university building. It is endowed by the general government, having received 186,569 acres of land, of which 34,603 acres remain unsold. These lands have yielded a permanent endowment of \$1,406,796 and eventually the sum will be increased to not less than \$20,000,000.

The university is made up of colleges, schools, and departments, including the college of science, literature, and the arts, the college of engineering and mechanic arts, the school of mines, the school of chemistry, the college of education, the department of agriculture, the dairy school, the college of law, the department of medicine, the college of homeopathic medicine and surgery, the college of dentistry, the college of pharmacy, and the graduate school. It is supported by funds received as the income from the permanent endowment, from fees, from the United States government, from a State tax levy, from direct State appropriations, and from sales and miscellaneous sources, making a total of \$653,826. The university has 40 buildings valued at \$2,036,000. It is governed by a board of twelve regents, three ex-officio and nine appointed members, the former including the Governor, the president of the university, and the State superintendent of public instruction. Both the museum and the herbarium are extensive. The general library contains nearly 100,000 volumes. On the grounds is a statue of John S. Pillsbury, who was long a regent and a benefactor of the institution. Degrees have been conferred upon about 7,000 persons. It has a faculty of 386 and an attendance of about 4,250 students.

MINNOW (mĭn'nō), a class of fish allied to the carp, found abundantly in the streams of America and Europe. They are common in the same streams with trout, swim in schools, and prefer gravelly bottoms. Most species have an average length of three inches, but some attain fully five inches. They are caught easily in hand nets for the purpose of serving as bait in catching other fish. In some regions minnows are

known as *pink* and in some localities as the *minim*. The common minnows have a brown color, a protractile mouth, and small transverse bands of a darker shade of brown along the sides.

MINORCA (mĭ-nôr'kâ), one of the Balearic Islands, in the Mediterranean Sea. It is second in size only to Majorca, and is situated about 25 miles northeast of the latter. Minorca has a length of thirty miles, is ten miles in width, and has an area of 403 square miles. The coast is rocky and precipitous and the interior has a number of mountains. Mount El Toro is the highest peak, elevation 4,985 feet. The island is productive, yielding flax, wheat, hemp, wine, copper, lead, iron, live stock, marble, and tropical fruits. Ciadadela and Point Mahon are the principal towns. Minorca has belonged to Spain since 1802. Population, 1906, 39,784.

MINOR PROPHETS, the twelve prophets of the Old Testament that are so named from the brevity of their writings, whose prophecies are recorded in the Hebrew canon. These prophets are Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habakkuk, Zephaniah, Haggai, Zechariah, and Malachi.

MINSK (mĕnsk), a city of Russia, capital of the government of Minsk, 110 miles southeast of Vilna. It is situated conveniently on a number of important railroads. The Svislotch, a tributary of the Beresina, flows through the city. Its streets are improved by modern facilities, including pavements, waterworks, and street railways. Many of the buildings are of handsome stone. Among the chief structures are the townhall, the public library, the central railway station, and the Cathedral of Saint Catharine. It has manufactures of cotton and woolen goods, machinery and leather, and a growing commercial trade. Minsk was important as a Polish city, but became a part of Russia in 1793. Population, 1908, 101,284.

MINT, the common name of any one of several aromatic herbs of the mint family. They include many species, such as *peppermint*, useful in medicine as a stimulant; *spearmint*, used in cooking; and *horsemint*, *mountain mint*, and *catmint*. Most of these plants are perennial. They are distributed widely in temperate regions, have square stems and simple and opposite leaves, and yield an essential oil. The flowers consist of whorls or circles grouped together, are purple or red in color, and possess a peculiar odor. Peppermint is used extensively in flavoring confectionery.

MINT, an institution for coining money, from which it is issued for circulation by public or sovereign authority. In early times the coins

were made by cutting pieces of metal and hammering them into shape, but in the 16th century it became common to coin both gold and silver by melting, and, after mixing with it copper alloys, to cast it into molds of proper form. Antoine Brucher, a French engraver, was the inventor of the first coining machine similar to those now in use. The process involves mixing copper alloy to supply sufficient hardness to the gold or silver, which is done by melting the metals, and afterward these are cast into bars. The bars are then rolled to form sheets of proper thickness, suitable to have the coins cut from them. If, on weighing, the coins are too heavy, small strips are cut from the edges, but, if too light, they are remelted and again rolled. The result after cutting is a blank coin, which is taken to the milling machines, where the rim is completed, and afterward the figures and letters of the different coins are stamped on with the coining press. The finished coin is carefully inspected and weighed, and, if found in strict accord with the coinage requirements, it is placed with others of the same denomination in bags and stored in vaults until put into circulation.

The first mint in North America was established at Philadelphia under a national coinage act passed in 1792. At first the metal and machinery employed were imported. Copper money was coined at this mint as early as 1792, silver money in 1794, and gold money in 1795. Steam power was introduced in the coinage of money in 1816, and soon after branch offices were established at different places, both for assaying and coining metals. The royal mint of Canada is under the direction of the Deputy Master, who is assisted by the Superintendent of Coinage. Mints are maintained in the United States at Philadelphia, New Orleans, San Francisco, and Carson City, all of which are under the charge of the Bureau of the Mint of the United States Treasury Department. The establishment at Philadelphia is the most important, where the dies for all the mints are made. Assay offices are maintained in Denver, New York, Seattle, Helena, Deadwood, Saint Louis, and several other cities. Their purpose is to receive deposits of gold and silver, which are formed into bars and stamped with their weight and proportion of the metals, and then are returned to the depositor.

MINUTE (mĭn'it), a space of time and a division of angular measurement. As a space of time it is equal to the 60th part of an hour and is divided into 60 seconds. As a division of angular measurement it is the 60th part of a degree. To distinguish the two measurements, the former is called a minute of time and the latter

a minute of arc, 15 minutes of arc being equal to one of time. Four minutes of time are equal to a degree.

MINUTEMEN, the name of the volunteer soldiers of New England in the American Revolution, who were pledged to take up arms on a minute's notice. An act of the provincial congress passed in 1774 authorized the enrollment of such members as a military force, and a considerable number of them took part in the battle at Lexington, the first engagement of the war.

MIOCENE (mī'ō-sēn), a term applied in 1835 by Sir Charles Lyell to the geological beds which were formerly called the Middle Tertiary. It is used to denote that only a minority of the shells belong to recent species, while Pliocene designates the more recent. Miocene deposits contain fossils of mammals, plants, and shells that foreshadow the life forms of the present time. They indicate a moderate climate.

MIÖSEN (mē-ō'zēn), or **Mjösen**, the most important lake of Norway, in a fertile valley, 37 miles northeast of Christiania. The surface is 1,050 feet above the sea. It is eight miles wide and sixty miles long. The overflow is carried into the Glommen by the Vormen River. Near its shores are several railroad towns.

MIQUELON (mē-k'lôn'), an island off the southern shore of Newfoundland, in the Atlantic Ocean. See **Saint Pierre**.

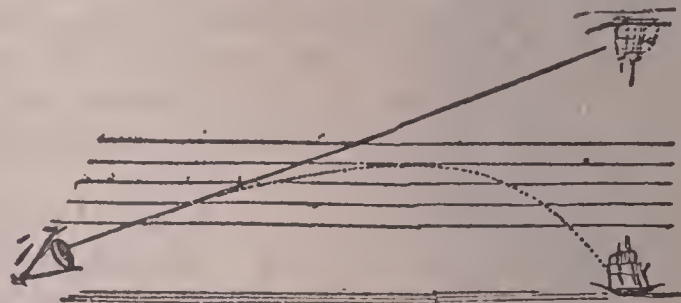
MIRABILITE (mī-rāb'ī-lit), a white crystalline substance commonly known as Glauber's salts, valuable as a cathartic. It was first discovered at Carlsbad, Bohemia, by Johann Glauber (1604-1668), a German chemist.

MIRACLE (mīr'ā-k'l), an act wrought by divine power. At present miracles are not thought necessary to show the divine will of God, because we may learn of it in the Scriptures, or they are explained as the result of divine power operating under laws entirely natural but unknown to us. Among the notable miracles recited in the Scriptures are those mentioned in Exodus as the work of Moses, while he was endeavoring to persuade the King of Egypt to allow his people to emigrate, and those mentioned in the four gospels as directly exhibited by Jesus. Christ specifically explains the object of miracles by saying: "The works that I do bear witness of me, that the Father hath sent me."

MIRACLE PLAYS, a class of dramatical entertainments whose subjects were drawn from the lives of saints and from the Bible, and which were performed in the Middle Ages. Plays of this character were given as early as the 4th century in the churches by or under the direc-

tion of clergymen, but later stages were built in public places of cities on which they were exhibited in public as a means to disseminate religious instruction. Ultimately the miracle plays became corrupted by jests or partook rather of an entertaining than an instructive aspect, on account of which they were abolished for irreverence. The Passion Play is a noted example and is still performed at Oberammergau, Germany, and elsewhere with much success and good moral results. See **Mysteries**.

MIRAGE (mē-rāzh'), an optical illusion in which images of distant objects are seen as if raised in the atmosphere, or as if inverted. The



MIRAGE.

illusion was first explained by a Frenchman who accompanied Napoleon I. on his expedition to Egypt. He was induced to investigate the phenomenon that appeared in the Egyptian desert, which was the source of much annoyance to the French soldiers, who were in several instances led to believe that a lake was really near them, when in fact they were deceived by illusionary images of water. The phenomenon is now known to be due entirely to the rays of light being changed in their direction when passing through colder or hotter strata of air. The layers of air in contact with the surface of deserts become greatly expanded and rarefied, while those immediately above remain more dense, thus causing the rays of light to be bent upward. However, the effect above water is usually the reverse, the layers above being warmer than those next the water.

The phenomenon is often seen in the form of one object over another, apparently raising objects above the horizon. It usually appears in a vertical form, but sometimes the images are horizontal. When an object appears to be lifted above its true position, as is shown in the figure, the phenomenon is called *looming*, and the observer is enabled to see the object, though it really is below the horizon. In looming objects appear either in an erect or inverted position. The difference between looming and mirage is that in the former the reflection is from the sky, while in the latter it is from the surface of the earth. The *Fata Morgana* is a remarkable phenomenon which appears frequently in the Straits

of Messina, and presents objects in the air and at other times in the water. In 1822 Captain Scoresby was sailing in the polar regions and observed in the air the mirage of his father's vessel, which he afterward found to be thirty miles off. The instances of seeing ships, armies, men, trees, streams, and other objects apparently near the surface, or at some distance in the air, are very numerous.

MIRAMICHI (mīr-ā-mē-shē'), a river of Canada, in New Brunswick. It is formed by two branches and, after a course of 150 miles, discharges into the Bay of Miramichi, an arm of the Gulf of Saint Lawrence. It is navigable for a distance of forty miles from its mouth. Along its banks are fine forests of pine. It has salmon and trout fisheries.

MIRROR (mīr'rēr), any glass or polished substance which forms images by the reflection of rays of light. In ancient times mirrors were made of thin polished bronze, either fitted with a candle or encased in a wooden or metallic frame. The Romans made mirrors of polished silver and later of glass, but they were usually of small size and were carried in the pocket or at the girdle. Those carried in the pocket consisted of small circular plaques of polished metal fixed in a circular box, covered with a lid. In the early part of the 16th century A. D. mirrors began to be used as household furniture and decoration. They were not introduced into England until 1673, but they soon became an important article of manufacture in that country and in the colonies of America.

Mirrors are of various forms, but are usually classed as plane, concave, and convex. A *plane* mirror has a plane reflecting surface. When an object is placed before a plane mirror, a virtual image of it can be seen by an eye placed in the proper position, since the image of an object is in the direction from which the directed rays come. The size of the image corresponds to that of the object and appears to be as far behind the mirror as the object is away from it, but the sides are reversed. That is, in looking into a mirror, the observer faces the reflecting surface, hence the left side is seen at the right hand of the image. Two or more persons, looking into a mirror, see different images.

A *concave* mirror has a concave surface, similar to the concave side of a lamp reflector, and the surface may be either a part of a sphere or a paraboloid. The reflection of a concave mirror, when it is brought in contact with parallel rays of light, is at a point called the *focus*. The focus is directly opposite the center of the mirror and at a point in front of it. Several kinds of images are reflected by such a mirror,

as may be observed by experimenting with a common lamp reflector. When the object is at the center of the curvature, the image is real, of the same size as the object, and at the center of curvature, but it is inverted. If the object is at a definite distance beyond the curvature, the image is real but smaller than the object, and it is likewise inverted. When the object is between the center of curvature and the principal focus, the image is larger than the object and inverted. The *convex* mirror is made from the section of the outside of a sphere. In such a mirror the reflected rays must be prolonged behind the mirror before they meet, hence the image is erect and smaller than the object. Small hand mirrors are usually made slightly convex.

MISHAWAKA (mīsh-ā-wā'kā), a city of Indiana, in Saint Joseph County, five miles east of South Bend. It is on the Grand Trunk, the Lake Shore and Michigan Southern, and other railroads, and is surrounded by a farming and fruit-growing country. The chief buildings include the high school, the city hall, and a number of churches. Settled in 1828, it is one of the oldest towns in northern Indiana and was incorporated in 1834. Among the manufactures are machinery, flour, farming implements, cigars, and earthenware. Population, 1910, 11,886.

MISSAL (mīs'sal), a book which contains the services of the mass for the various days of the week, used by the Roman Catholic church. At an early period of that church the several parts of divine services were arranged in different books, but these were later gathered into a collection. Pope Pius IV. commenced a revision that was finally completed and published under Pius V. in 1570. Later revisions were made under Clement VIII. in 1604 and by Urban VIII. in 1634. At the beginning of the missal now in use are a number of explanations and tables of the moveable feasts. These are followed by the service for the Sundays and greater festivals, by the proper of saints, and so on for the various days of the year.

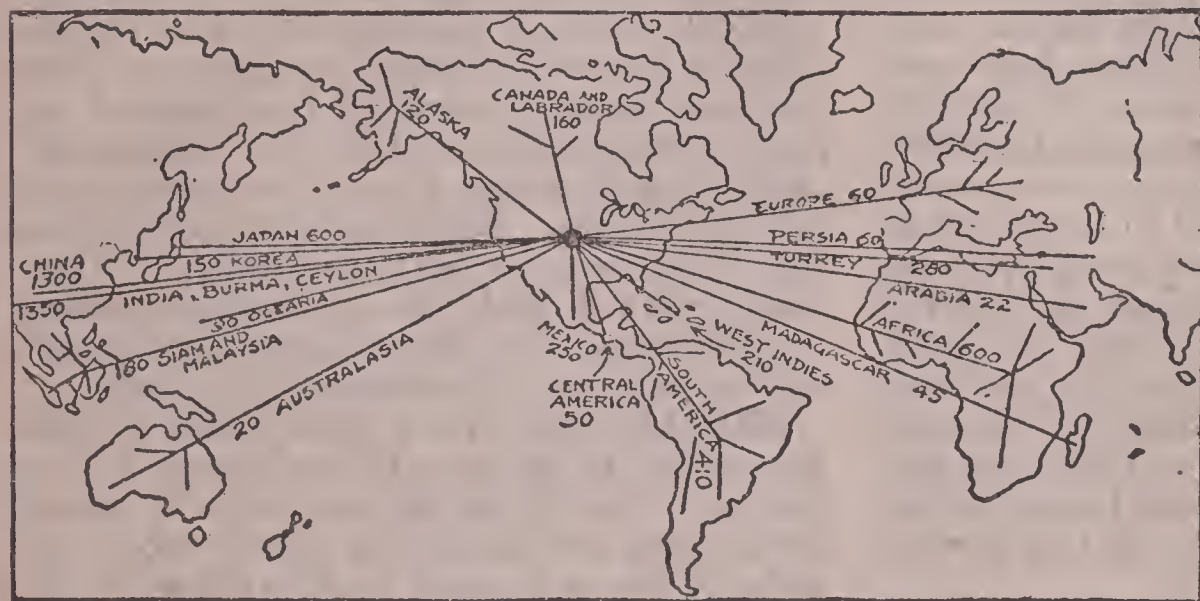
MISSION (mīsh'ūn), a term used to designate a station at which missionaries make their headquarters for the purpose of disseminating religious doctrines and winning converts to the faith. The apostles were enjoined by Jesus to preach the gospel and became the first teachers of Christianity. Their work was taken up by many Christian teachers and missionaries, who caused the religion of Christ to spread to the various parts of Western Asia, Northern Africa, and Southern Europe. Under Constantine, in the 4th century, the firm establishment of Christianity was made a concern of the civil

power and under Charlemagne, in the 9th century, the Saxons became converted. The faith spread rapidly to the various Germanic tribes, who soon sent missionaries into Hungary, Poland; and the Scandinavian countries. The order of Jesuits was established in the Roman Catholic Church in the 16th century, and this order founded missions in South America and Eastern Asia. Later the Dominicans, Franciscans, and other orders were organized, under whose direction institutions of learning and industry were instituted.

During the 16th and 17th centuries the Protestant churches attained to a vast membership, and they sent their ministers and missionaries into all parts of the world. At present missionaries of all the Christian churches are operating in every inhabitable portion of the earth, and

as a small stream from Elk Lake. It passes through Lake Itasca and a number of others, and thence has a general course toward the south until it flows into the Gulf of Mexico. The entire length of the Mississippi is 2,625 miles, while the Missouri River has a length of 2,920 miles before reaching the Mississippi, hence the combined length of the two rivers is about 5,545 miles. The whole area drained by the Mississippi system is 1,600,000 square miles. It constitutes the most fertile and valuable region in the world. At Minneapolis are the Falls of Saint Anthony, which furnish immense water power, and here, as elsewhere, navigation is obstructed, but in many places vast improvements have been made by canals and levees, the latter being maintained to protect portions of the valley from overflowing during high water.

The regions subject to overflow are situated south of Saint Louis, where it becomes a vast stream of rapidly moving water and carries large quantities of sediment to the gulf. Among the principal eastern tributaries are the Wisconsin, the Illinois, the Ohio, and the Yazoo. The western confluent include the Minnesota, the Des Moines, the Missouri, the Arkansas, and the Red rivers.



DISTRIBUTION OF AMERICAN FOREIGN MISSIONS.

large sums of money are spent annually for the purpose of evangelizing heathen nations. Many important missionary societies are maintained in Canada and the United States, such as those of the American Baptist Union, American Board of Commissioners of Foreign Missions, Methodist Episcopal Missionary Society, Lutheran Missionary Union, and Presbyterian Board of Foreign Missions. Besides these are organizations known as home missionary societies, whose aim is to prosecute religious reform work within the home country. The Protestant churches alone have about 575 missionary societies, of which the largest numbers are in North America and Great Britain. Missionary unions to promote foreign and domestic evangelistic work are now maintained in practically all the countries of Europe.

MISSISSIPPI (mĭs-ĭs-sĭp'pĭ), meaning great water, or the *Father of Waters*, one of the largest rivers in the world. The source is in the north central part of Minnesota, where it issues

wide, but at the mouth of the Ohio it is 4,700 feet and at New Orleans it is 3,100 feet, while the maximum volume of water per second during a flood is estimated at 1,500,000 cubic feet. The sediment transported annually is sufficient to cover a square mile to the height of 250 feet. In the upper course the water is clear and transparent, but it gradually grows dark with silt, which it deposits. During the past ages it has carried the land surface far into the Gulf and formed a large number of bayous and islands. The government of the United States has caused the construction of jetties to protect the channel for the passage of vessels.

The Mississippi River and its tributaries furnish about 16,000 miles of navigable waters, which make possible a vast inland commerce by steamboats. Numerous canals connect the various rivers and lakes near them, the most important of recent construction being the connection between Lake Michigan and the Mis-

Mississippi by the Chicago Drainage Canal. Among the important cities on the Mississippi River are Saint Paul and Minneapolis, Minn.; Dubuque, Davenport, Burlington, and Keokuk, Iowa; Rock

Island, Quincy, Alton, and Cairo, Ill.; Saint Louis, Mo.; Memphis, Tenn.; Vicksburg and Natchez, Miss.; and Baton Rouge and New Orleans, La. De Soto discovered the Mississippi in 1541 and was the first white man to reach it. Marquette and Joliet descended nearly to its mouth in 1673. La Salle reached the Gulf of Mexico by way of the Mississippi in 1682.

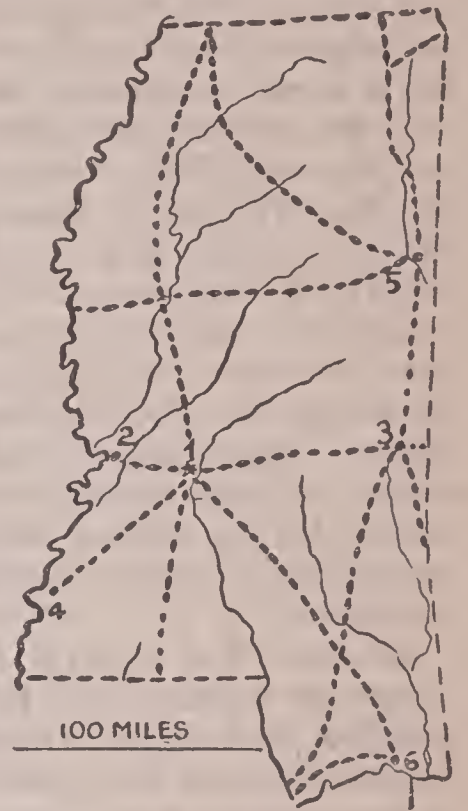
MISSISSIPPI, a southern state of the United States, popularly known as the *Bayou State*. It is bounded on the north by Tennessee, east by Alabama, south by the Gulf of Mexico and Louisiana, and west by Louisiana and Arkansas. The State takes its name from the Mississippi River, which forms its western boundary for a distance of 500 miles, separating it from Louisiana and Arkansas. A portion of the western boundary is formed by the Pearl River and a small part of the northeastern border by the Tennessee River. The extent from north to south is 335 miles; average width, 150 miles; and area, 46,810 miles. This includes a water surface of 470 square miles. A number of islands in the Gulf of Mexico belong to the State, including Cat, Bois, Horn, Petite, and Ship, which are separated from the mainland by the Mississippi Sound.

DESCRIPTION. Much of the surface is rolling land, broken in many places by valleys, but the highest ridges are in the northeastern part, where the altitude is about 1,000 feet above the sea. Extensive level tracts characterize the southern part and the region adjacent to the Mississippi. About one-sixth of the entire State lies in the river bottoms, of which the Yazoo bottoms are the most extensive. These lowlands are highly fertile and have been reclaimed by the construction of levees, which serve to prevent their overflow during high water. Cypress trees of much value are found in the swamp and marsh regions, while fine forests of timber are abundant on the drier lands.

Nearly all of the drainage is toward the south. The western part is drained by the Mississippi and its tributaries, which include the Yazoo, the Big Black, and the Homochitto rivers. A large section in the south central part is drained di-



LOWER MISSISSIPPI VALLEY.



MISSISSIPPI.

1, Jackson; 2, Vicksburg; 3, Meridian; 4, Natchez; 5, Columbus; 6, Biloxi. Chief railroads shown by dotted lines.

rectly into the Gulf of Mexico by the Pearl River. The Tombigbee drains the northeastern part and the Pascagoula drains the southeastern part, both discharging directly into the Gulf. Though the Tennessee touches the northeastern corner, only a small part of the interior is drained by it. The State has a number of lakes, but all of them are directly connected with rivers. Biloxi Bay, Pascagoula Bay, and the Bay of Saint Louis are the largest inlets.

The climate is semitropical and highly favorable to vegetable growth. Though the summers are long, they are made pleasant and healthful by breezes from the Gulf. The southern part has a mean temperature of 50° in January, and near the northern boundary it is 40°. In summer the mean temperature is about 81°, though the heat frequently ranges from 85° to 100°. Frosts and light falls of snow visit the northern part, where the thermometer rarely reaches the zero point. All parts of the State have an abundant rainfall, the annual average being about 50 inches, but the southern part has over 60 inches. Rains occur most frequently in late winter or early spring, but precipitation is well distributed throughout the year. In summer the prevailing winds are south, while in winter they are north.

MINING. The mineral deposits consist principally of brown coal, limestone, and potter's and fire-brick clays. Gypsum deposits of considerable extent are found in the central part of the State, and these are worked quite extensively in some localities. The clays are worked more generally than any of the other minerals and the output is utilized in the manufacture of brick, pottery, and sewer pipe. Mineral springs are distributed in various parts, especially in the bluffs of the Yazoo and Mississippi rivers, and some of them have waters that contain valuable medicinal properties. Iuka Springs and Ocean Springs are widely known as health resorts.

AGRICULTURE. The nature of the soil and the favorable climate favor agriculture, which is the leading industry. The farms average 82 acres, and the majority of the farmers are Negroes. Only about 15 per cent. of the colored tillers own their farms, as against 63 per cent. for the white farmers. Cotton is the chief crop and is grown on about one-half of the cultivated area. The State holds third rank in the yield of this product, being exceeded only by Texas and Georgia. Corn is grown extensively and the acreage is next to that of cotton. Other products include oats, hay, peas, wheat, rice, and fruits. The bottom lands are well suited to the cultivation of rice, but the acreage is not large.

Many varieties of fruit are grown profitably, including figs, oranges, peaches, pears, and strawberries.

Stock raising represents large investments, but this enterprise does not receive as much attention as other departments of farming. Cattle are grown profitably, both for meat and dairy-ing purposes. Other domestic animals include swine, horses, sheep, mules, and poultry.

MANUFACTURES. The manufacturing enterprises are not extensive when compared to those of the eastern states, but considerable progress has been made for several decades. Lumber and timber products stand at the head of the list in the value of the output. Valuable areas of timber are still abundant, including such species as the oak, ash, cypress, beech, elm, sycamore, magnolia, holly, pine, hickory, and live oak. About two-thirds of the State are still included in the forest area. This has given rise to a long list of manufactures, such as turpentine, furniture, resin, and planing-mill products. A large quantity of fish and oysters are canned. Other manufactures include cotton-seed oil, flour, cotton and woolen goods, sugar, and tobacco products. Meridian, Vicksburg, and Natchez are the leading manufacturing cities.

TRANSPORTATION AND COMMERCE. Transportation facilities are afforded by the Tennessee, the Mississippi, and the Gulf of Mexico. Railway lines are operated to a considerable extent, aggregating 3,250 miles. Trunk lines and branches extend through the State at various points, affording communication with all the principal towns and cities. The principal railroads include the Southern, the Queen and Crescent, the Illinois Central, the Louisville and Nashville, and the Mobile and Ohio. Electric railways are operated in the cities and through some of the interurban points.

The State exports timber, cotton, corn, cotton-seed oil, turpentine, and timber products. Manufactured goods, such as clothing and machinery, are imported.

EDUCATION. The public school system dates from 1846, when it was established by a general law. Separate schools are maintained for white and for colored pupils. Although illiteracy has been reduced to eight per cent., it is 49 per cent. among the Negroes. The school term averages 110 days per year in the State, a material increase since ten years ago, but the towns generally have school for nine months per year. Education is supervised by a State board, which consists of the superintendent of education, attorney-general, and secretary of State. This board and the senate have concurrent power to appoint a school superintendent for each county.

The schools are supported mainly by local taxes, but the revenue derived from the State taxes is a material factor in building up the educational system. Educational work culminates in the State University, near Oxford. An agricultural and mechanical college is situated at Starkville. The private institutions of higher learning include Mississippi College, Clinton; Rust University, Holly Springs; Whitworth Female College, Brookhaven; Millsaps College, Jackson; Alcorn Agricultural and Mechanical College, Westside; and Cooper-Huddleston College, Daleville.

Adequate provisions have been made for the care of the unfortunates and for correctional purposes. Jackson has the State institution for the deaf and dumb, Meridian and Jackson have hospitals for the insane, Vicksburg and Natchez have hospitals that are supported by the State, and Jackson has a school for the blind. The penitentiary is located at Jackson. Most of the prisoners are put to work upon farms, either owned by the State or rented, and those committed to the county jails are likewise similarly employed. Vicksburg has a Confederate hospital and a home for indigent Confederate soldiers is maintained at Beauvoir.

GOVERNMENT. The constitution under which the State is governed was adopted in 1890. It vests the chief executive authority in the governor, lieutenant governor, treasurer, auditor, attorney-general, and secretary of State, all of whom are elected for four years. The governor, treasurer, and auditor cannot be elected to immediately succeed themselves or each other. The Legislature consists of a senate and a house of representatives, the members of both branches being elected for four years. It convenes in regular session on the Tuesday after the first Monday of January of every fourth year after 1892, but special sessions may be convoked by the Governor. Three judges appointed by the Governor and senate for terms of nine years constitute the supreme court. Judges of the circuit and chancery courts are appointed in the same way for four years. Each county is divided for the purpose of local government into districts instead of townships.

INHABITANTS. Only a small per cent. of the people are of foreign birth. The State has the largest per cent. of colored population, though Georgia has a greater number of colored inhabitants. In some counties near the Mississippi the Negroes are five times as numerous as the whites. Jackson, on the Pearl River, is the capital of the State. Other cities include Vicksburg, Meridian, Natchez, Greenville, Columbus,

Aberdeen, Yazoo City, Biloxi, and Wesson. In 1900 the State had a population of 1,551,270. This included a colored population of 908,370, including 237 Chinese, 2,203 Indians, and 905,930 Negroes. Population, 1910, 1,797,114.

HISTORY. The region now included in the State of Mississippi was first visited by a Spanish expedition under De Soto in 1540, but no traces of a settlement were left. In 1673 Joliet and Marquette came down the Mississippi, and in 1682 La Salle took formal possession of the region in the name of the King of France. The French settled at Biloxi Bay in 1699, under Iberville, who brought 200 immigrants from France. Soon after, in 1718, settlements were made in the vicinity of New Orleans. The territory was ceded by France to England in 1763. It was included within the State of Georgia until 1798, when it was organized as a territory of the Union, and in 1817 was formally admitted as a State. When the Civil War commenced, the State seceded from the Union, and, owing to its location on the Mississippi River, it became the scene of a number of important battles, including those of Corinth, Holly Springs, Iuka, and Vicksburg. The war caused the State to lose greatly in population and wealth. However, within the last quarter of a century it has been developing rapidly its material resources, building cities, extending manufactures, and giving aid to the progress of educational and industrial arts.

MISSISSIPPI, University of, a State co-educational institution at Oxford, Miss., opened for instruction in 1848. It was suspended during the Civil War and was maintained chiefly by annual grants of the Legislature until 1880. The departments include those of science, law, pedagogy, philosophy, mining, civil and electrical engineering, and liberal arts. With it are affiliated the accredited high schools, from which students are admitted without examination. It has an endowment fund of \$795,000, a library of 22,500 volumes, and property valued at \$1,250,000. The professors and instructors number 20, while the attendance of students is 265.

MISSISSIPPI SCHEME, an enterprise promulgated at Paris, France, in 1717, by John Law. The scheme was to develop by colonization the Mississippi valley, for which purpose a large amount of currency and bonds were issued, which sold at a premium for a long time. The enterprise attracted the attention of investors from all the civilized countries, but later the stock began to decline and the scheme proved an entire failure. John Law fled from France when the company became bankrupt, in 1720, and soon after the government assumed

the obligation to pay the paper currency and the stock issued to shareholders.

MISSOLONGHI (mīs-sō-lōŋ'gē), a town of Greece, on the Gulf of Patras, an extension from the Mediterranean Sea. It is memorable as a center for the Grecian revolutionists from 1821 until 1822, when it was held by Marco Bozzaris against Turkish besiegers. In 1824 Lord Byron came to Missolonghi to assist the Greek patriots, but died there the same year. The town is located on a level region, has a considerable trade, and contains fine statues of Byron and Bozzaris. Population, 1906, 9,206.

MISSOULA (mī-zōō'lā), a city of Montana, county seat of Missoula County, on the Hell Gate River, 125 miles northwest of Helena. It is on the Northern Pacific Railroad and is surrounded by a mining, farming, and lumbering region. The chief buildings include a public library, several public and private schools, and a number of churches. It is the seat of the Garden City Commercial College, the Sacred Heart Academy, and the University of Montana. The industrial enterprises include flour mills, bottling works, and railway shops. The first settlement on its site was made in 1864 and it was incorporated in 1887. Within recent years it has grown rapidly in population and commercial enterprises. Population, 1910, 12,869.

MISSOURI (mīs-sōō'rī), meaning muddy river, the largest confluent of the Mississippi. The source is near the boundary line between Idaho and Montana, where it springs from the Rocky Mountains, and thence has a general course toward the northeast to the northern part of Montana. In the latter State the Missouri flows east, entering North Dakota, and thence has a southeasterly course until it reaches the Mississippi River, about eighteen miles above Saint Louis. It is 2,920 miles from its source to its junction with the Mississippi, about three-fourths of the distance being navigable. At a point about 400 miles from its source is a gorge 450 feet wide and 1,200 feet deep, known as the Gates to the Rocky Mountains, and 550 miles from its source are the Great Falls, consisting of four consecutive cataracts. The principal tributaries of the Missouri are the Yellowstone, the James, the Cheyenne, the Niobrara, the Big Sioux, the Platte, the Kansas, the Grand, and the Osage. Among the cities on its banks are Great Falls, Bismarck, Pierre, Sioux City, Council Bluffs, Omaha, Atchison, Leavenworth, Kansas City, and Jefferson City.

MISSOURI, a central state of the United States, situated about midway between the Rocky Mountains and the Atlantic Ocean, popularly called the *Bullion State*. It is bounded on

the north by Iowa; east by Illinois, Kentucky, and Tennessee; south by Arkansas; and west by Oklahoma, Kansas, and Nebraska. A part of the western boundary is formed by the Missouri, which enters the State at Kansas City, and the eastern border is mainly by the Mississippi. A small portion of the eastern boundary is formed by the Des Moines. Southward it projects between the Mississippi and the Saint Francis rivers. From north to south the State has a length of 285 miles. The width at the northern boundary is 208 miles and at the southern it is 312 miles. The area is 69,450 square miles, including 680 square miles of water surface.

DESCRIPTION. The Missouri River, which forms the western boundary from the northern line to Kansas City, flows across the State. About one-third of the State lies north of the Missouri River. This portion is made up largely of a rolling prairie, while the southern part is hilly or mountainous, including the principal chains of the Ozark Mountains. The general elevation is from 350 to 800 feet above the sea level, but the highest ranges of the Ozark Mountains rise to altitudes of 1,600 feet. Pilot Knob and Iron Mountain, both in the eastern part, are the highest summits. Along the Mississippi are level bottoms and these are protected from inundation by levees.

All of the drainage belongs to the Mississippi, which forms the eastern boundary. The principal tributary is the Missouri, which flows into it about eighteen miles north of Saint Louis. Other rivers flowing into the Mississippi include the Salt, which drains the northeastern part, and the Saint Francis, which drains the plain in the southeastern section. The White and the Black rivers, in the south, cross the southern border and flow into the Arkansas. Much of the drainage in the central and northern parts is by the Missouri, which receives the Platte, the Grand, and the Chariton rivers from the north, and the Osage, the Gasconade, and the Lamine from the south. Most of the streams within the State are tortuous and flow slowly, hence are subject to overflows during excessive rains.

The climate is continental and healthful, but it is subject to the extremes common to the interior of the continents. The winters are short, the summers are long, and the winds are rarely excessive. In the Ozark Plateau the heat of summer is tempered by elevation, though the extremes in summer frequently register from 95° to 102° on the thermometer. In July the mean temperature varies from 75° to 80° and in January from 20° to 35°, though the mini-

imum of 10° below zero is sometimes reached. All parts of the State have ample rainfall, which ranges from 30 inches per year in the north to 60 inches in the south. It is quite uniformly distributed throughout the year, the greatest amount of precipitation occurring in the spring. The fall of snow ranges from 10 to 20 inches.

MINING. The State has large mining interests. In the output of zinc it occupies a high place, producing more than one-half of the total spelter in the country. It is surpassed only by Idaho in lead mining and holds second rank in the quarrying of building stone. The coal fields, which extend into it from Iowa and Kansas, yield a fine grade of bituminous coal, and the product is used largely for the local



MISSOURI.

1, Jefferson City; 2, Saint Louis; 3, Kansas City; 4, Saint Joseph; 5, Springfield; 6, Joplin; 7, Hannibal; 8, Chillicothe. Chief railroads shown by dotted lines.

consumption. Extensive beds of iron ore are found in the Ozark Plateau, especially in the vicinity of Pilot Knob and Iron Mountain, which are famous for their large yield of hematitic ore. Granite and limestone are quarried in many sections of the State and valuable clays for brick and pottery are abundant. Other minerals include copper, petroleum, natural gas, manganese, and mineral waters.

AGRICULTURE. The State holds a high rank in agriculture, which is the most extensive industry. About 78 per cent. of the total area is included in farms, which average 120 acres. Corn is grown on a larger area than that of all other crops, hence the State is one of the leading producers of that cereal. Hay and forage crops are the next most important productions and both the acreage and the yield are large. Both spring and winter wheat can be grown successfully, but the greater share of attention is giv-

en to the latter, and the crop is especially favorable for milling. Other farm products include oats, flax, potatoes, sorghum cane, rye, and cotton, but the last mentioned is grown exclusively in the southern part. Large interests are vested in raising tobacco, tomatoes, watermelons, and strawberries. Apples of a fine quality are produced throughout the State and many of the orchards contain a large number of peach, pear, and cherry trees, all of which produce abundantly.

Missouri is one of the cattle-growing states, both for meat and dairying, but the former receives the larger share of attention. The large yield of corn makes it important for swine raising. Other domestic animals include horses, sheep, mules, and poultry.

MANUFACTURES. The State has the largest manufacturing interests west of the Mississippi. This condition is due to the presence of extensive resources, such as are yielded by the mines, farms, and forests. Saint Joseph and Saint Louis have large interests in slaughtering and meat packing. The smelting of zinc is carried on chiefly at Carthage and Joplin. Many of the streams yield an abundance of water power, hence flouring and grist mills are located in many sections of the State, but the larger share of flour milling is done in the larger cities by steam power. Saint Louis and Kansas City are noted as publishing centers and for the manufacture of boots and shoes. The former city likewise has extensive brewing interests. Missouri ranks first in the manufacture of chewing and smoking tobacco, third in malt liquors, fourth in boots and shoes, fourth in slaughtering and meat packing, and seventh in flour milling. Other manufactures include carriages and wagons, clothing, machinery, confectionery, and railway cars.

TRANSPORTATION AND COMMERCE. Extensive communication by water is afforded by the Missouri and Mississippi rivers, but that of the former is of greater importance. Formerly the Missouri River carried a large water traffic, though this has been largely displaced by the building of railways across the State. Numerous lines cross the State, including a number that furnish direct connections with many trade centers of the country. The largest number of lines are in the northern half of the State and the principal railway centers are Saint Louis, Kansas City, and Saint Joseph. Among the chief railroads are the Wabash, the Chicago and Alton, the Missouri Pacific, the Chicago, Burlington and Quincy, the Atchison, Topeka and Santa Fé, the Southern, the Chicago, Milwaukee and Saint Paul, and the Saint Louis and San

Francisco. Electric lines are operated in all the larger cities, and these lines connect with many urban and interurban points. The railways aggregate 7,250 miles.

Missouri has large commercial interests, both within the State and with other sections of the country. Saint Louis and Kansas City are noted as grain and stock markets, and distribute large quantities of merchandise throughout the southwestern part of the United States. Among the leading exports are meats, fruits, lead, zinc, iron ore, tobacco products, and boots and shoes. Coffee, tea, sugar, and clothing are among the leading imports.

GOVERNMENT. The constitution now in force was adopted in 1875. A governor, lieutenant governor, treasurer, auditor, secretary of State, attorney-general, and superintendent of public instruction are elected by a popular vote of four years, but the governor and treasurer cannot be reelected to succeed themselves. The Legislature consists of 34 senators elected for four years and 142 representatives elected for two years. Sessions of the Legislature convene on the Wednesday after the first day of January of odd years. Seven judges elected for ten years constitute the supreme court. The judges of the circuit courts are elected for six years. Appellate courts are maintained in Kansas City and Saint Louis and each county has a probate and a county court. Government is administered locally by county officers. Each county is subdivided into townships, which are presided over by officers elected by the people.

EDUCATION. Higher education in Missouri is ably cared for by the State university, the six normal schools, the Missouri College Union, and a number of public high schools of very high class, notably those of Kansas City, Saint Joseph, and Saint Louis. The State has about eighty other colleges and academies and more than 300 public high schools. The State University is located at Columbia, where it was established in 1843. It began with a faculty of five, an enrollment of 78, and two graduates at the end of the first year. During the Civil War the faculty and the enrollment were reduced materially, but since that time there have been no interruptions in the satisfactory growth of the institution. The faculty, including that of the Rolla School of Mines, which is about thirty in number, is 220, and the enrollment averages 2,500 students.

Nine colleges, in addition to the State University, belong to the Missouri College Union, as follows: Central, Fayette; Westminster, Fulton; William Jewell, Liberty; Missouri Valley, Marshall; Park, Parkville; Saint Louis University, Saint Louis; Washington University,

Saint Louis; Drury, Springfield; and Tarkio, Tarkio. These schools spend annually for salaries of the presidents, teachers, and tutors, \$250,000; for incidentals, rents, and libraries, \$140,000; total, \$390,000. They are well equipped with libraries and facilities to teach biology, physics, and chemistry. The value of buildings and grounds is \$4,500,000; the permanent endowment, \$12,500,000.

The State maintains six normal schools, including Lincoln Institute, at Jefferson City, an institution for Negro teachers. The schools at Kirksville, Warrensburg, and Cape Girardeau were founded in 1871; Lincoln Institute became a State institution in 1879; and the other two, one at Springfield and one at Maryville, were established by legislation in 1905 and began operations in 1906. These six institutions have a combined enrollment of 5,500 and represent an outlay of \$2,162,000. Additional normal instruction is given at the Teachers' College, a department of the State University. The high schools of the State do thorough and advanced work and are well equipped with libraries and apparatus for teaching the sciences. General supervision of the schools is vested in the State superintendent of public instruction, who is assisted by a county superintendent in each county, the county superintendency having been established in 1909.

Many charities and benevolent institutions are maintained by the State. Hospitals for the insane are located at Farmington, Fulton, Saint Joseph, and Nevada. An institute for the feeble-minded is at Marshall. Fulton has the State school for the deaf and dumb; Saint Louis, the school for the blind; Chillicothe, the industrial home for girls; Boonville, the training school for boys; and Jefferson City, the State penitentiary.

INHABITANTS. Missouri is fifth among the states in population. It has a larger foreign-born population than any of the states classed as southern, and fully half of these are Germans. The density is greater than that of any other State west of the Mississippi, being 46 to the square mile. Jefferson City, on the Missouri River, is the capital. Other important cities include Saint Louis, Kansas City, Saint Joseph, Joplin, Springfield, Sedalia, Hannibal, Moberly, Carthage, Independence, Saint Charles, Chillicothe, and Nevada. In 1900 the population was 3,106,665. This included a total colored population of 161,822, of which 130 were Indians, 449 Chinese, and 161,234 Negroes. Population, 1910, 3,293,335.

HISTORY. A Spanish expedition under De Soto visited the region included in Missouri in

1541, and Marquette explored some portions of it in 1673. A settlement was made by the French at Saint Genevieve about 1735 and not long after other permanent settlements were made along the Mississippi and in the vicinity of Saint Louis. In 1803 the territory was ceded to the United States as a part of the Louisiana Purchase. Two years later the southern part was organized as the Orleans Territory and the northern part as that of Louisiana. In 1812 the Missouri Territory was formed, and Congress was asked to allow the framing of a State constitution in 1817. An extended controversy regarding slavery in Missouri arose immediately, which was settled by the famous compromise of Henry Clay in 1820, and the following year it was admitted to the Union. The Civil War occasioned much loss of property and life in the State, it being a prolific field for contests between northern and southern interests, but after the war its resources began to be developed with much rapidity and it now ranks as the fifth State in wealth.

MISSOURI, University of, a coeducational State institution at Columbia and Rolla, Mo., established in 1843. The university proper is located at Columbia and the Rolla School of Mines, a part of the institution, is at Rolla. It comprises departments of law, education, medicine, military science and tactics, mines and metallurgy, and agricultural and mechanical arts, and has graduate academic departments. The faculty consists of 220 professors and instructors, and the average attendance is 2,500 students. It has a library of 78,500 volumes and an endowment of \$2,750,000.

MISSOURI COMPROMISE, an act of Congress passed as a compromise measure to effect a settlement regarding the extension of slavery in the regions beyond the Mississippi River. The act was passed in 1820 and provided that Missouri should be admitted into the Union as a slave-holding State. However, it made the restriction that slavery should never be established in any State to be formed from regions lying north of latitude 36° 30'.

MISSOURIS, a tribe of North American Indians, belonging to the Siouan stock, first met with along the Grand River, a tributary of the Missouri. It is thought that they were once identified with the Iowa and Oto Indians. In 1805 they settled largely along the Platte River in Nebraska, where they joined the Otoes. At present the tribe includes a large per cent. of Indians who have made considerable progress in educational and industrial arts.

MISTLETOE (miz'1-tō), a parasitic plant growing on many varieties of plants, especially

on the oak, poplar, lime, ash, apple, and other fruit trees. About thirty species have been described, but the common mistletoe is the best known. It grows to a length of from one to five feet, has a greenish-yellow appearance, and its fibrous roots penetrate into the wood of the tree upon which it preys. Its leaves are oblong, the flowers are yellowish-green, and it bears yellow viscid berries. The mistletoe is found widely distributed in North America and Europe. When young, the mistletoe is succulent, but it becomes woody when old. The view held that it is an antidote to apoplexy has long since been abandoned, and its principal use at present is for making birdlime from the berries. The ancient Celtic peoples of Europe and the Druids regarded the mistletoe with much veneration. It was thought to be effective in the cure of diseases and a preventive of sickness. Ability to see ghosts was thought to result to those having a plant in possession. Many old superstitions regarding the mistletoe are still extant in Germany and other European countries, such as kissing under the mistletoe at Christmas as a proof that it is an emblem of love.

MITCHELL, a city of South Dakota, county seat of Davison County, 68 miles west of Sioux Falls. It is on the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul railroads, and is surrounded by a fertile farming country. The noteworthy buildings include the high school, the county courthouse, and the Dakota University. Among its manufactures are flour, brooms, brick, and machinery. It has systems of waterworks and sewerage. The place was settled in 1879 and incorporated in 1883. Population, 1905, 5,719; in 1910, 6,515.

MITE, a very small articulated animal, belonging to the same class as the spiders. Many species of animals are classified as mites, ranging from certain microscopic forms to those fully half an inch long. Most of the species have four pairs of feet, while others have six to eight pairs, and the mouth is fitted for boring and sucking. They differ from the spiders by being smaller in size and by the body being unsegmented, though to the latter there are some restrictions. The body of some mites is covered with scales, while others have hairs or bristles. They are parasitic, feeding on the juices of plants and the blood of animals. A few are aquatic, living in water, while others live on plants or animals. *Gall mites* produce enlargements on the leaves and stems of plants, and itch mites burrow into the skin of man and produce itch. *Ticks* fasten themselves to various animals, especially to dogs and sheep, feeding upon the blood. The *spinning mite*, or *red spider*, is

so called from the tiny thread which it weaves while moving about. Nearly all of the species are injurious, either as parasites or for spreading diseases, though some are beneficial in that they destroy the eggs of injurious insects. The *cattle tick* is particularly injurious in spreading disease among cattle in warm countries and the *chicken tick* infests poultry in warm climates.

MJÖSEN. See **Miösen.**

MOABITES (mō'āb-īts), a race of people that inhabited the regions of the Dead Sea and the Jordan River, where they pursued a pastoral life. The Israelites came in contact with them after immigrating into Canaan, and in the time of the judges they exercised superior power over the Jews. David made them tributary about 1025 B. C., but later they formed an alliance with the Chaldeans against the Jews. Their descendants have long since been lost among the Arabs, but there are various monuments of black basaltic granite that have been ascribed to these people. See **Moabite Stone.**

MOABITE STONE, a block or stone discovered by F. Klein, a German missionary, at Diban, in ancient Moab, in 1868. On it are 34 lines written in the Moabite language, the inscription being a record of the achievements of Mesha, a King of Moab, who reigned about 880 B. C. The stone is black basaltic granite, about three feet eight inches high, two feet three inches wide, and one foot thick. It is rounded at both ends. After it was discovered, a dispute arose among the Arabs about the sale of it, and it was broken to pieces. However, the fragments were collected and are now in the Louvre, Paris.

MOBERLY (mō'bēr-lī), a city of Missouri, in Randolph County, 63 miles southwest of Hannibal, on the Wabash and the Missouri, Kansas and Texas railroads. The surrounding country is rich in stock and cereals and produces an abundance of coal and hardwood lumber. It has a public library, the Saint Mary's Academy, a fine high school, and a Y. M. C. A. building. Among the manufactures are earthenware, flour, lumber, ice, farming implements, and machinery. The city has large machine shops and is the center of an extensive grain and jobbing trade. Population, 1900, 8,012.

MOBILE (mō-bēl'), a river of the United States, formed in southern Alabama by a union of the Tombigbee and Alabama rivers. It was so named from the Indians inhabiting that region at an early period of history. There are properly two branches after the union of the two rivers, the east branch being the Tansas River and the west branch the Mobile. These branches unite and divide several times, and aft-

er a course of fifty miles flow into Mobile Bay, an inlet from the Gulf of Mexico.

MOBILE, a city in Alabama, county seat of Mobile County, on a bay and river of the same name, forming the only seaport of the State. It is on the Southern, the Mobile and Ohio, the Louisville and Nashville, and other railroads. The site is on a plain rising gradually from the river. The streets are regularly platted and many of them are improved by avenues of magnolia and live-oak trees. Among the noteworthy buildings are the county courthouse, the public library, the Chamber of Commerce, the Cotton Exchange, the United States Marine Hospital, the Masonic Temple, the city hospital, and the Cathedral of the Immaculate Conception. It is the seat of the Evangelical Lutheran Institute, the Spring Hill College, the Barton Academy, the Medical College of Alabama, and the College of Saint Joseph.

Mobile has a large trade in tobacco products, lumber, fruits, fish, and oysters. Improvements in the mouth of Mobile Bay have increased its importance as a port of entry and regular lines of steamers ply between it and New York, Liverpool, New Orleans, and other American and European trade centers. It has manufactures of cotton goods, lumber products, furniture, machinery, ironware, tobacco products, earthenware, and utensils. The city has electric street railways, stone and shell pavements, and systems of waterworks and sanitary sewerage. A French settlement under Iberville was established near Mobile in 1702. Before coming into possession of the United States it was successively under French, English, and Spanish dominion, and until 1723 was the capital of the French colony of Louisiana. In 1803 it was acquired by the Louisiana Purchase. Admiral Farragut defeated the Confederates in Mobile Bay in 1864. Population, 1910, 51,521.

MOBILE BAY, an inlet from the Gulf of Mexico into Alabama, having a length of thirty miles and a width of from eight to sixteen miles. The mouth of the bay at the Gulf of Mexico is about three miles wide. Its entrance is guarded by forts Gaines and Morgan. The depth is from twelve to fourteen feet. Sediments flowing through the Mobile River are tending constantly to make it more shallow, but there have been some improvements to at least partially overcome this tendency. From August 5 to 23, 1864, it was the scene of a naval engagement between the Federal fleet under Admiral Farragut and the Confederate forces under Admiral Buchanan, which resulted in the surrender of forts Gaines and Morgan and a Union victory.

MOCCASIN (mők'ká-sin), the name of a poisonous serpent of North America, which is found largely in swamps of the warmer regions. It is fish eating. The general color is brown with black bars. It attains a length of about two feet. Species of these snakes are found in North Carolina and the country toward the south and in some localities west of the Rocky Mountains.

MOCCASIN, a kind of shoe worn by the North American Indians. It is usually made of deerskin or some other variety of soft leather, the sole and upper part of which are formed of one piece. The finer grades are ornamented with beads of various colors and fine leather trimming.

MOCKING BIRD (mők'ing bērd), the popular name of about twenty species of birds of the thrush family, most of which are widely distributed in North America, the West Indies, and Northern South America. The color is ashy-brown above and whitish beneath, and the wings and tail are varied with black and white. Most species are found in the warmer regions, but during the summer time they visit the northern parts to breed. Their nests are built near houses and are formed of grasses and twigs. The parents show considerable bravery in defending the young against cats, snakes, and other intruders. They were named from their ability to imitate the songs of other birds and such sounds as the quacking of ducks, barking of dogs, and bleating of lambs. At night they do not attempt to imitate, but sing their own natural notes, which are bold, rich, and full, and varied almost without limitation. Several species are able to imitate with exactness the soft notes of the bluebird and the wild screams of the eagle. In color they differ somewhat. The common mocking bird is about ten inches long and has an ashy-brown color. The bill and tail are black.

MODENA (mō'dā-nā), a city of northern Italy, on a fertile plain between the Panaro and Secchia rivers, 22 miles northwest of Bologna. It is fortified by substantial walls and has well-improved streets, but within recent years it has not been improving materially. Several railways connect it with other centers of trade. It has manufactures of silk and woolen goods, machinery, ironware, leather, and utensils. Several public buildings date back many centuries, among them the University of Modena, founded in 1678. This institution has advanced courses of study, an observatory, a military school, a botanical garden, and an extensive library. A fine Gothic cathedral is situated here and a royal palace contains the Este library of 100,000 vol-

umes. The city was built by the Etruscans, but later fell successively into the hands of the Gauls, Romans, Goths, and Longobards. In the time of Constantine the Great it was destroyed, and in 960 it came into the possession of a member of the house of Este, who was proclaimed Marquis of Modena. It was made a part of the Cisalpine Republic in 1796 and in 1860 was united with the kingdom of Italy. Population, 1906, 66,308.

MODICA (mō'dē-kä), a city of Sicily, in the province of Syracuse, thirty miles southwest from Syracuse. It is located in a rocky region, but the surrounding country is among the most productive districts of Sicily, and in its vicinity are valuable rock formations. The chief buildings include the public library, the theater, a gymnasium, and a cathedral. It has a considerable export trade in wool, soda, butter, cheese, tobacco, wine, and hemp. Population, 1906, 49,386.

MODOCS (mō'döks), a tribe of Indians of North America, found originally in the vicinity of Klamath Lake, California. They became hostile to the whites as early as 1847. In 1864 their lands were ceded to the United States under an agreement to go on a reservation, but the region set apart for them was not selected until 1871. Treachery on the part of government agents caused them to engage in a warfare against the United States troops, their leader, Captain Jack, demonstrating much ability in strategy and defense. In 1872 they fortified themselves in the mountains, where they offered stubborn resistance, and in 1873 murdered General Canby and others serving on a peace commission sent to treat with them. Shortly after they were finally quelled, when Captain Jack and other leaders of the rebellion were hanged, and the remainder of the tribe was located on the Quapaw reservation in Indian Territory, now Oklahoma.

MOGUL (mō-gül'), the popular name applied to the sovereigns of the empire founded by the Mongols under Baber, in 1525, which remained a powerful political influence until 1803. The Moguls were descendants of Tamerlane, or Timour, the most noted of the Tartars. Mohammed Bahadoor was the last representative of the Mogul dynasty, being deprived of his title for taking part in the Sepoy mutiny in 1858.

MOHÁCS (mō'häch), a town of Hungary, on the west branch of the Danube, 25 miles southeast of Fünfkirchen. It is not well built, but has a large trade in lumber, coal, grain, and live stock. The place has a good harbor and railroad communication. Mohács is noted for a battle fought here on Aug. 29, 1526, between the Hungarians and Turks. Louis II. commanded

25,000 Hungarians, but was defeated by 200,000 Turks under Soliman the Magnificent, the Hungarian loss being 22,000 men. On Aug. 12, 1687, a second battle was fought against the Turks by the allied Austro-Hungarian army under Charles of Lorraine, in which the former were defeated. This battle terminated the dominion of the Turks in Hungary. Population, 1906, 15,904.

MOHAIR (mō'hâr), or **Camlet**, a fabric made of the hair taken from the Angora goat and allied species of animals. Formerly camlet was made entirely of camel's hair, but the term is now used interchangeably with mohair in the market, and both are imitated by products made from silk, wool, and cotton mixed with wool. Genuine mohair is made from the fine, white, silky hair produced by the goats of Angora, in Asia Minor, and has long been a valuable article of export from that locality.

MOHAMMEDANISM (mō-hām'mēd-ān-iz'm), the name generally applied by Americans and Europeans to the religion established by Mohammed, but which is known among its adherents as *Islam*, meaning entire submission to the decrees of God. The tenets of Mohammedanism embrace many that are allied to other faiths. They include the belief that there is but one God; that He is perfect in knowledge, power, glory, and wisdom; that He is the Creator and Lord of the universe; and that He exists eternally without beginning or end. The Koran is held to be the supreme and incorruptible revelation of God which was given to His people through Mohammed. Other Holy Scriptures in a corrupted form include the Psalms, the Pentateuch, and the Christian gospels. According to Islam, there are ever-living, perfect angels that were created of light. On the other hand, there are evil genii, created of a smokeless fire and subject to death. At the end of time there is to be a general resurrection followed by a final judgment for future rewards and punishment, both being largely of a physical character. All good and evil events are held to be predestined by God, this view having developed into a form of fatalism.

It is held essential among Mohammedans to believe in the prophets and apostles of God, the most noted being Adam, Noah, Abraham, Moses, Jesus, and Mohammed, but the last named is not only the greatest, but the most excellent of God's creatures. Those embracing Mohammedanism are required to observe five duties: have faith that Mohammed is the prophet of the only existing God, prayer, fasting, alms giving, and a pilgrimage to Mecca. Prayer is required at four definite periods each day, and consists of certain adoration and

thanksgiving ordained by God and his prophet. Friday is the Sabbath and day of special worship, when all prayers must be said in the mosque. At other times any clean place may be selected for prayer, but in praying the face of the worshiper must be turned toward the Kebla, meaning in the direction of Mecca. The giving of alms depends of course upon the means possessed by the Moslem, each individual being expected to give according to his ability. Fasting occurs in a particular form in the month of Ramadhan from daybreak until sundown, the only exemption being extended to those who are physically unable to abstain from food. The obligation of fasting is an absolute abstinence from all forms of drinking and eating as well as sensual indulgences.

An annual pilgrimage to Mecca is advised, but at least one is a religious duty, and after such pilgrimage the Moslem is designated a *Hadji*. All forms of intoxicating liquors are forbidden, as well as gambling, sensual enjoyments, and images. On the other hand, veracity, modesty, and piety are commended as virtues. Idol worship is prohibited. Moslems are forbidden the use of blood and are not permitted to eat the meat of swine or of animals that die of a disease. Abu Bekr, the father-in-law of Mohammed, became the successor of Mohammed in 632. He was succeeded in 634 by Omar, after whose death, in 644, Othman became the head of the faith. Shortly after a dispute arose regarding the succession, and Ali, Mohammed's son-in-law, was selected by the Arabs and Moavia was chosen by the Syrians. From this division arose two Mohammedan sects known as the Sunnites and the Shiites. The former are considered orthodox Mohammedans, and the latter hold that Ali was the first and rightful successor of Mohammed. The Sunnites are most numerous in Turkey, Turkestan, Arabia, and Africa, while the Shiites predominate in India and Persia. Besides these may be mentioned other minor sects, such as the Assassins and the Nosairis, but all may be generally grouped as Sunnites and Shiites. There are about 176,800,000 Mohammedans in the world. No other faith has offered such a stubborn and persistent resistance to the advance of Christianity as the religion of Mohammed. See **Koran**.

MOHÁVE (mō-hā'vā), a tribe of Indians found in North America, residing in the lower part of the valley of the Colorado River, both in Arizona and California. They engage in stock raising and agriculture, giving considerable attention to the cultivation of corn, melons, beans, and pumpkins. Many are skilled in making baskets, pottery, and beadwork. Their

houses consist of structures built of logs covered with sand. They are warlike, practice tattooing, and cremate the dead. At present they number about 2,175, including 650 who are now on the Colorado River Reservation of Arizona.

MOHAWK (mō'hak), a river of New York, rises in Lewis County, flows in a southwesterly direction to Rome, and thence flows southeast and joins the Hudson opposite Troy. The river is about 135 miles long, has an abundance of water power, and is paralleled in its entire course from Rome to Troy by the Erie Canal. Among the towns on its banks are Rome, Utica, Cohoes, Schenectady, and Waterford.

MOHAWKS, an Indian tribe of North America, one of the Five Nations of the Iroquois, and originally located in the Mohawk valley. The Dutch and English secured their friendship in the early settlement of New York, and during the French and Indian War they proved valuable allies to the colonists. In the Revolutionary War they adhered to the British, their chief, Brant, rendering effective service to the latter. The Bible was translated into their language, as well as several prayer books and histories. More recently a grammar and dictionary were written. The tribe includes many representatives of more than ordinary ability. After the Revolutionary War most of the Mohawks settled on the Grand River in Canada.

MOHICANS (mō-hē'kanz), or **Mohegans**, an Indian tribe, located originally along the Hudson River, classed with the Algonquin family. The Mohawks compelled them to settle along the Connecticut River in 1628, but later a portion returned to their former possessions and others went eastward and became known as the Pequots. They were generally friendly to the English in their contests with the French, but later they sided with the Americans. After the Revolution they divided and formed settlements in New York, Wisconsin, and Kansas. Many of the Mohicans have become assimilated by the whites, and are now represented by descendants noted for their educational and industrial skill. The "Last of the Mohicans" is a novel written by Cooper that has made the name famous.

MOKI (mō'kē), or **Hopi**, a tribe of Indians found in Arizona, classed with the Pueblo branch of the Shoshone stock. They live principally in seven villages located in the northern part of Arizona and have been little influenced by the customs of the whites. These Indians are chiefly farmers, engaging in the cultivation of beans, corn, and pumpkins. They practice the celebrated snake dance, in which the performers have living serpents in their mouths. Wallpie and Oraibi are their principal villages

and these, like other centers of the tribe, are located in high altitudes, being reached only by steep and difficult trails.

MOLASSES (mō-lās'sēz), a brown syrup obtained in refining sugar. It is uncrystallizable and is secured from draining crystallizable sugar. Molasses consists generally of thirty-six per cent. inconvertible sugar, thirty-six per cent. crystallizable sugar, twenty per cent. water, five per cent. organic acids and extractive, and three per cent. mineral matter. Large quantities of cane molasses are produced in the Southern States, but *sorghum*, a form of molasses, is made in all the states and many localities of Canada. Louisiana takes the highest rank in the production of molasses.

MOLD, the name of any fungus growth on food, clothing, walls, gum, and other substances. The term is applied especially to such growths as form a woolly coating on decaying vegetable matter, or in moist, warm places. Mold is a vegetable growth of a low type.

MOLDAU (mōl'dou), the largest river of Bohemia, having its source in the Böhmerwald, on the frontier of Bavaria. From the source it flows toward the north and joins the Elbe after a course of 275 miles. The Moldau courses through a fertile region. It is important on account of its fisheries and navigation, and on its banks are the cities of Budweis and Prague. About half of its course is navigable.

MOLDAVIA (mōl-dā'vī-à). See **Rumania**.

MOLE, an insectivorous animal of the family *Talpidae*. It is a small mammal, has very broad fore feet adapted for digging, and bur-



COMMON MOLES.

rows immediately below the surface of the ground in search of worms and the larvae of insects. The moles include several well-known species, most of which are from five to six

inches long. They have small eyes and a velvety fur, and are destitute of external ears. Moles make extensive underground excavations as a center for their operations, these central places usually having a large number of halls and galleries, and from them the passages proceed in all directions. The central rooms, in which they rear their young, are connected by channels with places where they secure water. The earthworm is the normal food of moles, but they feed greedily on all kinds of flesh, such as mice, frogs, and even small birds. The common mole native to America is distributed from Canada to the Gulf, and allied species are found in various parts of both hemispheres. In some localities it does damage to pastures and lawns and injures many kinds of growing plants by disturbing the ground immediately surrounding the roots. The *shrew mole* is found largely in North America and the *cape mole* is native to South Africa. Moles increase with great rapidity. From four to six young are produced at a time, twice each year. The adult of the common mole is about six inches long, of a blackish color, and the tail is one inch long.

MOLE CRICKET, the name of the burrowing cricket, so called from its habit of constructing channels under the surface of the ground. It is large and covered with a velvety down. All of its life is subterranean. It moves about from place to place by digging burrows, in which it lays the eggs and rears the young. Many species are native to the warmer parts of America, especially to Porto Rico and the West Indies. From 200 to 400 eggs are laid by the female, which watches over the young until their first molt, when they dig burrows for themselves. In some parts of South America these insects are injurious to plants, since their burrows often destroy the roots.

MOLECULE (mŏl'ĕ-kŭl), the smallest parts into which a body can be divided without destroying the substance of it. If the forces which keep the molecules intact are overcome, they may be broken up into *atoms*, which are regarded the primary part of molecules, hence are not further divisible. The molecules are so small that they cannot be seen by the most powerful microscope. Using the thickness of the film in soap bubbles as the basis, Lord Kelvin estimated that if a globe of water the size of a football were magnified to the size of the earth the molecules would range in size between small shot and footballs. According to this estimate, the number of molecules in a cubic centimeter of gas at the ordinary pressure and temperature is equal to 19,000,000,000,000,000,000. By *molecular weight* is meant the relative weights of mole-

cules. The *molecular forces* are those that bind together the atoms into molecules, hence, by this union they form matter in a gaseous, liquid, or solid state. See **Atoms**.

MOLINE (mŏ-lĕn'), a city of Illinois, in Rock Island County, on the Mississippi River, immediately north of Rock Island. It is on the Chicago, Burlington and Quincy, the Chicago, Rock Island and Pacific, and the Chicago, Milwaukee and Saint Paul railroads. Among the noteworthy buildings are the public library, the high school, a hospital, and many fine churches. An abundance of water power is derived from the river. Bituminous coal is mined in the vicinity. The manufactures include wagons, machinery, stoves, paper, musical instruments, flour, and farming machinery. It has electric street railways, systems of waterworks and sanitary sewerage, and a large trade in produce and merchandise. Population, 1910, 24,199.

MOLINO DEL REY (mŏ-lĕ'nŏ dĕl rĕ'), **Battle of**, an engagement of the war between Mexico and the United States, fought a short distance from the City of Mexico on Sept. 8, 1847. General Worth commanded a force of 3,500 Americans and at early dawn stormed the massive stone buildings of Molino del Rey, which were defended by 10,000 Mexicans under Santa Anna. The Mexicans were driven from their position by heavy firing and the American loss, about 800, was heavier in proportion than in any other battle of the war. The Mexicans lost 700 by capture and 3,000 by death or injury. This battle is regarded as an American defeat by the Mexicans, since the latter look upon it as a movement against Chapultepec.

MOLLAH (mŏl'lĕ), a title applied by the Turks to any one having acquired position in public worship under the Koran, or attained to respect because of personal purity. Such a title is applied from common habit. It corresponds to the English terms master and excellency.

MOLLUSCA (mŏl-lŭs'kĕ), a subkingdom of animals, embracing a division of the invertebrates. It includes especially the species which have an unsegmented bilateral body and four nerve cords arranged in pairs, two visceral and two pedal, with lateral and medial abdominal ganglia. The division embraces the oysters, cockles, snails, limpets, slugs, and many others. Most mollusks are supplied with shells, but many have a muscular sac, while others have a body quite naked and unprotected. Those with shells are commonly called *shellfish*. They are classified as *univalves*, *bivalves*, and *multivalves*. The limpet is a univalve and has a shell constructed of a single piece. Many of this class of animals have shells formed like cups, or as if

spirally wound on an axis, but they always consist of a single piece. Mollusks of the bivalve class are so named from the two parts of their shells, which are attached by a hinge, and represented by the oyster and cockle. The shell of multivalves is composed of a number of pieces, but this class is not numerous. In the female of the genus *argonauta*, or paper nautilus, the shell is remarkably beautiful.

Carbonate of lime is the principal constituent of the shells of mollusks, which contain only a



ARGONAUT IN ITS SHELL.

small per cent. of animal matter, the whole being secreted by an interior tegument of soft texture. The different species are variously constructed, though generally the blood is quite colorless; a mouth, gullet, stomach, and intestines constitute the digestive system; and respiration is effected quite variously. The bivalves and some of the univalves breathe by gills and some univalves, as in the snail and slug, have an air chamber so constructed of organs that the air is breathed directly. Many of the mollusks have an organ of locomotion, commonly called a foot, which may be protruded from the lower part of the shell, as in the cockle, clam, and snail. In this way they are able to propel themselves forward by burrowing in the ground. Oysters are unable to move, owing to the foot being rudi-



ARGONAUT SWIMMING.

mentary, while the octopus and cuttlefish are supplied with locomotive organs in the form of tentacles around the mouth.

Clams, oysters, and mussels are known as *acephala*, meaning without a head. The nautilus, octopus, and cuttlefish have two great eyes and from eight to ten tentacles or arms surrounding the mouth. They are called *cepha-*

lopods, meaning head-footed. Many thousand species of mollusca have been studied. They are distributed throughout every clime and nearly every part of the world. The number of species is estimated at 21,500. Fully 20,000 extinct species have been classified, being possible to study them on account of the reliable means afforded by the comparative indestructibility of the shells when buried in the various strata of deposits formed by the action of water. Some forms of mollusks inhabit fresh water and others live on the land, but the larger species are found in salt water. Many mollusks leave remains that almost defy decay.

MOLLY MAGUIRES (möl'ly má-gwīrz'), a secret society organized in 1843 in various portions of Ireland, whose purpose was to attain advantages by intimidating officers and citizens. In 1867 branch organizations were formed in the anthracite coal districts of Pennsylvania, where the members sought to gain advantage in political and financial matters by terrorizing and intimidating their opponents. Detectives operated among them for some time with more or less effect. The organization was finally broken up in 1887 by the execution of twenty members on conviction of murder.

MOLOCH (mō'lök), or **Molech**, an idol worshiped among the Ammonites and later in Judah. During the Hebrew monarchy the special place to worship Moloch was in the valley of Hinnom, where children were sacrificed in the fire of Moloch within the reigns of Kings Ahaz and Manasseh. It is thought that children were originally offered as a sacrifice to this idol, but later, when humane sentiment began to displace cruel superstition, the practice gradually became extinct.

MOLOKAI (mō-lō-kī'), one of the Hawaiian Islands, situated north of Lanai, noted principally on account of its colony of lepers. The island is thirty-eight miles long and about eight miles wide. It has an agreeable and a healthful climate. Lepers from all parts of the Hawaiian Islands have been located on Molokai, but the colony is separated entirely from the other portion of the populace. Population, 1906, 2,607.

MOLUCCAS (mō-lük'káz), or **Spice Islands**, the name applied to a division of the Malay Archipelago. This group is situated between the Philippine Islands on the north, the Sunda Islands on the south, New Guinea on the east, and Celebes on the west. It has an area of 43,864 square miles. The entire group includes several hundred islands, of which the principal ones are Gillolo, Ceram, Booro, Morty, Mysole, and Mangola. They are generally divided into two divisions: the northern Moluccas and the

southern Moluccas, the former being governed directly by the Dutch and the latter through native sultans or rulers. However, all of the group is a possession of the Netherlands and is divided into the four residences of Ternate, Amboina, Banda, and Menado.

The Moluccas are of volcanic origin and contain a number of lofty mountains, but the soil is generally fertile and the climate is favorable. Earthquakes are of frequent occurrence. They have a considerable trade in live stock, tropical fruits, valuable timber, fish, beeswax, cloves, birds' nests, nutmegs, tea, and various spices. Among the native animals are the birds of paradise, the flying opossum, gorgeous butterflies, corals, and many varieties of birds of song and plumage. The Moluccas were first claimed by the Portuguese in 1521, but in the 17th century they became tributary to Holland. As a whole they are a valuable possession, supplying many useful articles of commerce at small expense. Most of the inhabitants are natives of the Malay and Polynesian races. The European population is very small. Population, 1906, 412,910.

MOMBASA (möm-bä'sä), or **Mombaz**, a seaport town of Africa, capital of British East Africa, on a small island off the coast, about 150 miles north of Zanzibar. It is connected with the mainland by a railway and is important as a naval coaling station and commercial center. The harbor is deep and well improved, but the buildings are poorly constructed. It has a large trade in maize, hides, ivory, copra, and fruits. The Portuguese first visited the region under Vasco de Gama in 1497. It remained Portuguese territory until 1824, when it passed to the English. Ex-President Roosevelt began his tour of Africa from Mombasa in 1909. Population, 1906, 28,508.

MOMENTUM (mō-měn'tüm), the power of overcoming resistance possessed by a body in motion, which may be defined as the product of the mass and its velocity. To measure any force we must know what quantity of matter is moved and what velocity it possesses in a unit of time, the product of the two being the momentum. Thus, a ball of four pounds, moving uniformly at the rate of eighteen feet in a second, has double the momentum of one weighing three pounds and moving at the rate of twelve feet per second, for $4 \times 18 = 72$ and $3 \times 12 = 36$, or half as much. The momentum of a moving body and the force with which it strikes an object are the same in amount.

MOMPÓS (möm-pös'), or **Mompox**, a city of Colombia, in the department of Bolivar, on the Magdalena River, 108 miles southeast of Cartagena. It has a college and several ele-

mentary schools. Formerly it was the seat of a large river trade, but the channel became changed by a flood in 1868, and since only small boats have been able to reach the place. The manufactures consist of tools, jewelry, and musical instruments. Population, 11,200.

MONACHISM (mön'ä-kiz'm). See **Monastery**.

MONACO (mön'ä-kō), a small principality of Europe, located nine miles northeast of Nice, between the French department of Alpes-Maritimes and the Mediterranean. The area has consisted of eight square miles since 1861, when the Prince of Monaco transferred the remainder of the territory to France in consideration of \$800,000. It has a mild and healthful climate. Trade in aloes, fruits, and cereals is the chief industry, but the people engage largely in the enterprise of accommodating tourists. The inhabitants are practically free from taxes, since sufficient revenues are raised by the sale of commercial and gambling privileges at Monte Carlo. The legislative and executive authority is vested in the prince. Monaco, the capital, has a population of 3,308 and is a pleasant resort for tourists. The Genoese House of Grimaldi received a grant of Monaco in 980. Subsequently it was placed under the protection of Spain, France, and Sardinia. The independence of the principality is now generally recognized by the nations of Europe. Population, 1906, 15,810.

MONARCHY (mön'ärk-ÿ), a form of government administered by a monarch, in which the supreme authority is vested in a single person. Monarchies are either absolute or limited. An *absolute* monarchy is one in which the sovereign has absolute authority and in him is vested the power to make, interpret, and execute the law according to his own will. Persia, China, and Morocco are among the absolute monarchies. A *limited* monarchy is a government in which the sovereign is restrained by a constitution and established laws, as is the case in Austria-Hungary, Sweden, Germany, England, and other European countries. In a limited monarchy the power to make laws is vested in a legislative department; the power to interpret them is in the courts, and they are executed by the sovereign. A *hereditary* monarchy is a government in which the sovereign obtains title to the throne by birth, as in England and Germany, and an *elective* monarchy is one in which the subjects elect a sovereign for life, as was the case in Poland before its partition. The principal terms used to signify the position of a monarch include *emperor*, *king*, *kaiser*, *czar*, *sultan*, and *shah*. In countries recognizing fe-

male succession the equivalent feminine appellations, as *empress* or *queen*, are applied.

MONASTERY (mōn'ās-tēr-y'), an institution occupied in common by individuals under religious vows of seclusion. Certain classes who have taken vows of monastic seclusion, or monachism, have been mentioned from periods long before the Christian era. They are still common to the Buddhists and Brahmans, among whom are many individuals who take the vow to practice a life of religious piety as recluses. It is thought that the first Christian monastery was founded in Upper Egypt, in 305, by Anthony the Great, who organized the institution by calling around him hermits and held them together by conducting exercises of devotion in common and encouraging industrial enterprises among the members. A monastic colony was founded soon after by his disciple, Pachomius, on the island of Tabenna, in the Nile, which, in 348, numbered 7,500 persons.

Christian monasteries were established as early as the 4th century. They were first instituted on the northern shore and the islands of the Mediterranean, especially in Italy. Saint Patrick and others, in the 5th century, founded many monasteries in Ireland. In the 6th century Saint Benedict introduced monastic vows that led to a spread of learning, piety, temperance, and industry, and from his efforts sprang the influential Benedictine rule, under which strides of advancement were made both in spiritual and physical relations. Much of the early education of Europe was fostered under monasticism. At the time of the Crusades the monasteries became quite generally independent of all superintendence, except that of the Pope. Later such orders as the Franciscans, Dominicans, Carthusians, Capuchins, Cistercians, and Jesuits became factors in education.

After the Reformation the number and influence of monasteries diminished. The institutions are wholly abolished in some countries as harmful to the government. Joseph II. of Germany annulled most of the monasteries in 1781, while those remaining were prohibited from being influenced by foreign sovereigns. France took a like step in 1789, but since 1880 institutions of this character are permitted. In 1875 the monasteries of Germany were limited to those providing for the sick. Similar, although less severe, restrictions have been placed upon them in Spain, Russia, Portugal, and Italy. In Canada, the United States, and many other countries of America there is no restrictive influence, but several of the Catholic countries of South America have either abolished or limited them. The monastic vows include the three

obligations of poverty, obedience, and chastity. The vow of *poverty* places an obligation upon a monk under which he is unable to hold property, though in some of the orders, as the Augustines and Carmelites, a sufficient amount for support may be held by members. On the other hand, the vow of *obedience* makes it necessary to comply with the established rules of the organization and that of *chastity* requires total abstinence from association with the opposite sex.

MONASTIR (mōn-ās-tēr'), or **Bitolia**, a city of European Turkey, in Macedonia, ninety miles northwest of Salonica. It is situated on an important route of trade between northern Albania and the Aegean Sea. Among the chief buildings are the military hospital, the central railroad station, and many mosques. The manufactures include woolen and silk goods, carpets, jewelry, and utensils. At present it is in an illy kept state, but during the prosperity of ancient Greece, when it was known as Pelagonia, it was both substantially built and important as a strategic point. The Turkish government maintains a military force at Monastir, and it is the residence of the governor-general. The inhabitants are chiefly Greeks and Bulgarians. Population, 1907, 45,500.

MONBUTTU (mōn-but'tō), or **Mangbuttu**, a region in the central part of Africa, located west of British East Africa and included chiefly in the Congo Free State, of which it forms the northern part. It consists mainly of an elevated tableland and is drained by the Gadda and the Kibaly, which form the Welle River. The region includes about 4,000 square miles and is inhabited by natives who practice polygamy and cannibalism. Slave traders have carried off many of the inhabitants, who engage in raising cereals, fruits, and live stock. Population, 1,050,000.

MONCTON (mōnk'tūn), a town of New Brunswick, in Westmoreland County, 88 miles northeast of Saint John. It is located on the Petitcodiac River, which is navigable to this place, and on the Intercolonial Railway. The town has a fine harbor, railway machine shops, and a large trade in lumber and agricultural products. The manufactures include flour, cotton and woolen goods, leather, ironware, and machinery. The streets are well platted and improved. Electric lighting, telephones, waterworks, and sewerage are among the public improvements. Population, 1901, 9,026.

MONDAY, the second day of the week, so named by the Romans from the moon. The Monday before Lent is called *Blue Monday*. When Easter falls on Monday, it is known as

Black Monday, from the circumstance that the forces of Edward III., while encamped before Paris, suffered from rain and cold on Easter Monday in April.

MONEY, any material that by agreement serves as a common medium of exchange and measure of value in trade. It is quite difficult to devise a definition to describe all the different ways in which money may be used to serve a useful purpose in an economic sense, but it is generally agreed that as a circulating medium it constitutes the standard by which the value of all other commodities is measured, that it is an equivalent for commodities, and that to be utilized as a medium of exchange for commodities it must bear certain marks by which it may be recognized.

Various articles have been used among primitive peoples to effect exchange. The earliest system was one of barter, in which one commodity was exchanged for another, but in some regions cattle, shells, skins, feathers, beads, grain, sugar, tobacco, nails, postage stamps, and many other objects were used as money. Many of the semisavages accepted beads, wampum, and cowries by custom as money at an arbitrary value. The first mention of a medium of exchange in the Bible is in Genesis, where it is said that money was used by Abraham, when he secured a field as a sepulcher for Sarah. The coinage of money has been ascribed at an early date to the Corinthians, the Lydians, and the people of India. It is certain that coins were employed in the 6th century B. C. Paper money came into use in Europe in the 14th century, but it was employed to some extent in Europe at a much earlier date.

The utility of money as a medium of exchange is easily understood. Without it there would be much difficulty in effecting commercial enterprises, and we would have to resort to the barter system recognized by early peoples in exchanging one commodity for another. As a measure of value the quantity of money must be properly adjusted to furnish the best facilities for trade, since the amount in circulation has an important effect upon the industries and the price of commodities. Where the state of society is otherwise perfectly stationary, an increase in the volume of money brings about a smaller purchasing power, thus increasing the price of commodities, and, on the other hand, a decrease in the volume has the contrary effect. This is based upon the well-known law of *supply* and *demand*. In addition there must be stability in the value of money, otherwise it might decrease or increase as a valuable possession within a short time. To secure the necessary

stability in value, it is necessary to have a government organized on a proper and durable basis, or to make the money quite largely of a material representing much value in a small bulk. Paper money depends for its stability wholly upon the government back of it, while coin represents a value aside from the monetary functions which it serves.

Among the necessary elements that should characterize any substance used as a medium of exchange are that it should have value aside from its use as money, comprise much value in small bulk, possess close approximation to constancy of value, be divisible into small portions without loss, possess great durability, be in practically universal use by the leading nations, and possess capability of receiving and retaining stamps to indicate its current value. Both gold and silver have all these characteristics, while all other metals fail in answering the requirements in one or more respects. For this reason both gold and silver are used chiefly as standard money, some countries preferring a bimetallic and others a single or monometallic standard. Besides the principal coin constituted of gold and silver, there is token money for exchange made of such metals as nickel and copper. It is generally aimed to put a value equal to the monetary value in *standard* money, while *token* money is not generally a legal tender for more than small amounts, and represents an exchange value far greater than that of the metal of which it is made. By *legal tender* is meant that the money possesses attributes which are sufficient to discharge a debt. Token money is usually a legal tender for only a small amount, because it becomes cumbersome when presented in payment of a large obligation.

Paper money is based either upon the credit of the nation or upon coin deposited in the national treasury. The so-called greenback money is an example of the former and gold and silver certificates of the latter. Both in a system of banking and a national currency it has been found that a small amount of coin is adequate to supply the basis for a much larger system of credit money, for the reason that very few individuals care to exchange the more convenient currency for gold and silver coins. By *money unit* is meant the representative denomination used in making exchange, which, in Canada, Mexico, and the United States, is the *dollar*. The *franc* is the money unit of France, Switzerland, and Belgium; the *mark* of Germany; the *pound sterling* of Great Britain; the *ruble* of Russia; the *lira* of Italy; the *crown* of Austria-Hungary; the *krona* of Sweden, Norway, and Denmark; the *milreis* of

Brazil and Portugal; the *rupee* of India; the *guilder* of the Netherlands; the *peseta* of Spain; the *piaster* of Turkey; the *yen* of Japan, and the *tael* of China. See **Banking; Bimetallism; Credit; Currency Reform; Mint**, etc.

MONGOLIA (mōn-gō'li-à), an extensive region of Asia, situated between Asiatic Russia and China proper. It stretches from Manchuria westward to the Altai Mountains and Eastern Turkestan. The area is estimated at 1,250,000 square miles, all of which comprises a colonial possession of the Chinese Empire. It includes the Desert of Gobi, but a large part of the region is fertile and productive. Barley, wheat, millet, sheep, cattle, and horses are the chief products. Many wild animals roam across the vast stretch of unoccupied country, such as sables, deer, wolves, mountain goats, and wild camels. The people are nomadic in their habits, moving from place to place as they graze their herds. Buddhism is the chief religion. The lamas or priests receive support from the Chinese government. Population, about 2,500,000. See **Mongolians**.

MONGOLIANS (mōn-gō'li-anz), in ethnology, one of the five great races of the world. The term was originated by Blumenbach and, when the five races discriminated by him were reduced by Cuvier to three, the latter adopted the name. Among the principal characteristics are a square head, a flattish face, and a flat nose. The eyelids are obliquely turned up at their outer angle, the cheekbones are projecting, and the chin is quite prominent. The hair is black and straight, the face and body are yellowish or olive, and the stature is medium. This race was so named from Mongolia, a large region in the east central part of Asia, stretching from Turkestan to Manchuria. The inhabitants of this region lead a nomadic life, especially in the portions occupied by the Desert of Gobi, or Shamo. Other members of the Mongolian race, and who are thought to have descended from the natives of Mongolia, are the Turks, Chinese, Kalmucks, Tartars, Japanese, Burmese, Hungarians, Finns, Eskimos, and Siamese. The Mongols constitute about one-third of the population of the earth, the total number of different branches being estimated at 560,500,000.

The Mongols proper are considered typical of the Mongolian race, but their early history is wrapped in doubt and tradition. Their original seat seems to have been in the vicinity of Lake Baikal, in Siberia, and the earliest notice in history appears in the year 619 A. D., when they are connected historically with the T'ang dynasty of China. In the early part of the

13th century they commenced to attain political power. Genghis Khan, in 1206, began to organize the different tribes into one vast state with the view of conquering the earth. His immediate descendants, especially his grandson, Kublai Khan, succeeded in the consummation of at least a portion of the original design. The whole of China was conquered and a Mongol dynasty came into possession of the Chinese throne, which continued to reign until the 14th century. A great horde of Mongols invaded Russia in 1237, whence they made incursions into Hungary and Poland. In 1241 the Hungarians were crushed completely in a battle at Pesth. When Marco Polo visited China, in the latter part of the 13th century, he witnessed the greatest power of the Mongol Empire under Kublai Khan. Its scope of territory included the vast region from Poland to the China Sea, and extended from the Indian Ocean to the northern part of Siberia.

When the Mongol dynasty of China was overturned by a revolution in 1368, it was succeeded by the Ming dynasty, and the Mongols proper were compelled to fall back toward their original possession in the vicinity of Lake Baikal. The next powerful warrior was Tamerlane, known also as Timour and Timurlenk, a descendant of Genghis Khan. He collected many of the Mongol tribes in a new government, of which Samarcand became the capital in 1369. Tribal differences and the spread of Buddhism in the East and Mohammedanism in the West operated to divide the different tribes. After the death of Tamerlane, the government became gradually weakened and in 1468 it was divided into several minor states. The great Mongol Empire of India was the last effort of the Mongols. It was founded by Baber, a descendant of Tamerlane, in 1519, and in 1857 every vestige of it disappeared. The Mongols lost their importance in the 16th century, when they were absorbed largely under separate khanates by different peoples, and their original territory became a part of the Chinese Empire in the 17th century.

The Chinese, who may be considered the typical Mongolians, are represented most largely in Asia, but many have emigrated to Australia, North America, and other continents. Their immigration into the United States has been prohibited as injurious to the industries and as generally undesirable. The term *Yellow Peril* originated from a supposed movement of the Mongolians to unite for military and commercial purposes as against the Americans and Europeans. The language of the Mongols is classed with the Turanian, and their literature

and tradition are devoted chiefly to the empires founded by Genghis Khan and Tamerlane. However, there are various translations from the Chinese and Japanese that have entered to a considerable extent into general literature.

MONGOOSE (mōŋ'gōōs), a species of ichneumon, native to India and closely allied to the ichneumon of Egypt. The body is weasel-like and from fifteen to seventeen inches long, and the tail measures fourteen inches. It has been domesticated for the purpose of killing snakes, a feat it performs with much adroitness and safety to itself. The mongoose sucks the blood of its prey, such as birds and reptiles, and leaves the body uneaten. See *Ichneumon*.

MONITOR (mōn'ī-tēr), the name of a genus of large lizards, some of which are nearly as large as alligators. The monitor of Africa, found in large numbers in the valley of the Nile, has a length of six feet, though nearly half of the body consists of a slender tail. It has dark blotches distributed over the gray back. The head is long, the tongue is fleshy and extensile, and the body is covered with scales. It feeds on the eggs of aquatic birds and crocodiles, and is so named from the erroneous belief that it acts as a monitor to warn the unwary of the approach of crocodiles. Several species of lizards native to Australia and South America closely resemble the true monitors.

MONITOR, the name of an ironclad vessel originated by John Ericsson in 1861. It was built under an order from the United States



MONITOR AND VIRGINIA.

government and was completed in about three months. The guns were placed in a revolving turret or tower, and the wooden frame of the ship was covered with plates of iron. This ingenious vessel was able to cope with the *Virginia*, a Confederate warship which had formerly been called the *Merrimac*. The battle took place on Hampton Roads, Va., and both vessels withdrew after an engagement of four

hours, but the contest demonstrated the efficiency of vessels built on the type of the *Monitor*. Immediately several European countries began the construction of similar vessels. Monitors are now constructed with one or two revolving turrets, in each of which one or more powerful guns are located, and the whole is designed to secure a large amount of power with the least possible exposure to the enemy. Modified devices are employed extensively on the various ironclads, but all are patterned more or less after the principles employed by Ericsson.

MONKEY, a name commonly applied to the whole order of quadrumanous mammals. However, the term is limited in its application by some writers to those having a well-developed tail and generally cheek pouches, but they exclude baboons, apes, and lemurs. The many species of monkeys are classified into two sections, the lower and the higher. The former are known as *New World Monkeys*, or *Platyrrhini*. They are native to the tropical regions of America. Ten species are native to the region north of the Isthmus of Panama, but none is found north of the Rio Grande. The animals of this division have tails, are devoid of cheek pouches, and live largely in trees. They feed principally on vegetable food. Among the species of this section are the *howling* monkeys, a class known from their peculiar noise at night; the *marmosets*, which are small and have peculiar, silky fur; and the *squirrel* monkeys, *spider* monkeys, *macaque* monkeys, *capuchin* monkeys, and a number of others.

The higher section embraces the *Old World monkeys*, or *Catarrhina*, and includes numerous species common to Africa, Asia, and many of the adjacent islands. The tail is either wanting or rudimentary, the nostrils are set obliquely, and the cheek pouches serve to store food before it is masticated. Among the representative species of this section are the *baboons*, *orangs*, *gorillas*, *proboscis monkeys*, *chimpanzees*, *anthropoid*, or *manlike apes*, *sacred monkeys* of the Hindus, *monas*, *Diana monkeys*, *mandrills*, *gibbons*, *wandereos*, and many others. In general the Old World monkeys have a broad face, which distinguishes them from the New World species, and their tails, if any, are not used for climbing. All species have a more or less separated thumb and great toe, the former being more prominent than the latter. The name *quadrumana* is applied for that reason, meaning that they are four-handed. See illustration on following page.

MONMOUTH (mōn'mūth), a city in Illi-

nois, county seat of Warren County, 180 miles southwest of Chicago. It is on the Iowa Central and the Chicago, Burlington and Quincy railroads. The principal buildings include the county courthouse, the high school, and Monmouth College, a United Presbyterian institution founded in 1856. It has systems of electric lighting, waterworks and sanitary sewerage.

Jersey. The British evacuated Philadelphia on June 18 for the purpose of concentrating at New York, and it was Washington's design to strike a severe blow upon their forces. He accordingly took a position at Allentown, N. J., and Gen. Charles Lee was dispatched with 6,000 men to make an aggressive attack, but he soon retreated without striking a blow. Washington at once severely rebuked Lee, restored order among the retreating troops, and a drawn battle resulted. The Americans lost 362 and the British lost 416 men, but Clinton made good his escape to New York. Lee was court-martialed for his conduct and was deprived of his command for a year.

MONOMANIA (mōn-ō-mā'nī-ā), a form of insanity, consisting of a delusion without impairing the intellect of the afflicted. A person subject to this form of insanity may be rational in all respects, except that he is insane on one topic or in some particular direction. **Monomania** includes several distinct varieties, such as *kleptomania*, an irresistible propensity to steal, and *dipsomania*, an uncontrollable craving for drink, especially alcoholic liquors.

MONOMETALLISM (mōn-ō-mēt'al-iz'm), the financial theory of a single metallic standard in the coinage of money. See **Bimetallism**.

MONONGAHELA

(mō-nōn-gā-hē'la), a river of the United States, having its source in Upshur County, West Virginia. It has a general course toward the northeast to the Pennsylvania line, thence flows northward to Pittsburg, where it joins the Allegheny to form the Ohio. It is a rapid stream, supplying an abundance of water power, has a length of 150 miles, and is navigable for river boats a distance of 50 miles.



APES AND MONKEYS.

A, Young Orang-Outang; B, Sacred Monkey; C, Cebur; D, Capuchin Monkey; E, Spider Monkey; F, Macaque Monkey; G, Squirrel Monkey; H, Howling Monkey.

Among the manufactures are cigars, sewer pipe, carriages, machinery, flour, earthenware, and soap. It has a growing trade in farm produce and merchandise. Monmouth was settled in 1836 and incorporated in 1852. Population, 1900, 7,460; in 1910, 9,128.

MONMOUTH, Battle of, an important engagement of the Revolutionary War, fought on June 28, 1778, in Monmouth County, New

MONONGAHELA, a city of Pennsylvania, in Washington County, on the Monongahela River, thirty miles south of Pittsburg. It is on the Pennsylvania Railway and is surrounded by a farming and a coal mining country. The manufactures include paper, flour, glass, machinery, and clothing. It has a number of fine public schools and churches, electric lighting, waterworks, and sewerage. The first settlement on its site was made in 1772 and it was incorporated in 1873. Population, 1910, 7,598.

MONOPOLY (mō-nōp'ō-lŷ), a term applied in economics to the exclusive power of sale, production, transportation, or purchase of any commodity. Monopolies have been a factor in commerce from remote history. They were maintained at various times by monarchs to enhance their own profit, to enrich chiefs or favorites, and to raise supplies for the maintenance of government. Monopolies were abundant especially during the Middle Ages, practically all of the trade privileges and production of necessary commodities being in the hands of individuals or associations for personal or corporate gain.

It is no doubt true that monopolies are generally an evil, since they give special advantages to the classes who are most able to battle for an economic existence, and, on the other hand, they may work a hardship upon the industrial and laboring classes. However, there are instances in history where monopolies have been the means of effecting permanent good, such as those resulting from patents to land in the early development of the American continent. These patents gave certain individuals control of trade with the lands to be discovered or settled, thus making it possible to secure enormous reward for enterprises whose risks would otherwise have prevented their being undertaken. The East India Company, chartered in England in the reign of Queen Elizabeth, is a notable example of a vast monopoly. It was at first beneficial in developing enterprises, but later became greatly opposed by the people, owing to its depressive influence upon men of small means, particularly because it affected those who sought to found new and infant industries.

In general, the monopolist has absolute control over the prices of his services or commodities. By controlling the supply, he is able to create an artificial scarcity, thus making it more difficult to attain the necessary commodities to support life, and a rise in price to the limit of the consumers' ability to purchase is the result. Any one beginning business with small means may be ruined in his enterprise by the monopolist selling his products below cost of

production, but, after the small trader or manufacturer has become bankrupt, the prices may again be raised to an exorbitant rate. Among the monopolies are those known as landed, by which corporations have come into possession of the principal fields containing valuable deposits of natural gas, petroleum, anthracite and bituminous coal, and forests. Transportation monopolies affect the market by controlling largely the transportation facilities. The so-called *legal monopolies* include those especially reserved by the government or granted by patents, or charters, to individuals and corporations. There has been a tendency for some decades to promote enterprises of a monopolistic character in all lines of production whereby the producers, traders, or manufacturers can secure special advantages of some kind and to some extent. In several political campaigns the question of monopolies or trusts has been an important factor, but the solution still awaits at least to a large extent the earnest application of true principles of statesmanship.

The post office system is a government monopoly, but it is the most wholesome and beneficial institution supported by the whole people for the benefit of all classes. The events of the past two decades indicate a strong drift toward other systems coming under like control, such as the telegraphs, telephones, public lighting, street railways, and even railroads. Germany and France control exclusively the tobacco trade, this commodity being produced or imported and sold by government agents to yield public revenue. Railroads, electric car lines, and telegraphs are managed quite generally in the same way by Russia, Germany, Austria, and other countries of Europe. The governments of Canada and the United States grant a monopoly for a period of seventeen years to an inventor under a patent. Copyrights are issued for a period of 28 years and they may be renewed for fourteen years, if certain conditions are complied with. Both patents and copyrights have been the means of inducing men of genius to devote many years of careful study to the invention and publication of products of much value.

MONOTHEISM (mōn'ō-thē-iz'm), the doctrine or belief that there is but one God, being opposed to *polytheism*, which is the doctrine that there are many gods. Formerly it was thought that monotheism constitutes the original religion, but it is generally held at present that polytheism preceded it, the former being adopted through the education and enlightenment of mankind. Christianity, Judaism, and Mohammedanism are the three principal monotheistic religions of modern times.

MONOTREMATA (mŏn-ŏ-trĕm'ă-tă), an order of mammals that have only one aperture for the genital, urinal, and intestinal canals. The mammary glands are well developed, but have no nipples, and the teeth, if present at all, are formed of four horny plates. Darwin traced a certain connection between the higher mammals and reptiles through the monotremata, and showed their approach to birds. The *duck-bill* and *echidna* of Australia are representative species of this order.

MONOTYPE (mŏn'ŏ-tĭp), a machine to cast and set type singly, instead of in a line, as is done by the linotype. It consists of two parts, the perforating apparatus and the type-casting and setting machine. As the operator uses the keyboard, which resembles that of a typewriter, the keys perforate a narrow strip of type paper, which is afterward adjusted to guide the machine in casting the type. The type cast in this machine is single, resembling that used in hand composition, and is afterward arranged in lines and columns as required in the form to be set. While the operation is not as rapid as that of the linotype, it is preferable for high-class work, such as book printing, since various sorts of type can be produced and the printing is more uniform than can be obtained from composition in which the letters or words are cast in a solid line.

MONROE (mŏn-rŏ'), a city in Louisiana, capital of Ouachita Parish, on the Washita River, in the north-central part of the State. It is on the Queen and Crescent and the Saint Louis, Iron Mountain and Southern railroads. The river is navigable for steamboats. The chief buildings include the courthouse, the high school, and the Federal building. Among the manufactures are lumber, brick, cigars, machinery, furniture, and cotton-seed oil. It has a considerable trade in cotton and merchandise. Population, 1900, 5,428; in 1910, 10,209.

MONROE, a city and the county seat of Monroe County, Michigan, at the mouth of the Raisin River, 35 miles southwest of Detroit. It is about two miles from Lake Erie, on the Pĕre Marquette and the Lake Shore and Michigan Southern railroads, and is surrounded by a productive farming and fruit-growing country. The principal buildings include the public library, the county courthouse, the armory, the opera house, and the Saint Mary's Academy. Among the manufactures are dairy products, tile, flour, lumber products, furniture, and machinery. A company of Canadians settled here in 1784, when it was called Frenchtown, and it was platted as Monroe in 1815. It was incorporated in 1836. Population, 1904, 6,128; in 1910, 6,893.

MONROE DOCTRINE, a policy announced by President Monroe in a message to Congress in 1823. It commits the United States to the doctrine that any interference of European powers in the political affairs of North and South America is an unfriendly act to the countries of the New World. After 1815, following the overthrow of Napoleon, an alliance was formed by Russia, Germany, Austria, and France for the purpose of preserving the balance of power and suppressing revolutions within their dominions. Mexico and the states of South America revolted against Spanish occupation, and in 1822 the independence of these countries was recognized by the United States. It was suspected that the allied powers would come to the rescue of Spain, on account of which Monroe declared in a message to Congress on Dec. 2, 1823, "that the American continents are henceforth not to be considered as subject to colonization for any European power. With the existing colonies or dependencies of any European power we have not interfered and shall not interfere, but with the governments which have declared their independence and maintained it, and whose independence we have acknowledged, we could not view any interposition for the purpose of suppressing them, or controlling in any other manner their destiny, by any European power, in any other light than as the manifestation of an unfriendly disposition toward the United States."

The doctrine announced by Monroe has been maintained on many subsequent occasions, particularly in relation to the Isthmus of Panama, the French intervention in Mexico under Maximilian, and the dispute of Great Britain and Venezuela regarding the boundary between the latter and British Guiana. The Spanish-American War likewise involved an important feature of the doctrine, namely, that a country having possessions in America is bound to exercise reasonable intelligence and a humane policy in dealing with the people and their civil institutions. More recently the policy has been extended to imply that the United States is responsible to a certain extent for the smaller republics of America, especially for the international relations of the governments of Cuba and Central America.

MONROVIA (mŏn-rŏ'vĭ-ă), a seaport of West Africa, capital of Liberia, on the Saint Paul River, so named in honor of President Monroe. The climate is unhealthful, but the place has a large trade in rubber, dyewoods, and palm oil. It has several government buildings, a hospital, and a public library. Higher education centers largely in the university main-

tained by the Methodists. Steamships belonging to the principal European lines visit the harbor regularly. Communication inland is by a motor road and by river navigation. The place was founded in 1824. Population, 1908, 8,554.

MONS (mōns), a city of Belgium, capital of the province of Hainaut, on the Trouille River, 35 miles southwest of Brussels. It is connected by several railroads and is surrounded by a farming and coal-mining country. Among the principal buildings are the Cathedral of Saint Waltrudis, the public library, the townhall, the palace of justice, and the Hôtel de Ville. The manufactures include cotton and woolen goods, sugar, spirituous liquors, cutlery, soap, and machinery. The site was occupied by a Roman fort. In 804 it was made the capital of Hainaut by Charlemagne, after which it was strongly fortified, and for some time was in several contests between Austria and France. Population, 1906, 27,046.

MONSOON (mōn-sōon'), a term applied in general to winds blowing half the year in one direction and half in the other, such as occur regularly in certain sections of North America, North Africa, Australia, and South Africa. They are caused by the unequal heating of the land and water, as well as of the several large land masses in the regions in which they affect the continents. They are of utility in navigation in that navigators plan their voyages to take advantage of the movements of air, thus rendering it less expensive to make rapid voyages. Monsoons are the means of bringing rain to countries which would otherwise lapse into deserts. The term is applied particularly to the modification of the regular trade winds that are common to the Indian Ocean, the Bay of Bengal, and the western Pacific. These monsoons are of two classes, the *southwestern*, prevailing from April to October, and the *northeastern*, prevailing from October to April.

MONTAGUE (mōn'tā-gū), a town of Massachusetts, in Franklin County, on the Connecticut River. It is on the Fitchburg and the Vermont Central railroads. The chief buildings include the public library and several public schools. It has manufactures of paper, hardware, brick, and cotton goods. The public utilities include waterworks, sanitary sewerage, and electric lighting. Turner Falls and several villages are included with it, and on the opposite side of the Connecticut River is Greenfield. The first settlement was made in 1716 and it was incorporated in 1753. Population, 1900, 6,150; in 1910, 6,866.

MONTANA (mōn-tā'nā), a northwestern state of the United States, separated from Brit-

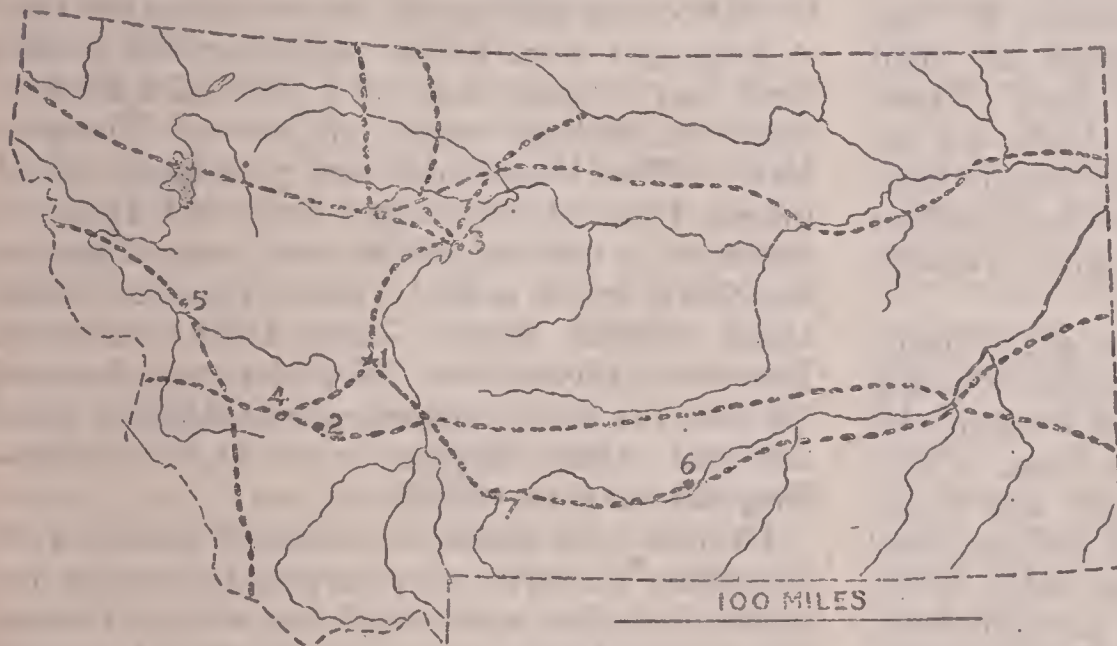
ish America by the international boundary, 49° north latitude, popularly called the *Treasury State*. It is bounded on the north by Alberta and Saskatchewan, east by North Dakota and South Dakota, south by Wyoming and Idaho, and west by Idaho. In size it ranks third among the states of the Union, being exceeded only by California and Texas. The greatest length from east to west is 540 miles; the average width from north to south, 275 miles; and area, 146,080 square miles, including a water surface of 770 square miles.

DESCRIPTION. The eastern portion comprises an elevated plain, the altitude being from 1,750 feet in the northeast to 4,000 feet among the foothills of the Rocky Mountains, which trend through the western part. The Continental Divide, which crosses the State from the southwestern boundary, extending in a northwesterly direction, is the main range of mountains. It is separated by a wide basin from the Bitter Root Range, which forms the western boundary, and whose summits extend from 7,500 to 8,000 feet above sea level. Mount Douglas, the highest elevation in the State, is one of several peaks that rise from 9,500 to 11,300 feet. In general these mountains are considerably lower and less rugged in Montana than farther south in Wyoming and Colorado. They are characterized by many fertile valleys and outlying ranges of hills. The eastern part of the State has numerous buttes and spurs of mountains, including the Powder River Range in the southeast, the Piny Buttes in the east central part, and Bear's Paw Mountains in the north. Fine forests of spruce, tamarack, pine, fir, cedar, and hard wood are found in the mountains and along many of the streams.

The Continental Divide forms the principal watershed, separating the basin of the Columbia from that of the Missouri, all of the drainage being by these two river systems. However, the larger part of the State is drained by the Missouri, which rises by several headstreams in the southwestern part and flows northeast beyond Fort Benton, after which it has a general course eastward. On the southern boundary is Yellowstone National Park, from which the Yellowstone enters Montana and flows through a large portion of the Bad Lands, which extend into the State from Wyoming. The Musselshell and the Yellowstone are the principal tributaries of the Missouri from the south, and the Yellowstone receives the inflow from the Powder, Big Horn, and Tongue rivers. The streams flowing into the Missouri from the north include the Poplar, Milk, Marias, Teton, and Sun rivers. Among the streams belonging to the

Columbia system are the Kootenai and Clark rivers, which leave the State before joining the Columbia. The Missoula and the Flathead, both tributaries of the Clark, drain the lake basin in the northwestern part, which includes Lake Flathead, the only large body of water in the State.

The climate is dry and healthful and the atmosphere is clear a large portion of the time. Being an inland State, it has a wide range of temperature, rising in summer to 95° or even 100°, and falling in January as low as 45° below zero. The mean temperature of the State is given as 46°, but for the coldest months it is 11° and for the warmest, 70°. In winter the extreme cold is tempered by the warm and dry Chinook winds, which blow from the west and absorb much of the moisture. Large areas of the State have insufficient rainfall to support agriculture without irrigation, which is employed to a considerable extent. The pre-



MONTANA.

1, Helena; 2, Butte; 3, Great Falls; 4, Anaconda; 5, Missoula; 6, Billings; 7, Livingston. Chief railroads shown by dotted lines.

cipitation ranges from 12 to 20 inches per annum, being somewhat larger in the western than in the eastern part.

MINING. Montana is rich in many of the useful minerals and mining still holds rank as the leading industry. In the output of copper it has first rank, the annual production averaging about \$60,750,000. Butte and Anaconda are the principal centers of copper mining. In the production of silver it stands second, but is a close rival to Colorado, the annual output having a commercial value of \$10,500,000. The output of gold has about half the value of its silver, but both gold and silver are obtained from the same mines as copper. A fine grade of bituminous coal is mined in several sections of the State and the output has been increasing

annually. Granite and limestone are abundant and furnish a superior quality of building materials. Other minerals include lignite coal, sapphire, lead, and commercial clays.

AGRICULTURE. Farming and gardening are carried on most successfully in the region lying immediately west of the main range of the Rocky Mountains, where the rainfall is sufficient to mature the crops. In the eastern part the rainfall is scant, hence irrigation is depended on more or less. About half of the cultivated fields are irrigated and the irrigated area is being extended constantly under private ownership and by the reclamation service of the Federal government. Oats is grown on the largest scale, exceeding in extent that of wheat, which is given as second in acreage. Other crops grown extensively include hay, flax, barley, and potatoes. Corn, though raised to some extent, is not an important crop. Sugar beets and garden vegetables are grown profitably. Small fruits and apples thrive in many parts of the State.

Large areas of the plains have nutritious grasses, including both buffalo and bunch grass, hence stock raising is a source of large returns. The buffalo grass cures on the root in the fall and furnishes good grazing during a large part of the winter. In the number of sheep Montana holds second rank, and they are reared both for wool and mutton. Formerly they were shipped east to be fed for the market, but the cultivation of alfalfa on a large scale has made it possible to fatten them before shipping. The output of wool is placed at 31,500,000 pounds per year. Cattle are grown principally for beef, though dairying is receiving larger attention from time to time. The cattle industry is carried on quite generally as an exclusive enterprise, though the herds are more numerous and somewhat smaller than formerly. Other live stock includes horses, swine, mules, and poultry.

MANUFACTURES. The manufacturing enterprises have a large output, but they are represented chiefly by the refining and smelting industries. Some of the largest copper smelters in the world are located within the State, which has an abundance of water power at many points on the Missouri and other rivers, making manufacturing enterprises profitable. Bonner and Hamilton have large interests in lumbering.

Flour and grist mills are operated by steam and water power in several points of the State. Coke is manufactured for use in the smelters. Montana is noted for its production of fine barley, owing to its dry climate during the harvesting season, and on account of this circumstance has built up numerous breweries. Other manufactures include clothing, ironware, pottery, brick, cigars, and machinery. Anaconda, Great Falls, Butte, and Helena have the largest manufacturing establishments.

GOVERNMENT. The constitution in force at present was adopted in 1889 and is the only one the State has had since its admission. The chief executive officers are the governor, lieutenant governor, secretary of State, attorney-general, auditor, treasurer, and superintendent of public instruction, all of whom are elected for terms of four years. The Legislature consists of a senate and a house of representatives, the former having 27 members elected for four years and the latter 73 members elected for two years. Meetings of the Legislature are held every two years, limited to sixty days. Three justices, elected for six years, constitute the supreme court. The State is divided into judicial districts, each of which has one or more judges elected for four years. County and township officers are elected for two years.

TRANSPORTATION. Three of the great transcontinental railways cross the State, including the Northern Pacific, the Great Northern, and the Chicago, Milwaukee and Saint Paul. Other lines enter the State from the south and southeast, and all have branches from the principal trade centers to points within the State, hence the facilities for communication are extensive. At present the lines equal a total of 4,250 miles. In the mountains conveyance is largely by saddle horses, pack mules, and stages. None of the rivers is navigable for large boats, but considerable rafting is done. Many of the highways have been improved by grading and the construction of bridges.

EDUCATION. Ample facilities were made for education through the government reservation of public lands, the income of which is distributed among the schools. Additional support is obtained through a system of State and local taxation. The schools are under the supervision of a State superintendent, who is assisted by county and city superintendents. A law requiring uniformity of text-books throughout the State and attendance at school between the ages of eight and fourteen years was passed in 1903. This law has had a wholesome effect in bringing all the children in contact with educational work. County high schools are maintained in most of

the counties and in all of the larger towns and cities. The average length of the school term for the State is 6.6 months, but in the towns it is nine months. A revised and enlarged course of study was adopted for general use in 1907. The rate of illiteracy is reported at 6.1 per cent.

The University of Montana, located at Missoula, is at the head of the State system. Dillon is the seat of the State normal school, which has ample facilities for training teachers. Butte has a school of mines and Bozeman has a college of agriculture. Many parochial schools and private institutions of higher learning are maintained. The State reformatory is at Miles City, the penitentiary is at Deer Lodge, and the school for the deaf and blind is at Boulder. Twin Bridges has a State orphans' home and Columbia Falls has a soldiers' home. Warm Springs is the seat of a hospital.

INHABITANTS. The western part of the State contains the larger number of inhabitants, owing to that section having the larger mining interests. A large per cent. of the people are of foreign birth, but no nationality is represented by large numbers, though nearly all are of European birth. The inhabitants are principally immigrants from states farther east and their descendants. Helena, in the west central part of the State, is the capital. Other cities of importance include Butte, Great Falls, Anaconda, Bozeman, Livingston, Missoula, and Kalispel. In 1900 the total population was 243,329, which included 1,523 Negroes and 11,343 Indians. Population, 1910, 376,053.

HISTORY. Montana was formed partly of the Louisiana Purchase and partly of a region formerly included with Washington and Oregon, the former lying east of the Rocky Mountains. The region was first explored in 1742 by the French, and soon after Jesuit missionaries began to operate among the Indians. An abundance of wild game and many fur-bearing animals made it a favorable region for trappers and fur traders at an early date. Gold was discovered in 1861, which soon caused many immigrants to make settlements in the western portion. The Territory of Montana was formed in 1864 and its admission into the Union was effected in 1889. Railroad building and the construction of irrigation canals soon caused many agriculturists and stock raisers to settle upon the public lands, and since then its development has been steady and rapid.

MONTANA, University of, a coeducational State institution of Montana, founded at Missoula in 1895. The departments include those of science, literature, arts, and philosophy, and it offers in addition preparatory and graduate

courses. Affiliated with it are a summer school and a biological station. All residents of the State are admitted free of tuition. The library has 15,000 volumes and the university property is valued at \$250,000. Congress endowed the institution by a grant of 72 sections, or 46,080 acres, of land under an act passed in 1892. The faculty consists of fifteen professors and instructors and the attendance averages 350 students.

MONT BLANC (môn blän'), meaning White Mountain, a celebrated mountain situated on the boundary between Italy and France, near the frontier of Switzerland. It is a peak of the Alps, the loftiest of Europe, rising to an altitude of 15,787 feet. This vast mountain is about thirty miles long and ten miles wide. It has many summits and is formed largely of granite. In 1786 the highest peak was reached under the direction of Jacques Balmat, this being the first entire ascent. Among the thirty glaciers that have their source in Mont Blanc are Mer de Glace, Bois, and Des Bossons.

MONTCLAIR (mōnt-ciâr'), a town of New Jersey, in Essex County, five miles northwest of Newark, on the Erie and the Lackawanna railroads. It is nicely situated on the slope of the foothill of the Orange Mountains, at an elevation of about 500 feet, and is the residence of many New York business men. Electric lights, pavements, waterworks, and electric street railways are among the improvements. The chief buildings include the public library, the high school, the Montclair Military Academy, and two orphan asylums. It is a center of many manufacturing enterprises and has a large trade in merchandise, fruits, and cereals. The place was incorporated in 1868. Population, 1905, 16,370; in 1910, 21,550.

MONTE CARLO (mōn'tâ kär'lô), a small town in Monaco, near the Mediterranean. It is noted as a popular resort for health seekers and gamblers. The gambling institutions are authorized by the Prince of Monaco for the purpose of securing revenue to defray the expenses of government. The place has many fine hotels and much business activity in connection with the entertainment of tourists. It is estimated that the average number of visitors annually approximates 400,000. Population, 1906, 3,865.

MONTENEGRO (mōn-tâ-nâ'grô), meaning Black Mountain, an independent principality between Turkey and Austria. The boundaries are formed by Albania, Novibazar, Herzegovina, Dalmatia, and the Adriatic Sea. The area is 3,630 square miles. Much of the surface is mountainous, being traversed by the Dinaric Alps, the highest peaks attaining an elevation

of 8,825 feet. The drainage is chiefly by the Zeta and the Moraca rivers, which flow through fertile valleys. Lake Scutari, on the border of Albania, receives the inflow of both these streams. The soil is highly productive along the coast and in the valleys. Among the principal products are corn, rye, barley, potatoes, cheese, honey, butter, and fruits. Cattle, sheep, goats, and horses are reared in the grazing lands of the mountains. The mountain slopes furnish a supply of valuable timber, including many hardy species. Extensive stone quarries and fisheries furnish employment for a large number. Among the manufactures are cotton and woolen goods, clothing, earthenware, butter and cheese, canned and cured fish, tobacco, wine, and machinery.

The inhabitants are mostly Montenegrins, belonging to the Slavic race, but include some Serbs and Albanians. They belong almost entirely to the Greek Catholic Church. The government supports a general system of education, the schools being free to all. Attendance at school is nominally compulsory. The commercial trade is developing steadily under government stimulation. It is a constitutional monarchy and the reigning prince is politically friendly to the imperial house of Russia. Executive authority is vested in the prince, who is not restricted in the discharge of his duties, and the legislative power is exercised by a council of state. The language and literature are Serbian.

Montenegro belonged to Servia in the Middle Ages, but, when the latter was conquered by the Turks in 1389, the Montenegrins fortified themselves in the mountains. There they offered stubborn resistance to Turkish attacks until 1714, when they were subjugated, but soon after again became independent under the protection of Russia. Pietro I. was recognized as a bishop-prince in 1796 and defeated the Turks under the Pasha of Scutari, and for a quarter of a century maintained peace. He was succeeded by Pietro II. in 1830, who in his reign of 21 years was successful in establishing schools and effecting internal improvements. At the death of that sovereign the church and state became separated, but the reforms in the civil service did not meet the approval of Russia, and the Turks took advantage of this condition by invading the country. The great powers compelled the conclusion of a treaty in 1853, but the sovereignty of Turkey was formally recognized in 1862. In the war of Russia against Turkey, in 1877-78, the Montenegrins coöperated with the former, thus securing their independence at the close of the contest. The Treaty of

Berlin added about 2,000 square miles to the original territory. Cetinje, the capital, has a population of 4,542. The other towns of importance include Podgoritzza, Dulcigno, and Niksic. Population of the country, in 1908, 230,650.

MONTEREY (mōn-tē-rā'), a city of Mexico, capital of the state of Nuevo León, 160 miles west of Matamoras. It is an important railroad center, is surrounded by a fertile agricultural country, and has an extensive jobbing trade. The manufactures include cotton and woolen goods, tobacco products, clothing, machinery, jewelry, and utensils. Among the principal buildings are the cathedral, the state capitol, the public library, and a theological seminary. The place was founded by the Spaniards in 1581. It was captured by the American forces under General Scott in 1846. Population, 1907, 78,788.

MONTEREY, Battle of, an engagement of the Mexican War, fought on Sept. 21, 1846. General Taylor, with a force of 6,700 men, moved from Matamoras against Monterey, which was occupied by 10,000 Mexicans under General Ampudia. A detachment of Americans under General Worth occupied the heights west of the city, but the battle continued for three days, and on the 24th terms of capitulation were agreed upon, under which the city was surrendered, but the Mexicans were permitted to withdraw and retain their small arms and some ammunition. Much dissatisfaction was caused in the United States by the terms of capitulation.

MONTEVIDEO (mōn-tē-vīd'ē-ō), a city of South America, capital of Uruguay, on the north shore of the estuary of the La Plata, 108 miles east of Buenos Ayres. The site is on a small peninsula. It has a fine climate and an excellent and well-sheltered harbor. It is a railroad center. The streets are platted to cross each other at right angles. They are improved by many modern facilities and as a whole the city is one of the best built and most modern in South America. Originally the harbor had an average depth of seventeen feet, but extensive improvements have been made by excavations and the construction of dry docks and wharves. The export and import trade is very important, since its location is at the most convenient point for river navigation on the Uruguay and Paraná rivers. Among the manufactures are cotton and woolen goods, machinery, hardware, utensils, furniture, lumber products, and clothing. Steamboat communication is maintained with all the leading countries of the world.

Montevideo is generally well built of brick and stone. The chief buildings include the na-

tional capitol, the Church of the Immaculate Conception, the university, the customhouse, the post office, the public library, the national museum, a normal school, and the central railway station. It has systems of waterworks, sanitary sewerage, gas and electric lighting, and electric street railways. The inhabitants include a large number of French, Spanish, and Italians. Fully one-third of the people are of these three races. Montevideo was founded in 1717. It was made the capital of Uruguay in 1828. Population, 1906, 272,381.

MONTGOMERY (mōnt-gūm'ēr-ī), the capital of Alabama, and the county seat of Montgomery County, on the Alabama River, 180 miles northeast of Mobile. It is on the Louisville and Nashville, the Central of Georgia, the Mobile and Ohio, the Western of Alabama, the Seaboard Air Line, and the Atlantic Coast Line railroads. The surrounding country has valuable deposits of iron and coal and produces large quantities of cotton, cereals, and stock. Steamboats ascend the Alabama River to Montgomery. The streets are regularly platted and improved by brick, stone, and asphalt pavements. It has an extensive system of electric street railways and is important as a market for cotton and farm produce. Among the manufactures are tobacco products, spirituous liquors, confectionery, soap, oil, machinery, earthenware, vehicles, and utensils.

Montgomery is well built and has many large business blocks. The noteworthy buildings include the State capitol, the county courthouse, the Masonic Temple, the Carnegie Library, the city hall, the State normal school, the La Grange Academy, the Federal building, the Estelle Hall, and the Montgomery Industrial School for Girls. A fine Confederate monument is located in the grounds of the capitol. Many fine churches, hospitals, and public schools are maintained. The State library contains a large collection of books. Montgomery was founded in 1817, when it was known as New Philadelphia, and the present name was adopted in 1819. It was incorporated in 1837. The capital was removed here from Tuscaloosa in 1847. It was occupied by the Union army in 1865. Population, 1900, 30,346; in 1910, 38,136.

MONTH, a period of time, originally equal to the interval between two new moons. This division of time afterward came to be called a *lunar*, or *synodical*, month and is equal on the average to 29 d. 12 hr. 44 min. 2.9 sec. The *sidereal* month is the interval occurring between two successive conjunctions of the moon with a particular fixed star. Its average length is 27 d. 7 hr. 43 min. 11.5 sec. The *anomalous* month

indicates a revolution of the moon from perigee to perigee, having an average length of 27 d. 13 hr. 18 min. 37.4 sec. The *solar* month is one of the twelve parts into which a solar year is divided, equaling 30 d. 10 hr. 29 min. 5 sec. The *calendar* month is fixed distinctly by law for ordinary purposes. Calculations of time by months have come down to us from remote antiquity, the lunar month being used mostly by the ancients. This form of calculation is still used extensively, notably by the Mohammedans and many other classes of Asia and Africa. The calendar months recognized by Europeans and now generally used by civilized nations were named by the Romans from various heroes and statesmen. The following is a complete list:

NAME.	SO NAMED FROM.	DAYS.
January	Janus.....	31
February.....	Februalia.....	28
February (leap years).....	".....	29
March.....	Mars.....	31
April.....	Aperire, meaning to open.....	30
May.....	Maia.....	31
June.....	Juno.....	30
July.....	Julius Caesar.....	31
August.....	Augustus.....	31
September.....	Septem, meaning seventh.....	30
October.....	Oct, meaning eighth.....	31
November.....	Novem, meaning ninth.....	30
December.....	Decem, meaning tenth.....	31

It will be noticed from the above that September was originally the seventh month, October the eighth, November the ninth, and December the tenth. To aid in remembering the number of days in each month, the following rhymes were made in 1606, which have been employed quite largely in text-books:

Thirty days hath September,
April, June and November.
All the rest have thirty-one,
But February twenty-eight alone,
Except in leap-year once in four,
When February has one day more.

MONTICELLO (mŏn-tĕ-sĕl'łŏ), the name of the residence and estate of Thomas Jefferson, third President of the United States, located about three miles southeast of Charlottesville, Va. Jefferson personally designed the mansion, which was first occupied as a residence in 1770, though it was not fully completed until later. It occupies an eminence overlooking Charlottesville and the surrounding country, and was the home of Jefferson and his family for 56 years. After his death it passed out of the ownership of the family. Jefferson, his wife, and two daughters were buried on the estate.

MONTLUÇON (mŏn-lü-sŏn'), a city of France, capital of an arrondissement in the department of Allier, 45 miles northwest of Clermont Ferrand. It is located on the Cher River,

has railway facilities, and is important as a commercial and manufacturing center. The streets are well improved and traversed by electric railways, and many of the buildings are modern and substantial. The manufactures include ironware, glass, clothing, chemicals, and machinery. Grain and fruit are grown in the vicinity. Population, 1906, 36,502.

MONTMORENCY, Falls of, a famous series of falls on the Montmorency River, a small stream of Canada, which rises in Snow Lake and flows into the Saint Lawrence eight miles below Quebec. The falls have a width of about 50 feet, and the main descent of water is over a precipice 265 feet high. The region is remarkable for its natural scenery and is a favorite summer resort. In the winter time the falls are increased in grandeur by vast ice formations, which are often 200 feet in height.

MONTPELLIER (mŏnt-pĕ'li-ĕr), the capital of Vermont, county seat of Washington County, on the Winooski River, forty miles southeast of Burlington. It is on the Central of Vermont, the Montpelier and Wells, and other railroads. It has a beautiful site, is surrounded by a farming and dairying country, and has a large trade in produce and merchandise. Among the noteworthy buildings are the State capitol, the county courthouse, the public library, the Montpelier Seminary, the Wood Art Gallery, the Heaton Hospital, and many fine schools and churches. The city has a fine park, pavements, public lighting, and systems of sewerage and waterworks. The manufactures include furniture, flour, leather, machinery, lumber products, earthenware, and vehicles. A fine statue of Ethan Allen adorns the portico of the State house. Montpelier was settled in 1787 and became the capital in 1805. Population, 1910, 7,856.

MONTPELLIER (mŏn-pă-lyă'), a city in France, capital of the department of Hérault, located a few miles north of the Gulf of Lions. It is built beautifully, has a large commercial trade, and is well connected by railroads with the trade centers of southern France and the coast. The manufactures include chemicals, cotton and woolen goods, perfumes, spirituous liquors, soap, leather, oil, and machinery. Among the principal buildings are the public library, the cathedral, the university, the commercial exchange, and the central railway station. The city was founded at an early date in European history. It is the seat of a medical school established by Arab physicians in the 12th century and a botanical garden which dates from the time of Henry VI. Montpellier was a center of Huguenot influence during the religious wars and on Oct. 20, 1622, the Edict of

Montpellier confirmed the Edict of Nantes by granting religious freedom to the Protestants. Population, 1906, 77,114.

MONTREAL (mōnt-rê-ā'), the largest and most important city of Canada, in the Province of Quebec, 180 miles southwest of Quebec, on an island formed by the mouths of the Ottawa, which flows into the Saint Lawrence at this place. It is so named from Mount Royal, *Mont*



Réal, a prominent elevation near the city, which is utilized as a public park. The city is on the southeastern side of Montreal Island and on the Canadian Pacific, the Grand Trunk, and other railroads. It has a fine harbor and extensive wharves and is accessible by canals that permit the passage of the larger vessels to convenient points within the city. Steamboat connections are maintained with the principal cities of the Great Lakes and ocean liners ply regularly between its harbor and many foreign ports. Being located at the junction of many railroads and at the termini of the inland and ocean navigation, it has commercial advantages which are rarely excelled.

The site of the city is a low tract of land, with a width of about two miles, but it rises gradually toward Mount Royal, which is 900 feet above sea level. The business portion is mainly on level ground, where some of the streets are irregular and narrow, but the residential portion is on a higher tract toward Mount Royal, giving that part a very beautiful appearance. Saint Lawrence Street divides the French from the English section, the former lying toward the east. McGill, Saint James, Notre Dame, Saint Paul, Bleury, Saint Cath-

erine and Saint Lawrence are the principal business streets and are lined with many modern and substantial structures, the buildings being chiefly of gray limestone quarried in the vicinity. It has an extensive export and import trade, the latter being somewhat the larger. Among the chief imports are tea and sugar, raw cotton, woolen and silk goods, iron and hardware, and chemicals. The exports include grain, flour, lumber, boots and shoes, musical instruments, locomotives, and machinery. It has manufactures of flour and grist, furniture, brass and iron products, clothing, machinery, and spirituous liquors. Many of the streets are paved with granite and asphalt and are traversed by electrical railways that reach the principal parts of the city and many interurban points. Waterworks, sewerage, electric and gas lighting, and telephones are among the public utilities.

The city is beautified by many public squares and parks, including Logan, Viger Gardens, and Mount Royal parks. In Victoria Square is a fountain and a statue of Queen Victoria. The Church of Notre Dame is a fine structure, in fact one of the largest cathedrals in America, having ample accommodations for 10,000 people. The Cathedral of Saint James, commonly known as Saint Peter's, is modeled after Saint Peter's at Rome. Other buildings of note include the city hall, the courthouse, the customhouse, the Saint James' Methodist Church, the Jesuit Church, and the Seminary of Saint Sulpice, the oldest building in the city. Montreal is noted as an educational center, having many institutions of higher learning and numerous educational and scientific associations. The former include McGill University, with which are connected an observatory and a natural museum; the French College de Montreal; and the Roman Catholic Laval University. It is the seat of many professional and benevolent institutions, including schools of medicine and surgery, hospitals for the blind and feeble-minded, and institutions for orphans and adult invalids. As a center of publishing and printing it takes high rank. It has an extensive public and many institutional libraries.

The site of the city was occupied originally by an Algonquin village called Hochelaga. Champlain visited the place in 1603, but at that time the native village was in a state of ruin as the result of a battle between the Iroquois and Hurons. In 1642 the French founded the present city under the name of Ville Marie de Montreal, but it was captured by the British under General Amherst in 1760. The colonial troops captured it in the Revolutionary War,

but they were dispossessed in 1777. The seat of government of Lower Canada was located at Montreal from 1844 until 1849, when it was removed to Quebec. A great fire destroyed four acres of the business section in 1901, but it was rebuilt rapidly and on a more substantial scale. About half of the inhabitants are French, the remainder being chiefly of English, Irish, and Scotch descent. Population, 1901, 267,730.

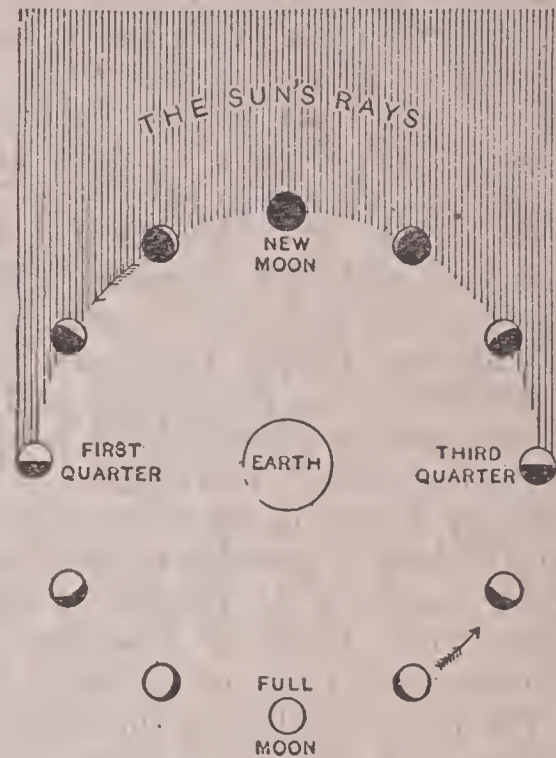
MONTREAL, an island of Canada, in Quebec, formed at the junction of the Ottawa with the Saint Lawrence River. The length is 30 miles; greatest breadth, 10 miles; and area, 197 square miles. The soil is fertile and productive and a large portion of it is utilized in orchards and gardens. Much of the surface is level, but Mount Royal, at Montreal, rises to a height of 900 feet above the sea. Montreal, the largest city in Canada, is located on the island.

MONTSERRAT (mōnt-sēr-rāt'), an island of the West Indies, one of the Leeward group, 34 miles northwest of Guadeloupe. The area is 32 square miles. The surface is mountainous, but it produces coffee, sugar, cacao, limes, and tropical fruits. Earthquakes are of frequent occurrence, and hurricanes are quite common, the latest of importance occurring in 1899, when three-fourths of the inhabitants were forced to depend upon the government for food. Plymouth is the capital and principal town. It was discovered by Columbus in 1493. The British established a settlement on the island in 1632. It is governed as a part of the British colony of the Leeward Islands. Population, 1906, 12,451.

MOON, the satellite of the earth, classed as one of the secondary planets. It revolves around the earth in an almost circular orbit once each sidereal month, at a mean distance of 238,818 miles. The least distance from the earth is stated generally at 221,593 miles and the greatest distance is 252,948 miles. So far as known the moon has an equal diameter in all directions, it being calculated by trigonometry at 2,160 miles. The surface area is about one-fourteenth that of our planet, or four and a half times that of the United States. The bulk of the moon is one-forty-ninth that of the earth, the mass is about one-eighty-first, and the mean density is about one-half. It would require fifty globes the size of the moon to equal the earth. A body weighing one pound on the surface of the earth would, if placed on the moon's surface, weigh about 2.65 ounces. All its light is received from the sun, hence moonlight is sunlight reflected from its surface. Owing to its brightness when lighted by the sun, it appears larger than it really is.

Since the moon turns once on its axis while going once around the earth, the lunar day is equal to twenty-nine and a half of our days, and the same side is always turned toward the earth. As it revolves round the earth it exhibits phases, these depending upon the extent of the illuminated portions that may be seen from the earth.

Full moon occurs when it is exactly opposite the sun with the earth between; *last quarter*, when one-half of the illuminated surface, that is, one-quarter of the moon's surface, is seen; *new moon* when it is between the earth and the sun; and *first quarter* when



PHASES OF THE MOON.

only one-half of the illuminated portion is again visible. The moon is said to *wane* from full moon to new moon, and during the other half of its course it is said to *wax*. Eclipses of the moon and sun are due to the relative positions of the three heavenly bodies. An eclipse of the moon occurs when that body is obscured either wholly or in part by the shadow of the earth; and an eclipse of the sun takes place when the moon occupies a position between that body and the earth, the former phenomenon being possible only at or near full moon and the latter only at new moon. The *sidereal* period of the moon, that is, a complete revolution round the earth, is completed in 27 d. 7 hr. 43 min. 11.46 sec.; but the *lunar* month is longer than the sidereal by 2 d. 5 hr. 51.41 sec., owing to the advance made by the earth in its orbit between two successive conjunctions of the moon.

The closest telescopic examination has revealed no traces of organic life. It appears to have no clouds, no water from which they may be formed, and no atmosphere to support them. The exposure to the sun's rays and an absence of light and heat on the opposite side give rise to great extremes of heat and cold. Being nearer the earth than all other bodies of considerable size, the surface of the moon has been examined carefully by powerful telescopes, and every portion of its surface has been mapped

and named by astronomers. Most of the surface visible to us is constituted of mountain chains, valleys, and extensive craters. Johannes Hevelius (1611-1687), of Dantzic, prepared the first lunar map, in 1647, and since then many photographs and maps have been made. Many of the mountain ranges are connected by chains running across valleys, but there are some isolated mountain peaks and a number of small clusters or groups of elevations. Some of the craters are from ten to twenty-five miles in diameter, and in many localities are crevices and cracks that appear to have been formed by volcanic action. It is thought that there are forty mountain peaks of the moon higher than Mont Blanc. The Leibnitz Mountains are regarded the highest, having elevations from 30,000 to 36,000 feet above the general surface, the whole system greatly exceeding in height any of the terrestrial peaks. The absence of an atmosphere tends to sharply define all objects on the surface, thus making it possible to measure with considerable accuracy the heights of mountains, their extent, the depth of numerous craters, their diameter, and many of the lunar landscapes.

The names applied to the different mountains, craters, and plains are those of celebrated astronomers and writers. Copernicus is the name of a crater which has a diameter of fifty miles and Eratosthenes is the name applied to one of the most celebrated mountains, having a height of nearly 16,000 feet. Anciently the moon was the subject of many superstitions. The time of planting cereals, beginning buildings, killing animals, pruning trees, gathering the harvest, and even forms of worship were determined by the moon's phases. However, as education spread it became apparent that all these, as well as predictions of the weather and other phenomena on account of the influence of the moon, are relics of ancient superstitions. Writers generally agree that it would take 600,000 full moons to equal in brilliancy the light of the sun, and that, if it has any influence on the weather, it is a slight tendency to produce clear nights at full moon. The most powerful telescopes now constructed are capable of bringing the surface of the moon within forty miles of the eye, which makes it apparent that a relatively close examination of its geography is quite possible.

MOONSTONE. See **Felspar**.

MOORS, a race of people originating from the Mauri, the inhabitants of ancient Mauritania, who are thought by some writers to be the direct descendants from a class of Berbers known as the Amazirgh. Their language is Arabic and their religion is Mohammedan. At present they inhabit Morocco and the southern coast of the

Mediterranean. In Spanish history the term Moor is used interchangeably with Arab and Saracen, since Mohammedan peoples from North Africa conquered the Visigoths in that country in 711 and governed the region until 1492. Later the Moorish forces invaded France, but they were defeated at Tours in 732 by Charles Martel. Moorish culture, industry, art, science, and customs prevailed in Spain for centuries, making that portion of Europe the center of commercial and educational activity at the time the Dark Ages characterized other parts of Europe.

At length the kingdoms of Castile and Aragon developed superior power under Christian influences, and the Moorish possessions were lost successively until they controlled only the region known as Granada. Their final downfall was effected in 1492 under Ferdinand the Catholic, and the Moors either colonized regions of Africa, or submitted to the Spaniards by adopting their customs and religion. However, revolts occurred at various times, and finally Philip III. expelled the remaining Moors by a decree in 1610. Fully 3,500,000 *Moriscos*, as their descendants were called, left Spain between 1492 and 1610, thus taking from that country the superior intellect and industry essential in maintaining its commercial, educational, and agricultural importance. This is assigned as the cause of the rapid decline in the importance of Spain, a condition from which that country has not yet fully recovered. The banished Moors established a foothold in the northern portions of Africa, where they founded the states of Barbary, and from their many cities and strongholds conducted expeditions against the Spaniards and other nations of Europe for centuries.

Many traces of Moorish industry and art still remain in Spain. The most prominent of their achievements is witnessed in the architecture still found in abundance in Granada and other parts of the Iberian peninsula in which they had possessions for some time. The Alhambra in Granada is the most notable and has an interior of great beauty and remarkable ingenuity, although its outer appearance is not particularly beautiful. Another structure of note is the Mosque of Cordova, which was founded in 786, but after the Moors were expelled from Spain it was converted into a cathedral. Many fine specimens of Moorish architecture are at Seville, notably the cathedral tower that was built in the latter part of the 12th century. See **Alhambra**.

MOOSE, the largest quadruped of North America, being a deer of the genus *Alces*. The male is much larger than the female, measuring

about six feet at the shoulders and weighing about half a ton. It has a large head and bears flat antlers of large size. Although both sexes bear antlers, they are larger in the male than in the female. The legs are long and well fitted to move swiftly, but the animal has a somewhat awkward gait, and the short neck makes it necessary to bend the front legs somewhat while feeding on the ground. The general color is brown, but the legs are yellowish. In summer the animals live a solitary life, but in winter they are found in herds. These animals are timid when in a wild state, but become savage and dangerous when at bay. The moose somewhat resembles the elk of the Old World, but writers regard it a distinct species. The killing of moose is now restricted by law and in some states of the United States and a number of provinces of Canada it is prohibited. Formerly these animals ranged throughout the north central part of North America, but they are now scarce in the United States and are becoming limited to the northern section of Canada and Alaska.

MOOSEHEAD LAKE (mōōs'hēd), the largest body of water in the State of Maine, being thirty-five miles long and from two to thirteen miles wide. It is the source of the Kennebec River, receives the water from several adjacent lakes by the Moose River, and on its eastern shore are a number of prominent elevations, of which Mount Kineo, height 4,125 feet, is the most noted. Fine fish are abundant. A railway line along its southwestern shore has stimulated a material development of the region.

MORaine (mō-rān'), a term originated from the German word *mur*, meaning débris, and applied to the accumulation of stone and earth deposited by a glacier. In some places these deposits form high walls or embankments. They are called *lateral* moraines, when deposited along the margins of a glacier. Two or more glaciers flowing in the same ravine sometimes unite or crowd together the inner lateral moraines, when they are known as *medial* moraines. *Terminal* moraines are those deposited at the lower extremities, owing to the melting of the glacial ice.

MORALITY PLAYS. See **Mysteries.**

MORAVIA (mō-rā'vī-ā), a province and crown land of Austria-Hungary. It is bounded on the north by Bohemia and Silesia, east by Hungary and Silesia, south by Hungary and the duchy of Austria, and west by Bohemia. The boundaries are formed largely by mountain ranges. It has an area of 8,578 square miles and consists mainly of a high plateau. The

larger part of the surface slopes toward the south and the drainage is wholly by tributaries of the Danube. Mining, manufacturing, and agriculture are important industries. The mines yield graphite, coal, iron, lead, and copper. Flax, rye, barley, potatoes, fruits, and sugar beets are the chief crops. Cattle, sheep, horses, and poultry are reared extensively. The manufactures consist of cotton and woolen goods, silk and linen fabrics, wine, beet sugar, and machinery. Moravia was a fief of Bohemia until 1526, when it was made a crown land of Austria. About seventy per cent. of the inhabitants are slavs and the remainder are Germans. Roman Catholicism is the religion of a majority of the people. Brünn is the capital and chief city. Olmütz is a commercial and manufacturing center. Population, 1906, 2,538,508.

MORAVIAN BRETHREN, a religious sect founded by the immediate followers of John Huss in Bohemia. They are also called *Herrnhuters*, from the town of Herrnhut, built by them in Saxony, which has continued until the present time to be the principal seat of their influence and educational institutions. They are closely allied to the Lutheran Church, but differ from it in discipline and some minor points of religious doctrine. It is their aim to embrace simplicity in manners and earnest piety, and to pursue the study and practice of religion with great earnestness. As missionaries they have attained to much influence, having stations in all the continents and many islands. Their schools are highly efficient institutions of learning, and are characterized by the devotion of their teachers and the high degree of morality in culture. Numerically the principal adherents of the Moravian Church are in America, Germany, and England, the total number being estimated at 225,000. In the United States there are 125 churches, with 140 ministers and 24,968 communicants.

MORAY FIRTH (mūr'ā), an inlet of the North Sea, extending into the northeastern part of Scotland. It is about forty miles long and sixteen miles wide and is noted for its fisheries. The Beuly River flows into it. Large steamers ascend as far as Inverness.

MORDANTS (mōr'dants), the name of certain substances used in dyeing and calico printing. They serve to fix the colors that have no affinity for the fabrics. The term is applied in gilding to any sticky matter used to making gold leaf adhere. The mordants used commonly include alum, ferric nitrate, ferrous acetate, stannic chloride, tannic acid, and potassium. The term *fatty acids* is applied to the salts of sodium or potassium dissolved in water.

MORELIA (mō-rā'lê-à), or **Valladolid**, a city of Mexico, capital of the state of Michoacán, 125 miles west of the city of Mexico. It is located in a beautiful valley, has a favorable climate, and is conveniently connected by railroads. The features include the city hall, the state capitol, the theater, the cathedral, and the College of San Nicolas de Hidalgo. Among the manufactures are flour, utensils, clothing, jewelry, and lumber products. It has a large trade in merchandise. The place was founded in the 17th century. Population, 1906, 34,896.

MORGARTEN (mōr-gär'tn), a mountain slope in Switzerland, in the canton of Zug, near Lake Egeri. It is celebrated for a victory won by the Swiss on Nov. 15, 1315, over an Austrian army of 50,000. The Swiss numbered only 1,400, but they had possession of the narrow pass that winds between the lake and Morgarten Hill, a fact of which their gallant warriors took due advantage.

MORIAH (mō-rī'à), **Mount**, a name applied in the Scriptures to the hill on which Solomon built the temple at Jerusalem. It is a part of the present city and is the site of the Great Mosque of Jerusalem, which is one of the principal attractions for the Moslem world. Near Mount Moriah is an intermittent spring known as Virgin's Fountain, from which the water passes by an aqueduct into the Pool of Siloam.

MORMONS, or **Church of Jesus Christ of Latter Day Saints**, a religious organization whose tenets are based upon the Bible and the Book of Mormon. Joseph Smith was the founder of the Mormons, in 1830. In 1820, when Smith was only fifteen years of age, he asserted that the first two persons of the Divine Trinity had communicated with him in person, and had placed upon him the duty of prophesying to the people. Numerous revelations were made to him from 1823 until 1827. In the latter year the golden plates of the Book of Mormon were placed in his hands, and he received two stones in silver bows resembling a pair of spectacles, called the *Urim* and *Thummim*, and by looking through them he was enabled to read the contents, while an assistant wrote them in the English language. The original Book of Mormon consisted of golden plates about eight inches in length and seven in width. These plates were constructed of thin sheets and fastened by three golden rings. The entire volume had a thickness of six inches. However, a portion of its contents was sealed. He received a revelation only of the unsealed part, and the other part was reserved to be revealed when future occasion makes it essential to the general welfare of man. Smith called the language of the

book Reformed Egyptian, and it was claimed that the characters used in the writing were executed elegantly, but of small size.

In 1830 the first edition of the Book of Mormon was published at Palmyra, N. Y. On the last few pages appeared the testimony of witnesses who claimed to have seen the original book. The testimony consisted of a statement signed by David Whitmer, Martin Harris, and Oliver Cowdery. Its purport was that they had seen the plates from which the book had been translated and that they had been handed down from heaven by an angel. This testimony was supplemented by the evidence of eight persons, who asserted the authenticity of the statement. Oliver Cowdery was the associate of Smith and wrote the words as dictated by him, and the eight witnesses included Joseph Smith's father and two brothers. It is asserted that Joseph Smith and the eleven different persons he referred to are the only ones that saw the plates of the original book before they were returned to the angel who had brought them to Joseph. Opponents to the new faith sprang up rapidly, and it was asserted that the money to publish the Book of Mormon was furnished by a farmer named Harris with the view of securing profit. Some claimed that several of the witnesses were induced to make a declaration that their former testimony regarding the authenticity of the original manuscript is untrue. However, converts to the faith were rapid and a large number of zealous adherents sprang up in various parts of the United States.

The Book of Mormon is so named from Mormon, the prophet who is represented as the historian of his people. The record assumes to give a history in relation to America from the building of the Tower of Babel, and recites that a Jew named Lehi led a band of Israelites from Jerusalem to America about 600 B. C. His son, Nephi, is claimed to be the founder of a race of people that includes the North American Indians. It is asserted that Christ appeared to this people after the crucifixion, ministered to them, and established his church. Dissensions among the people led many to forsake the true faith, some embracing idol worship, and at last great contests arose that terminated in a series of battles in New York, the last occurring in Ontario County, in which nearly all followers were exterminated. The prophet Moroni was one of the few survivors and he wrote a record of the principal events of his time.

The Mormons represent their own tenets as follows: "We believe in God, the Eternal Father, and his son, Jesus Christ, and in the Holy Ghost. We believe that men will be punished

for their own sins and not for Adam's transgression. We believe that through the atonement of Christ all men may be saved by obedience to the laws and ordinances of the Gospel. We believe that these ordinances are: Faith in the Lord Jesus Christ; repentance; baptism by immersion for remission of sins; and laying on of hands for the gift of the Holy Ghost. We believe that a man must be called of God to prophesy and by the laying on of his hands, by those who are in authority, to preach the Gospel and administer the ordinances thereof. We believe in the same organization that existed in the primitive church; apostles, prophets, pastors, teachers, and evangelists. We believe in the gift of tongues, prophecy, revelation, visions, healings, interpretation of tongues, and other miracles. We believe the Bible to be the word of God, as far as it is translated correctly; we also believe the Book of Mormon to be the word of God. We believe all that God has revealed, all that He does now reveal, and we believe that He will yet reveal many great and wonderful things pertaining to the kingdom of God. We believe in the literal gathering of Israel and in the restoration of the ten tribes, that Zion will be built upon this continent, that Christ will reign personally upon the earth, and that the earth will be renewed and receive its paradisiacal glory. We claim the privilege of worshipping Almighty God according to the dictates of our own conscience, and allow all men the same privilege; let them worship how, where, or what they may. We believe in being subject to kings, presidents, rulers and magistrates, in obeying, honoring and sustaining the law. We believe in being honest, true, chaste, benevolent, virtuous, and in doing good to all men; indeed, we follow the admonition of Paul: 'We believe all things, we hope all things;' we have endured many things, and hope to be able to endure all things. If there is anything virtuous, lovely, or of good report, or praiseworthy, we seek after these things."

In 1851 a division resulted from the publication of a revelation authorizing polygamy. According to this revelation two classes of marriages were recognized—one a spiritual and eternal, the other a temporal for this life. *Eternal* marriages were held to exist as a relationship having no end, while *temporal* marriages were looked upon as joining the contracting parties until they are divorced by death. Those denying the authenticity of this revelation constitute the Reorganized Church of Latter Day Saints, whose principal seat is at Lamoni, Iowa. Another division of the church occurred in Utah in 1869, when many withdrew from the so-called

spiritual priesthood of Melchisedec and organized the Church of Zion.

The history of Mormonism presents many incidents of devotion and endurance. Six members formed the first church at Fayette, Seneca County, N. Y., on April 6, 1830, but shortly after they removed to Kirtland, Ohio. There converts gathered from various states and the church was formally organized in 1833 under the First Presidency. Brigham Young was chosen as evangelist and in 1835 was included with the twelve apostles. Missionaries were sent to various portions of the United States and England, but financial troubles in a bank established at Kirtland and a series of contentions with opponents caused the Mormons to form a settlement at Independence, Mo., where nearly all of them located in 1838. Local trouble caused the Governor of the State to order them from Missouri, and they immediately formed a settlement in Hancock County, Illinois, which they named Nauvoo. Within a short time 15,000 adherents had collected in the settlement. In the meantime the revelation regarding polygamy was promulgated, which aroused much opposition. Disputes regarding taxation under the laws of Illinois likewise tended to complicate matters.

Joseph and Hiram Smith were placed under arrest for violations of law and while in jail at Carthage a mob shot both on June 27, 1844. It was necessary to call out the State militia to quell the disturbances that followed, but Brigham Young, the new leader, organized an exodus in 1846, and led about 1,000 families to the far west. In 1847 they reached the region of Great Salt Lake, where they settled and have since maintained their center of activity. In developing the natural resources of Utah the Mormons have shown much endurance and industry, built many thriving cities, redeemed waste lands by irrigation, constructed vast improvements, and built schools and homes for worship. In 1853 they laid the cornerstone for a beautiful temple at Salt Lake City, which was dedicated in 1893. It is a magnificent structure of gray granite, is lighted by electricity, contains a fine and substantial finish, and cost about \$12,000,000. Missionary work is a leading feature of the Mormon Church. The membership at present includes 375,000 communicants, about two-thirds of them being resident in Utah, and the others in the different states, but particularly in Arizona, Missouri, Nevada, and Idaho. In 1890 President Woodruff issued a proclamation by which polygamy was declared no longer a tenet of the Mormon Church. See **Latter Day Saints**.

MORNING GLORY, a family of climbing

plants, including many species. They are familiarly known as favorite flowering plants and are cultivated extensively in gardens. The vines climb to heights of from ten to twenty feet and produce funnel-shaped flowers of white, purple, pink, blue, and variegated colors. They are of especial beauty in the morning, when the flowers are full-blown. This family of plants includes the curious parasitic twiners known as *dodders*.



MORNING GLORY.

Vine.

Flower.

MOROCCO (mō-rōk'kō), one of the capitals of Morocco, in Africa, the others being Fez and Mequinez. It is situated on a fertile plain, near the Tensift River, 250 miles southwest of Fez. Formerly it was well protected by a wall of stone and earth, but it is now in a dilapidated condition. The streets are narrow and unpaved, the buildings are constructed principally with flat roofs, and the architecture is mainly of earth and stone. Anciently it was one of the most flourishing cities of the Moslem world, which is indicated by many ruined buildings, but in the main the city has few traces of former greatness and prosperity. However, its site is one of much beauty and commands a fine view of the surrounding country. In its vicinity are magnificent gardens, groves, and fields. The manufactures include leather, clothing, carpets, earthenware, textile fabrics, and utensils. Its market places are crowded with bazaars. The government palace is an extensive and beautiful structure. It has several public elementary schools and a large number of mosques. Morocco was founded in 1072 by Abubekr ben Omar. Its greatest prosperity was attained in the 13th century, when it was a vast business emporium. At that time it was the

chief seat of learning in Northwestern Africa and contained fully 725,000 inhabitants. Its decline is due to continuous civil strife with peoples of Northern Africa and Spain. Population, estimated, 56,500.

MOROCCO, a country in the northwestern part of Africa, bounded on the east by Algeria, south by the Sahara Desert, and west and north by the Atlantic Ocean and the Mediterranean Sea. It is separated from Spain by the Strait of Gibraltar, which forms a narrow channel between Europe and Africa, and a portion of the southern boundary is formed by the Draha River. Some uncertainty still exists as to the exact situation of its southern boundary, on account of which the entire area cannot be stated accurately, but the most recent estimates place it at 234,000 square miles. The Draha and Morbeja are the principal rivers. The drainage is almost exclusively into the Atlantic, only a small portion of the coast plain being drained into the Mediterranean. All the streams flow rapidly, many of them being characterized by cataracts. The Atlas Mountains trend through the interior, about midway between the coast and the Sahara, forming not only the watershed, but also protecting the coast regions from the hot winds that sweep

across the Sahara Desert. The highest peaks are from 10,000 to 13,000 feet above sea level. In many sections they are penetrated by valleys of much fertility and luxuriant vegetation.

Morocco is rich in valuable timber, including cork oak, esculent oak, cedar, Aleppo pine, and several species of palm trees. It contains extensive deposits of rock salt, iron, copper, gold, silver, lead, antimony, tin, and mineral oils. The coast region has a fertile soil and favorable climate, but in many localities the summer heat is intense and in some parts irrigation is necessary, but there is an abundance of small mountain streams that supply the necessary quantity of water for that purpose. Among the agricultural products are tobacco, cotton, wheat, rice, barley, maize, sugar cane, hemp, and many varieties of tropical fruits, including the fig, orange, lemon, pomegranate, and grapes. Large herds of domestic animals are reared, especially in the pastoral regions, the principal interests being vested in cattle, sheep, camels, goats, asses, mules, and Moorish horses. Field labor is done mostly by oxen and bulls and transportation is principally by the camel. The country has manufactures of leather, Fez caps, pottery, embroidery, carpets, cot-

ton and woolen goods, edged tools, and utensils. Commercial relations are sustained with most of the European countries. Much of the internal trade is in the hands of Jews and Europeans and the freighting is chiefly by caravans and coasting vessels.

The government is an absolute monarchy. Chief executive is vested in the Sultan, who has unrestricted control of religious affairs, and in the management of the state he is assisted by a cabinet of six ministers. An army of 12,000 men is maintained, consisting of 2,000 cavalry and 10,000 infantry. The revenues are derived by taxes and tariffs on foreign trade, the latter amounting to about \$1,800,000 per year. Fez and Morocco are centers of the caravan trade, and commerce with Europe is carried on at the ports of Rabat, Tetuan, Safi, and Tangier. At present the imports are estimated at \$6,250,000 and the exports at \$5,100,000 per annum. Trade with European nations is chiefly with Great Britain, France, Germany, Belgium, and Spain, in the order stated. Nearly all the native population is Mohammedan. The Europeans do not exceed 4,500. Fez is the principal city and the main seat of government, but Morocco and Mequinez are jointly capitals with Fez.

Anciently the country was a part of Mauritania. The Berbers were the earliest known inhabitants. It was annexed to the Roman Empire in 43 A. D., was conquered by the Vandals in 429, and in 533 became a dependency of the Eastern Empire. In the latter part of the 7th century Mauritania was conquered by the Arabs, and since 680 it has been largely in possession of that people and others of the Mohammedan faith. Edris ibn Abdallah, in 787, founded the kingdom of Fez and the city of Fez was begun in 807. In 1648 the present dynasty was founded, succeeding various independent monarchies that originated from a division resulting after securing independence from the caliphs of Bagdad. During the 18th century the Barbary influences maintained a widespread slavery of Christians, but that institution was abolished in 1814 and in 1817 piracy was forbidden. Abd-el-Kader conducted a war against France in 1844, and in 1859 a war occurred between Morocco and Spain, the latter terminating by a cession of land south of the Draha River.

In 1904 France and Great Britain concluded a treaty in which the former was given a free hand in Morocco, although it does not appear that Great Britain possessed any power to convey such authority. To this procedure Germany objected, making a formal protest in June, 1905, and for a time it was feared that war might be the outcome. The matter was referred to an

international conference, which met at Algeciras, Spain, early in January, 1906, and of which the Duke of Almodovar, the Spanish minister of foreign affairs, was chosen president. Among the subjects considered by the conference were the creation of a state bank to facilitate financial reforms, the organization of the Moroccan police, the repression of contraband arms, the best means of collecting revenues, and the problem of safeguarding life and protecting economic liberty in the country. Berbers, Tuaregs, Arabs, Moors, Jews, and Negroes constitute the chief inhabitants. Population, estimated, 8,504,500.

MOROCCO. See **Leather.**

MORPHINE (môr'fin), or **Morphia**, a bitter alkaloid found in opium, first isolated by Sertürner, a chemist of Hanover, in 1816. It is a white crystalline substance and possesses strong narcotic properties. Although it is slightly soluble in water, especially in lime water, it may be dissolved readily in acids and in boiling alcohol. In combination with acid it forms crystallizable salts, which may be dissolved in water and alcohol. Morphine acts more quickly as a therapeutic agent than opium, since it is more readily absorbed by the system, hence is employed for hypodermic use and is a powerful emetic. However, the habitual use of this drug is very injurious, causing the victim to become pale, dyspeptic, and licentious.

MORPHOLOGY (mör-föl'ö-gy), the branch of biology which treats of the structure of animals and plants, describing the form of their organs and their various characteristics. It uses comparative anatomy and embryology, as a basis, hence lays the foundation for physiology, but has no reference to the uses or functions of the several parts. As a branch of science it is based largely upon embryology and comparative anatomy, requiring that the morphologist base both observation and comparison largely upon these branches.

MORRISTOWN, a city of New Jersey, county seat of Morris County, thirty miles west of New York City, on the Morristown and Erie, the Lackawanna, and other railroads. It is beautifully situated at an elevation of 500 feet above sea level, has electric railway communication, and is the home of many business men of New York. The surrounding country is fertile, producing large quantities of cereals, fruits, and dairy products. Among the manufactures are paper, machinery, hardware, textiles, and wearing apparel. It has a fine courthouse, an orphans' home, and a State asylum for insane. The last named institution is one of the finest structures in the United States, costing about \$2,650,000. Other features include the public

library, the Y. M. C. A. building, the lyceum, and the Saint. Elizabeth's Convent. The vicinity was first settled in 1710. Washington made Morristown the headquarters of the Continental army during a part of the Revolution. The Ford mansion occupied by him is still standing and is now the property of the State Historical Society. Population, 1905, 12,146; 1910, 12,507.

MORTALITY (môr-tăl'i-tÿ), **Statistics of**, the branch of study that investigates the growth and changes of population, frequently treated under the title of *vital statistics*. Information upon which the study of this subject is based is derived mainly from census and registration reports. While the census is taken only at certain periods, it is possible to compare the results of two or more enumerations. By registrations are meant the records made by certain officials, including mainly the statistical facts relating to births, deaths, marriages, and divorces. Statistical tables containing information in regard to the number of deaths at certain periods in life are known as tables of *mortality*, or tables of *vitality*. The death rate in Canada and the United States is practically the same, though in England it is somewhat lower. In 1890 the average age at death in the United States was 31.1 and in 1900 it was 35.2. The number of deaths per thousand in 1900 was 17.8. Following is a table showing the death rate of each sex per one hundred persons in the United States for 1900:

DEATH RATE.

AGE.	MALES.	FEMALES.
0-4	56.7	47.5
5-14	4.4	4.2
15-24	6.7	6.1
25-34	9.5	8.5
35-44	12.4	10.5
45-64	24.1	20.1
65-	91.1	82.6

MORTAR. See **Artillery.**

MORTAR. See **Cement.**

MORTGAGE (môr'gāj), a transfer or conveyance of property, either personal or real, as security for the payment of a debt or the performance of an obligation. Such a conveyance becomes void upon the payment or performance of the condition stipulated in the agreement. The creditor is called the *mortgagee* and the debtor is termed the *mortgagor*. The instrument is known as a *chattel mortgage*, when personal property, or chattels, are transferred, and as a *real estate mortgage*, when landed property is pledged as security. A mortgage, in order to be valid against a third party, must be placed on record in the county where the prop-

erty is located. It does not convey absolute title even if full payment is not made, since in most instances the mortgagor has from six months to two years to redeem real estate, although in most cases the time of redemption is limited to one year. On the other hand, chattel property is sold on execution to the highest bidder to extinguish the debt and cannot be redeemed. However, in either case, any surplus remaining above the actual debt and the costs of the sale must be paid to the mortgagor.

MOSAIC (mō-zā'ik), or **Mosaic Work**, the branch of fine art by which surface decorations are made by inlaying in patterns small pieces of variously colored stone, glass, or other material. The design may vary in the degree or kind of elaboration, from the simplest geometrical pattern to the most elaborate picture, including figure subjects represented in colors of countless gradations. As a branch of fine arts it is entitled to rank as a style of painting, since it requires the preparation of a cartoon or colored design, as in the case of a fresco or an elaborate, oiled picture, and the artist must be skilled in the science of form and composition. The mosaic is usually made upon a slab of stone, in which the workman cuts a certain space, which he encircles with dams or cramps of iron. Upon this hollowed surface mastic or cementing paste is gradually spread as the progress of the work may require, thus forming the adhesive ground or bed on which the mosaic is laid. Into this paste are stuck the colored stone, marble, or glass which compose the pictures. When the mastic or cementing paste is sufficiently hardened, the work is carefully polished, but the degree of polishing varies according to the distance at which the product is placed from the spectator. When the design is to be seen at a considerable distance, as in cupolas or flat ceilings, they are generally less elaborately polished than when the work is placed where it can be seen at short range.

Mosaic work originated in Egypt and was practiced by the Greeks after the time of Alexander the Great. Later it became prominent among the Romans, who used it as a favorite decoration of their floors and walls. Specimens of their work are found in many museums of Europe, including samples taken from the baths of Caracalla and the pavements of various Roman cities. These pavements were usually of a coarse design, while the mosaics found in the finer buildings are made up of pieces cut in various sizes, from the smallest pin point to an inch in length. Many of the mosaics include representations of flowers, plants, animals, and historical scenes.

MOSCOW (mōs'kō), a city of Idaho, county seat of Latah County, ninety miles southeast of Spokane, Wash. It is located near the western boundary of the State, on the Northern Pacific Railway and the line of the Oregon Railroad and Navigation Company, and is surrounded by a farming and mining district. The manufactures include flour, lumber products, and brick and tile. It is the seat of the University of Idaho and the State Agricultural College. Electric lighting and waterworks are among the public utilities. Population, 1900, 2,484.

MOSCOW, the second city of Russia, capital of the government of Moscow, on the Moskva River, 402 miles southeast of Saint Petersburg. The elevation above sea level is from 500 to 850 feet. Many of the streets are platted irregularly, but they are generally well graded and paved. A wall 26 miles in circuit surrounds a large part of the city, but several suburbs have been built beyond the inclosure. Near the center of the place is the citadel known as the Kremlin, which forms a formidable stronghold. The citadel has connected with it several palaces and other large buildings, including the historic palace of the czars, the Cathedral of Saint Michael, the Church of the Enunciation, the Cathedral of the Assumption, the tower of Ivan Veliki, and several other historical structures. All these buildings are richly ornamented with mosaics and fine decorations. The great tower is especially noteworthy, dating from 1600 and towering to a height of 270 feet. Within the Kremlin are about 800 cannon captured from Napoleon in 1812, a great decorative cannon, and a colossal bell weighing 200 tons. The latter was broken in an endeavor to place it in the tower. It has been said that Moscow is remarkable for two things, a cannon which has never been fired and a bell which has never been tolled.

On the outside of the Kremlin are likewise buildings of general interest, including the historical museum, the Cathedral of Saint Basil founded in 1554, and the Imperial University established by Empress Catharine in 1755. This university is attended by 4,800 students. It has advanced courses of study, fine supplies and apparatus, and a library of 200,000 volumes. An imperial library of 300,000 volumes is in the public museum, which has, in addition to the library, a valuable collection of work in the arts and sciences. The city has thoroughly organized public schools, an extensive system of electric street railways, public waterworks, electric lighting, stone and macadam pavements, and splendid boulevards, parks, and monuments. The manufactures include woolen, silk, and cot-

ton goods, machinery, leather, furniture, spirituous liquors, metallic products, ironware, engines, paper, and earthenware. The commercial trade extends to all parts of Russia and bordering countries. Owing to its central location, it has a large trade in grain, merchandise, and live stock. It is not only on the commercial route between Saint Petersburg and the Black and Caspian seas, but is important because of its situation on the Trans-Siberian Railway.

The history of Moscow dates from the 12th century, having been founded in 1147 by Yuri Dolgoruki. At that time it was strongly fortified, but the Mongol incursions caused it to be sacked in 1237 and again in 1293. Later the Muscovite influences became more strongly established and it was made the capital of Muscovy. The Lithuanians made attacks upon it at various times in the 14th century, and in 1381 it was conquered by the Tartars. The Crimean Tartars again occupied it in 1591 and the Poles in 1610. Peter the Great removed the capital from Moscow to Saint Petersburg in 1713. In 1812 it was abandoned and burned by its own people to prevent its occupation by the French under Napoleon as winter headquarters. Subsequently the city has been improved until it takes rank as one of the most substantial and wealthy cities of Russia, being excelled in size only by Saint Petersburg. Population, 1907, 1,359,254.

MOSELLE (mō-zěl'), a river of Europe, an affluent of the Rhine. It rises in the Vosges Mountains of France, flows northwest to Nancy, and thence crosses into Germany and joins the Rhine at Coblenz. Its course is generally tortuous. The total length is 350 miles, of which about 200 miles are navigable. The valley of the Moselle is highly fertile and is noted for its production of aromatic and sparkling wines. Among the cities on its banks are Metz, Coblenz, Toul, and Treves.

MOSQUE (mōsk), the name applied to a place of Mohammedan worship. The style of architecture employed in these structures is of Saracen origin. Three essential parts are common to all the more important mosques. These include the *mihrab*, the *maksura*, and the *mimbar*. The *mihrab* is a place of prayer that indicates the direction of Mecca, the *maksura* is a place for the preservation of the Koran, and the *mimbar* is a kind of pulpit. An open court, often covered with a dome, contains the fountain for ablutions. Another requirement is a form of tower called the *minaret*, which serves as a place from which the hour of prayer is announced by the Imam. Many of the larger mosques have from four to six minarets. Five

prayers are said daily in the mosques. The worshiper removes his shoes on entering and carries them in his hand. After performing the necessary ablution, he takes his place in the mihrab, where the special prayers are offered and a sermon is delivered. Women rarely enter the mosque during the time of prayer, but a special place, set off by a screen, is provided for them in some buildings. The most noted mosques are the Mosque of Omar at Jerusalem, the Mosque of Tulun at Cairo, the Mosque of Walid at Damascus, the Masjid al-Haram at Mecca, and the Masjid al-Nabi at Medina.

MOSQUITO (mös-kē'tō), the common name applied to various two-winged insects, belonging to the gnat family. They have a long proboscis that serves to draw subsistence from animals and plants. The proboscis consists of six distinct slender pieces united at the base and protected by a sheathlike labium, capable of puncturing the skin of man and various animals to suck blood. However, the male of the mosquito feeds mostly on plant juices, while the female depends more largely on attacking the different classes of animals and man. Most of the species, of which there are several hundred, have long bodies and legs and, when flying, make a buzzing sound by a rapid motion of the wings. The female fastens the eggs, usually from 200 to 400, by means of a sticky substance to objects in stagnant water and the young are hatched in a few days. They are about half an inch long, when they are known as *wrigglers*, and, after remaining in the larva state about three weeks, pass into the pupa state. In this state they are smaller in size, take no nourishment, and soon after the fully developed mosquito is matured.

The family is divided into six subfamilies called *Anopheles*, *Aedomyia*, *Culex*, *Corethra*, *Megarhinus*, and *Trichoprosoön*. The *Corethra* does not belong to the biting mosquito, having a short proboscis not formed for piercing. The *Culex* is the typical genus and is found practically everywhere. In tropical countries the mosquitoes are of large size, but there are various species in the high latitudes, even in the polar circles. In some of the marshy regions great multitudes of mosquitoes are born in rapid succession and prove a noxious pest, while in temperate zones they appear most abundantly during the rainy seasons of the warmer parts of the year. Peoples advanced in civilized arts protect themselves by excluding the pests from dwellings by means of screens and nets, while savages use smoke as a preventive and in some cases cover the exposed portions of the body with an oil obnoxious to the insect.

The malaria mosquito, or *Anopheles*, has

longer legs and a smaller body than the common species and its wings are characterized by small spots. The bite causes the deposit of a small animalcule or protozoan, which infests the red corpuscles of the blood and enlarges by growth until it occupies the whole corpuscle. Every three days it throws off a new brood of spores. The liberation in different broods takes place at the same time and produces paroxysms of fever and chills, and gradually the red corpuscles of the blood are infested and destroyed. Quinine is recommended as an effective remedy and should be taken when paroxysms begin to affect the patient.

The yellow fever mosquito, or *Stegomyia*, is found only in regions having a warm climate. It is distinguished from the common mosquito by silver stripes on the thorax and abdomen. At present the yellow fever germ is not clearly understood, but it has been quite definitely settled that yellow fever is not a contagion like smallpox, but that its spread is due to mosquitoes. This was demonstrated in Havana in 1900, where Dr. Sternberg, surgeon general of the United States army, undertook some notable experiments, and again in 1905, in the plague-infested centers of New Orleans. In the latter instance it was noticed that Italians who would not consult physicians and scattered among friends in the outlying districts of the city were taken down, but those in the same rooms remained immune to the disease so long as they were protected from bites of mosquitoes.

Prevention of mosquitoes has come to be an important study, and the movement has received much attention by authorities and public-spirited citizens. These insects being bred in stagnant pools of water, it has been recommended that their breeding places should be abolished. This means the hermetical sealing of cesspools, the removal of cans and bottles, the filling of hollows in old trees and stumps, the covering of rainwater barrels by screens, and the drainage of swamps. Recently the State geologist of New Jersey recommended that the swamps near Newark, about 27,000 acres, be drained and filled. Notable improvements were made in Havana, Cuba, by draining stagnant pools. A committee recommended the general use of screens in the homes, and that the skin be anointed with oil of citronella by those who are required to be in swampy regions at night. In 1904 Dr. W. C. Gorgas, assistant surgeon general of the United States army, gave instructions that all mosquito-breeding places in the Panama Canal Zone be drained, and there has been a notable improvement in that the cases of malaria and yellow fever have been reduced. Similar work

is carried on by the Italian government in the black belt of Italy.

MOSQUITO TERRITORY, or *Mosquitia*, a region of Nicaragua, extending along the coast of the Caribbean Sea, formerly a kingdom under British protection. The coast regions are swampy, but the interior is mountainous and has a healthful climate. Stock raising, agriculture, and fishing are the principal industries. The region was discovered by Columbus in 1502 and claimed by Spain as dependent territory until 1660, when the British secured a protectorate, but they ceded it to Nicaragua in 1859, and in 1860 it was formally annexed by treaty to the Nicaraguan Republic. Since 1894 it has constituted the department of Velaya. Bluefields is the capital and chief town. Most of the inhabitants are Negroes and Indians. Population, 1908, 15,650.

MOSSES (mö's'es), an extensive order of flowerless or cryptogamous plants, widely distributed in all regions, but most common in the regions of the Temperate zones where moisture is plentiful. Several thousand species are included in this order of plants, all of which are of small size, the largest rarely exceeding a foot in height. These plants are made up of a stem with distinct leaves and the roots grow out from the different portions of the plant. They are propagated either by spore cases that open by a terminal lid and contain spores unmixed with elaters, or by fusiform bodies containing minute roundish particles. Mosses propagate most abundantly in airy but cool and moist woods, where they appear upon the trunks of trees, on mountain sides, and on the roofs of houses. In high latitudes with a moist climate they flourish on the ground. Bogs are formed by mosses growing in moist places, those found at the surface at present being only a continuation of plant life that has existed many thousands of years, the older portions dying as the new spring into existence. They are of utility in protecting the roots of plants from cold and drought, while some forms supply valuable foods to animals, such as the reindeer, elk, and other species of high latitudes. The name is applied also to other cryptogamous plants, such as Iceland moss, and even to small matted flowering plants. However, the so-called Irish moss is a seaweed.

MOTHS (möths), the name popularly applied to numerous lepidopterous insects. They are distinguished from butterflies in that the antennae taper to a point and do not terminate in a knob. Another marked difference is that they fly during the night or during twilight. They are less brightly colored than butterflies

and when at rest fold their wings flat instead of erect, as do the butterflies. This class of insects includes many species, ranging in size from forms so small as to be scarcely visible up to the *owl moth* of Brazil, which measures fully ten inches from wing to wing. To the moth family belong those insects that in a caterpillar stage feed on plants, fur, and clothes, such as the *carpenter moth* or *borer*, the *plume moth*, the *clothes moth*, the *hop-vine moth*, and the *wheat moth*. Some writers have designated a large number as *millers*, with which they include all the species whose bodies are covered by a dust or powder, like a miller's clothes. Others have confined the moth family to those that subsist on fur and cloth. The only species of utility to man are those known as *silk moths*.

MOTHER-OF-PEARL. See *Pearl*.

MOTMOT (mö't'möt), a genus of birds native to the warmer parts of North and South America, ranging from Mexico to Brazil. Fifteen species have been described, of which only one is seen as far north as the southern part of the United States. They live solitary or in pairs in the deep shades of the forests or gloomy recesses of old buildings, and usually perch with the head drawn between the shoulders. The plumage is very brilliant and the middle pair of feathers of the long tail have a peculiar shape and extend beyond the other tail feathers. The bill is rather long, slightly curved with compressed side. In size these birds resemble a blue jay, but the form is more slender. They move awkwardly on the ground, but fly quite rapidly.

MOUND BIRD, the common name of a bird belonging to a group of fowls that build a mound for a nest, within which the eggs are hatched by the heat generated through the decay of vegetable matter used in constructing the mound. The mounds vary both in size and shape and are commonly used by the same birds from year to year, being increased in size from time to time by the addition of sand and vegetable matter. It is thought that the female assists the young to escape from the mound after being hatched, since they are strong and quite well feathered when they make their appearance. The eggs are from three to four inches long. In most cases the mounds are from a foot to ten feet above the ground. Birds of this class are found in Australia and New Guinea, where they are called *jungle fowl* and *brush turkeys* (q. v.). In size they vary from that of a fowl to a small turkey. The flesh is eaten.

MOUND BUILDERS, the name applied to a prehistoric race of North America, of which remarkable remains have been found in various portions of the continent, especially in the Mis-

Mississippi valley, in the State of Washington, and in the peninsula of Yucatan. Knowledge of the existence of such remains was not attained until some time after permanent settlements were founded and trade with the Indians became established. Students of antiquity have ascribed the origin of the remains commonly found to a more or less civilized class of people who were the ancestors of the American Indians, though some writers think that they are the product of a race of people with superior intellect, but who were later exterminated by climatic conditions or by savage tribes. The remains consist mostly of extensive earthworks, and in many weapons and tools of stone and copper have been found. The methods of construction and many relics indicate that some of the earthworks were for defensive purposes and others for habitations. Others appear to have been used as temples and places of burial. About 200 mounds were excavated between 1844 and 1847 with the view of establishing at least some knowledge of the builders and their degree of civilization. Many excavations were made along the Des Moines River, in Iowa, in 1908 and specimens of the relics, mostly stone products, are preserved in the Iowa Historical Building at Des Moines. The results of these researches were published by the Smithsonian Institution and constitute the most authentic data at present available. It is learned from them that many of the mounds are from 100 feet to several miles in length and from five to 25 feet in height. Several of the larger mounds in the valley of the Ohio are from 60 to 100 feet high.

Many of the works attributed to the mound builders are in the form of rectangles. Some are square, others are circular or polygonal, and still others are in the form of different animals. One of the last named class was discovered in Adams County, Ohio, which had the form of a serpent, with a height of five feet and a length of 1,000 feet. At Newark, Ohio, is a group of mounds that consists of elaborate earthworks in the form of circles, octagons, and squares. It incloses an area of about four square miles. Many mounds have been discovered in the State of Washington, but in British America they are not numerous, and those found in Yucatan give evidence of remarkable age. Writers have divided the mounds into six classes, according to the purpose for which they were constructed, embracing sacred inclosures, sacrificial mounds, defensive mounds, sepulchral mounds, temples, and effigy mounds. The *sacred* inclosures are thought to contain the remains of deified objects. *Sacrificial* mounds give evidence that sacrifices were offered in the

presence of fire on altars, *defensive* mounds seem to indicate fortifications by reason of underground passages, and *sepulchral* mounds were used for the burial of the dead. The *temples* contain relics which indicate certain forms of worship and religious rites. *Effigy* mounds were constructed in the form of animals, such as reptiles, mammals, tortoises, birds, and even man. The skeleton remains indicate that the dead were laid to rest side by side in rows, but the great antiquity of the mounds has made it impossible to find entire bones in a fair state of preservation, a fact that has led antiquarians to attribute the construction of the mounds to about the beginning of the Christian era.

Pottery of fine construction has been discovered in some of the mounds. They have been found to contain lamps, basins, tobacco pipes, rings, copper ornaments, arrow heads, needles of ivory, beads of mica, and copper tools. The remains of this character indicate that the mound builders were not only superior to the American Indians when the continent was discovered by Columbus, but also to the primitive peoples of Europe. The age of many of the mounds is attested by the presence of large trees growing on their sides and tops, and by the fact that none of the Indian traditions in any way relates to the origin of the mounds. A mound found in the Little Miami valley gave evidence, when investigated, that fully 1,200 persons had been buried there, attesting the commonly supported view that the mound builders were numerous. The extent of their defensive embankments in various portions of West Virginia, Wisconsin, Iowa, Washington, and other regions is proof that their enemies were numerous and powerful.

MOUNDSVILLE, a city in West Virginia, county seat of Marshall County, on the Ohio River, ten miles south of Wheeling. It is on the Baltimore and Ohio Railroad and is surrounded by a farming country. The chief buildings include the county courthouse, the public high school, and the State penitentiary. Among the manufactures are glass, brick, boots and shoes, textiles, cigars, and clothing. Near it is a mound about 900 feet in circumference, dating from the mound builders. The place has waterworks, well-graded streets, and a large trade. Population, 1900, 5,362; in 1910, 9,150.

MOUNTAIN, an elevation of earth and rock, rising higher above the surface of the earth than a hill. Such an elevation is usually one of a chain, group, or system, but in some instances they occur singly. Mountains owe their origin to volcanic action, whereby certain regions be-

came elevated and others depressed. However, some systems originated from subterranean movements extending over long periods of time and from the wearing away of a portion of the surface by the action of water. The various systems were formed at different times and their age is determined from the presence of rocks of known age. Mountains are important as they affect the climate, the higher elevations being subject to a lower temperature than regions nearer the level of the sea, thus modifying the temperature. They precipitate rainfall by bringing the moisture of the atmosphere to the dew point and constitute the principal sources of rivers. They are powerful factors in determining the location of towns and forests, contain a large part of the mineral wealth, and form the principal watersheds. The height of mountains is determined most accurately by surveying instruments in which trigonometry supplies the necessary formulae, but it may be calculated by observing the boiling point of water by means of the barometer. The highest mountain of Asia is Mount Everest, 29,002 feet; South America, Aconcagua, 23,910 feet; North America, McKinley, 20,464 feet; Africa, Kilimanjaro, 19,680 feet; Europe, Elbruz, 18,600 feet; Australia, Kosciusko, 7,308 feet.

MOUNTAIN ASH, or **Rowan Tree**, an ornamental tree native to the central part of North America and Europe, including a number of species. It has pinnate leaves, cream-white flowers, and scarlet berries with yellow flesh. The different species abound principally in mountainous districts, where they attain a height of from ten to thirty feet, and bear a wood of value for its compactness and durability. The berries are an attraction for birds as a food. Mountain ash is cultivated extensively in gardens as an ornamental tree and for ornamenting avenues in cities.

MOUNT CARMEL (kär'měl), a borough of Northumberland County, Pennsylvania, 28 miles southeast of Sunbury. It is on the Pennsylvania, the Lehigh Valley, and the Philadelphia and Reading railroads. The surrounding country is a productive anthracite coal region. Among the manufactures are flour, clothing, cigars, brick, lumber products, and machinery. The chief buildings include the public library and the high school. It has a growing trade in merchandise. Population, 1910, 17,532.

MOUNT CLEMENS (klēm'enz), a city in Michigan, county seat of Macomb County, twenty miles northeast of Detroit, on the Clinton River and on the Grand Trunk Railroad. It is surrounded by a fertile agricultural country, has mineral springs of value for invalids, and is the

center of a large trade. Among the buildings are a fine courthouse, the public library, and a number of schools and churches. It has manufactures of cigars, ironware, salt, beet sugar, furniture, machinery, and lumber products. The city has systems of waterworks and sanitary sewerage. It was settled in 1802 and incorporated in 1872. Population, 1910, 7,707.

MOUNT DESERT (dê-zêrt'), an island lying one mile off the coast of Maine, belonging to Hancock County. It is about ten miles wide and fifteen miles long. The area is 100 square miles. The island has a mountainous surface and is noted as a fashionable resort. It contains several fine villages, extensive hotel facilities, and productive fisheries. The three principal harbors are at Northeast, Southwest, and Bar Harbor. Mount Desert was discovered by Champlain, by whom it was named, and the first settlement was made in 1608 by French Jesuits. The English founded the first permanent settlement at Somerville in 1789.

MOUNT HOLYOKE COLLEGE, an institution of learning near South Hadley, Mass., founded in 1837 by Mary Lyon for the higher education of women, to whom collegiate instruction had been refused except at Oberlin. Miss Lyon, a woman of great mental power, force of character, and executive ability, after several years of teaching, persuaded a number of able men to give their influence and aid as trustees, raised the necessary funds, and herself became the principal of this incorporated institution, which gave to young women opportunity for broad training and sound culture. Mount Holyoke was a seminary in name until 1888, when a college charter was granted. One-half the work of the four years is elective, chosen from courses offered by every department, including music and art, in which the practice courses are related to the historical. Mary E. Woolley is president of the faculty, which numbers 85, with 14 assistants and 21 in the administrative force. The attendance is over 700 students, including a few graduate students, and many applicants are refused for lack of room.

The scholarship funds amount to \$138,542, and four fellowships are awarded annually for study in some university. The system of coöperation inaugurated by Mary Lyon, through which each student had a share in the domestic work, is still retained, so that everyone who lives on the campus gives from twenty to fifty minutes a day either in the lighter housework or in laboratory, library, or office. The entire student body is organized into the Students' League for self-government. The college is undenominational, but distinctly Christian in its influence. Among

the 9,000 women who have been students are many who are leaders in educational and religious work in all parts of the world. In 1907 the institution had three buildings of brownstone in late Gothic style, the chapel and administration building, the library and the art building, two buildings containing laboratories and lecture rooms, an observatory, a gymnasium, and other buildings on a campus of 150 acres. The library contains 36,000 volumes with a capacity of over 100,000 and provides for 380 readers. The value of the entire plant is estimated at \$1,022,000 and the general endowment fund amounts to \$801,000. Mount Holyoke receives the benefit of the Carnegie Foundation for the Advancement of Teaching.

MOUNT STERLING, a city of Kentucky, county seat of Montgomery County, 32 miles east of Lexington, on the Chesapeake and Ohio Railroad. The chief buildings include the public library, the high school, the courthouse, and a military school. It has manufactures of flour, cotton and woolen goods, furniture, machinery, and utensils. Electric lighting, waterworks, and a system of public schools are among the utilities. Population, 1900, 3,561.

MOUNT VERNON, the home and burial place of George Washington, in Fairfax County, Virginia, on the Potomac River, about fifteen miles south of Washington. Several thousand acres of land were included in the original estate. Lawrence, the elder brother of George Washington, built the house in 1743 and named it in honor of Admiral Vernon, his commanding officer while serving in the West Indies, and later the estate passed to George Washington. The building is entirely of wood and is two stories and a half high. It is 30 feet wide by 96 feet long, has a high piazza on the east front, facing the Potomac, and near the back part are a number of outbuildings. The building was improved by George Washington and after his death came into possession of John A. Washington. In 1858 the Ladies' Mount Vernon Association purchased the house and 200 acres of land for the purpose of keeping it as a place of public interest. Washington's library and bedroom are still preserved in the form in which he used them. A short distance from the house, near a wooded ravine, is the tomb of Washington. The place is reached from Washington by steamboats and by an electric railway.

MOUNT VERNON, a city in Illinois, county seat of Jefferson County, 75 miles southeast of East Saint Louis. It is on the Wabash, the Southern, the Chicago and Alton, the Louisville and Nashville, and other railroads. Among the noteworthy buildings are the courthouse, the

high school, and many churches. It has manufactures of flour, railway cars, stone products, clothing, machinery, and dairy products. Electric lights, waterworks, and telephones are among the improvements. Mount Vernon was settled in 1819 and incorporated in 1872. Population, 1900, 5,216; in 1910, 8,007.

MOUNT VERNON, a city of Indiana, county seat of Posey County, on the Ohio River, 18 miles west of Evansville. It is on the Louisville and Nashville and the Evansville and Terre Haute railroads. The principal buildings include the public library, the county courthouse, and the high school. It has manufactures of brick, ironware, flour, machinery, and carriages. Bituminous coal is mined in the vicinity. It has waterworks, sewerage, and a large trade in produce. The place was chartered as a city in 1853. Population, 1910, 5,563.

MOUNT VERNON, a city of New York, in Westchester County, on the Bronx River, fifteen miles north of New York City. It is on the New York, New Haven and Hartford and the New York Central railroads. Intercommunication is by a system of electric railways. The place is nicely located along the river and on an arm of Long Island Sound, many of the streets being paved with macadam and asphalt. The surrounding country is fertile, producing cereals, fruits, and live stock. Among the noteworthy buildings are the Carnegie public library, the Mount Vernon Hospital, the Lucas building, and the high school. It has manufactures of pens, jewelry, glue, and machinery. Many New York business men reside here. It has a considerable trade in merchandise. Population, 1900, 20,346; in 1910, 30,919.

MOUNT VERNON, a city in Ohio, county seat of Knox County, on the Kokosing River, 25 miles north of Newark. It is on the Baltimore and Ohio and other railroads. The manufactures include flour, wagons, machinery, engines, furniture, and tobacco products. Among the general facilities are waterworks and sanitary sewerage. The institutions include Mount Vernon Academy and Kenyon College, both of which are near the city. It has Hiawatha Park, a public library, and a fine courthouse. Natural gas is found in the vicinity. Population, 1900, 6,633; in 1910, 9,087.

MOUSE, the popular name of the smaller species of the genus *Mus*, the larger ones being known as rats. Mice are found in all parts of the globe inhabited by man. In many tropical countries they are so abundant as to be extremely destructive in some seasons to the cereal crops, especially in various portions of Australia. The *common mouse* has a dusty-gray color above

and is ashy colored beneath, and the tail is about as long as the body. In autumn it seeks food and shelter in houses and barns. The smallest quadruped known is the *harvest mouse*, which builds a small nest of grass about itself and hibernates during the winter. About 100 species of mice have been described. They include, besides those named above, the *forest mouse*, the *rice mouse* of the Southern States, the *deer mouse*, the *cotton mouse* found in cotton-producing countries, the *wood mouse*, the *field*



FOREST MOUSE.

mouse, and the *water mouse*. The names applied to these species indicate somewhat their habits and the places they frequent. Another familiar species of America, the *jumping mouse*, is closely allied to the *jerboa* (q. v.). The so-called *dormouse* (q. v.) does not belong to the true mouse family.

MOUTH, the first enlargement of the alimentary canal, bounded by the lips in front and the soft palate and arches behind. It is lined by mucous membrane and contains the tongue and teeth. When closed, the cavity is completely filled. Into it open the ducts from three pairs of salivary glands and much mucus is discharged upon its lining surfaces. The *isthmus of the fauces*, bounded by two muscular pillars, between which are the tonsils, connect it with the pharynx. The mouth is of great service in speech as well as in crushing food and mixing it with mucus and saliva.

MOWING MACHINE, an implement for cutting grass by horse power, in which the cutting apparatus is similar to that of the reaping machine. It is smaller and less complicated than the harvester, owing to the fact that it merely cuts the grass, which falls backward over the

sickle bar. The working parts of most mowing machines are quite similar, though there are two general styles, known as the *front* and the *rear* cut. In the former, which is now in general use, the cutting apparatus is toward the front of the machine, making it less dangerous for the driver, who occupies a seat in the rear. See **Harvesting Machinery**.

MOZAMBIQUE (mō-zam-bēk'), or Portuguese East Africa. See **Portuguese East Africa**.

MOZAMBIQUE CHANNEL, an extensive strait between the continent of Africa and Madagascar. It has a width of 425 miles and a length of 1,030, and is noted for its important black whale fisheries. The Comoro Islands lie at the northern extremity of the channel. On its western shore is Mozambique, one of the chief trade centers of Portuguese East Africa.

MUCILAGE (mū'sī-lāg), a solution of the gum of certain plants or some similar substance in water. A preparation of this kind made of gum arabic is much used as a paste. It is prepared by dissolving gum arabic in hot water and adding a small quantity of carbolic acid to check molding. Another form of mucilage is used in making pills and for the diffusion of insoluble substances in water.

MUCUS (mū'kūs), the fluid which moistens the mucous membranes, by which it is secreted. It is a clear, viscid fluid, is slightly alkaline, and consists in great part of epithelial cells. Mucus is more or less mingled with all secretions poured upon mucous membranes, as the saliva, the biliary acids, and other digestive fluids. All the cavities of the body that have external openings are lined with membranes which are covered with mucus, including the nose, mouth, and intestinal canal. The purpose of mucus is to protect the membranes against the action of the food and the air, to keep them in a moist and flexible condition, and to lubricate the canals for the passage of various substances. Disease affects the mucus variously, rendering it acid or mixing it with pus.

MUDFISH, the common name of several species of fishes. They are found in fresh-water bodies, in the lakes and rivers between the Rocky Mountains and the Alleghenies, and in several sections of South America, Africa, and Australia. The American species belong properly to the ganoids. They attain a length of four feet and are favorites for food among the Indians. The mudfishes proper appear to form a connection between fishes and amphibians in that they are able to live for a brief period on land, breathing while out of water by taking in air, which is acted on by the swim bladder as a

lung. While in water they breathe with the gills found in ordinary fishes. The ganoid, or mudfish, of North America frequently comes to the surface and breathes the air in a similar manner, though it more frequently remains under water for long periods of time. Mudfishes generally live on insect and animal food, though they likewise partake of various plants, especially the newer growths. Several species attain to a length of from three to six feet, have flat scales, and during a season of drought locate themselves in the mud, where they retain life in a more or less torpid state for a considerable period.

MUEZZIN (mū-ĕz'zĭn), or **Mueddin**, an officer of a mosque in Mohammedan countries, who calls the faithful to prayer at the five times in the day prescribed by the Koran, namely at dawn, noon, 4 p. m., sunset, and nightfall. The call to prayer is commonly made from the balcony of a minaret. As the minaret is elevated above the roofs and the interior of buildings, the muezzin is usually a blind man, since it is extremely distasteful to the jealous orientals to have any one see the proceedings in their private residences. It is currently reported that many feign to be blind in order to become muezzins to wealthy mosques.

MUGWUMP (mūg'wŭmp), an Algonquin Indian word meaning *Great Man*, applied in American politics to a voter who claims the right to vote with another party than the one with which he is particularly identified. The term was thus used in 1872, when Horace Greeley, though a Republican, was the Liberal-Republican candidate for President. It came into general use in 1884, when many Republicans refused to vote for James G. Blaine for the Presidency, supporting Grover Cleveland, the Democratic nominee, for that office.

MÜHLENBERG COLLEGE, an institution of learning at Allentown, Pa., under the control of the Evangelical Lutheran Church. It is a direct outgrowth of the Allentown Academy founded in 1848, but was not incorporated until 1867, when the first board of trustees for the college was elected. The institution was named in memory of Henry Melchior Mühlberg, the patriarch of the Lutheran church in North America. It maintains classical and scientific courses, leading respectively to the degrees of A. B. and B. S., and supplies the needs of business men who want a course without the classical languages. The grounds consist of 55 acres, on which are located the administration building, the dormitory, the chemical laboratory, and other buildings. The value of the property is \$300,000, the endowment is \$253,500, and the

library contains about 20,000 volumes. It has 642 graduates and has given instruction to over 2,500 students. With it is affiliated the department known as the Allentown Preparatory School.

MÜHLHAUSEN (mül-hou'zēn), a city of Germany, in the province of Saxony, thirty miles northwest of Erfurt. It is located on the Unstrutt River and several railways and is surrounded by a fertile region. The chief buildings include a normal school for teachers, a gymnasium, a theater, and several public schools. It has manufactures of carpets, machinery, and woolen and linen goods. The trade is chiefly in grain, cattle, and fruit. Electric lighting, waterworks, and stone and asphalt paving are among the improvements. The city has been a part of Prussia since 1815. Population, 1905, 34,359.

MUIR GLACIER, an extensive glacier of Alaska, at the head of Glacier Bay, about 100 miles northwest of Juneau. It is so named from its discoverer, John Muir. The length of this glacier is about 15 miles, having its source fully 1,000 feet above sea level, and varies in altitude from 80 to 210 feet. At its entrance into Glacier Bay it is nearly three miles wide, where great icebergs fall from overhanging cliffs into the sea. The area covered by the glacier is 350 square miles in extent, but the basin drained by it is probably equal to 800 square miles.

MUKDEN (mōōk-dēn'), or **Moukden**, a city and the seat of government of Manchuria, situated 110 miles northeast of the Liao-tung Gulf. Formerly trade was carried chiefly from Niu-chwang, its port, but since the completion of the Port Arthur-Harbin branch of the Trans-Siberian Railway it has increased greatly in commercial importance. A brick wall surrounds the city, which is regularly platted and solidly built, and in the central part are the imperial palace and other public structures. The tombs of the present reigning family of China are near Mukden. It suffered greatly during the Boxer uprising in 1900 and was the seat of the great Battle of Mukden in 1905, in which 860,000 men were engaged. The Japanese under Marshal Oyama numbered 450,000 and General Kuropatkin commanded the Russian army of 410,000. The battle continued about two weeks, resulting in the defeat of the Russians with a loss of 100,000 men, while the Japanese lost about 75,000. The inhabitants consist mostly of Manchus, but include many Chinese and Japanese. Population, 1908, 178,450.

MULATTO (mū-lăt'tō). See **Negroes**.

MULBERRY (mül'bēr-rÿ), a genus of trees native to tropical and temperate climates, culti-



THE MUIR GLACIER, ALASKA, AT AN ELEVATION OF 1,800 FEET.



vated on account of their fruit. The *common* or *black mulberry* is the only species that possesses fruit of considerable value. It is a native of Central Asia, whence it was brought to Europe more than ten centuries ago. The tree has many branches. It is low, the leaves are heart-shaped and very rough, and the bark is

lieu of the word *hybrid*, but it is applied more specially to the mule proper, the cross between a male ass with a mare, and to the *hinny*, the offspring of a she-ass and a stallion. The mule matures at a later period than the horse. It is of service for a longer period and as a beast of burden has some points of advantage not possessed by the horse. Among



PAPER MULBERRY.

BLACK MULBERRY.

thick and uneven. This species thrives in America in regions south of 43° north latitude. Its fruit is eaten and is used in the manufacture of wine and preserves. The berries are of a purple-black color, yield a dark red juice, and are quite sweet to the taste. This class of mulberry trees grows vigorously for many years in suitable climates, many specimens in Europe being over 350 years old and still yielding an abundance of fruit. The leaves are regarded the most wholesome food for silkworms, on account of which the tree is cultivated extensively in various portions of Asia, Southern Europe, and the United States. Its bark yields a product useful in the manufacture of paper. The principal species of the mulberry in North America is the so-called *red mulberry*, which thrives abundantly in the central portion of the Mississippi valley, especially in southern Illinois, southern Iowa, Missouri, Kentucky, and adjacent states. Mulberry trees of this class grow to a height of from forty to sixty feet. They yield a durable wood. The fruit is fairly pleasant, but generally quite seedy. A distinct genus of trees bearing this name is the *paper mulberry*, which is native to Japan and the East Indies. It attains a height of from five to fifteen feet and is serviceable in the manufacture of clothing and paper. Its wood is useful in cabinet and ornamental work.

MULE, a name sometimes used loosely in

Among the advantages are that its skin is less sensitive, it is more easily fed, is less liable to disease, and is almost as sure-footed as a goat. When treated kindly it is gentle and even in warfare is thought to possess advantages over the horse in some respects. The head of a mule is thin and long, the ears are prominent, the tail is bushy, the mane is short, and the hoof is quite small. It is a favorite animal in many of the Southern States and is employed extensively in the Spanish-American states, Southern Europe, Western Asia, and many parts of Africa. In size

it usually represents the average between the sire and dam, weighing from 700 to 1,200 pounds.

MÜLHAUSEN (mül-hou'zen), a city of Germany, in Alsace-Lorraine, on the Ill and on the Rhine-Rhone Canal, 66 miles southwest of Strassburg. It is surrounded by a fertile region, is well connected by several important railroads, and has an active commercial trade. The manufactures include woolen and silk goods, clothing, carpets, leather, machinery, calico, chemicals, hardware, and musical instruments. It has a system of street railways, electric lighting, stone and macadam pavements, fine schools, and several hospitals and institutions of higher learning. Mühlhausen dates from the early part of the 8th century. It became a free imperial city in 1273. During the Reformation it was an important center of Protestant influence. In 1798 it became a part of France, but after the War of 1870-71 it was annexed to the German Empire. Population, 1905, 94,498.

MULLEIN (mül'lin), a tall weed of the figwort family, having a stout stem covered with a dense woolly growth and bearing club-shaped spikes of yellow flowers. Many species have been described, some of which yield medical properties of service in the treatment of coughs and colds. The most common species were brought to America from Europe, where, in some sections, they are obnoxious weeds. In

early times the Greeks used the leaves in making wicks for lamps, while the Romans made torches by saturating the stalks with suet. It is at present most common in the older parts of Canada and the United States, but has spread quite generally in the populated regions of the central and western sections.

MULLET (mŭl'let), the popular name of a class of fishes. They include many well-known species and generally are divided into two groups, the *gray mullets* and the *red mullets*. The different species, about 75, are found abundantly along the coasts and in bays and seas. The species belonging to the red mullets are ground feeders, but are sometimes classed as *surmulletts*. In the winter time they retire into deep water, but in summer approach the coast, and are most commonly observed in brackish water. They are brilliantly colored, attain a weight of ten or twelve pounds, and are considered good as food fish. The group of gray mullets is distributed quite generally in the Mediterranean, on the seacoasts of Europe, and in the warmer seas of America. The upper part is greenish in color, while the sides are more or less silvery. Several species of this group are cultivated extensively in countries adjacent to the Mediterranean, where they attain a weight of from ten to fifteen pounds and are considered favorites for food. The *striped mullet* is the best known species of America, occurring largely on the Atlantic coast south of New York and being especially abundant in the vicinity of the Bahama Islands. Large quantities are placed on the market early in autumn, at which season the mullet is esteemed especially for the table. Several species of surmulletts present a peculiar appearance when the scales are rubbed off, as underneath them is a beautiful variety of bright red and purple tints.

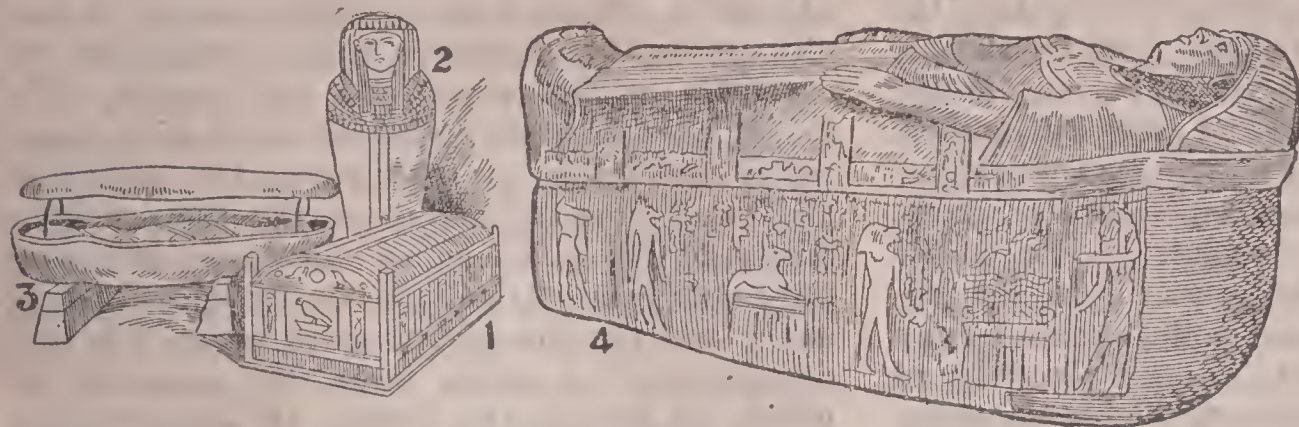
MUMMY (mŭm'my), the embalmed and dried body of a human being. The term is applied to similarly preserved bodies of the so-called sacred animals of various peoples, as of the ibis, cat, crocodile, and ichneumon. Extensive researches have led to the belief that mummies were prepared by the ancients because they thought that the soul of the dead, who departed from this life in a justified state, in due course of time would become reunited with the body and enjoy an everlasting and visible existence. The time between death on earth and the period for taking on everlasting life was thought to cover a space of from 3,000 to 10,000 years, and in this period the intelligence existed as a luminous wanderer through space, while a probationary pilgrimage was performed by the soul in the mysterious underworld.

Some writers think that the preparation of mummies was influenced at least partially by a desire to guard against disease. The legendary story relating that the body of the god Osiris had been destroyed by Typhun, but that it was later discovered by Isis and embalmed under the direction of Anubis, is popularly thought the basis that caused mummification to be established as a religious rite. Many classes of mummies have been found in Egypt, the larger number consisting of human bodies, but there were included many specimens of sacred animals. It is thought that the practice dates from about 4000 B. C., many of the specimens indicating that early date as the probable time of the beginning of the art.

It is certain that the children of Israel learned the art of embalming in Egypt, since it is related that the bodies of Jacob and Joseph were treated in that manner and carried from Egypt. The art of mummification was highly developed among the Assyrians, Persians, Hebrews, Romans, and Peruvians, though these peoples were not able to prepare mummies that as successfully overcame the influences of time as those of the Egyptians. Many fine specimens of embalming at a remote period have been discovered in Peru and Mexico. The Guanchoes of the Canary Islands developed skill in embalming almost as remarkable as that of the Egyptians. It is thought that the practice ceased in Egypt about the year 700 A. D. and that fully 750,000,000 bodies were embalmed while the practice prevailed in that country. Fine specimens have been found at various times, the most important of recent date being thirty embalmed bodies of distinguished personages, including the body of Rameses II., which was brought to light in 1881 at Deir-el-Bahari. The dryness of the air in some countries has a favorable influence upon mummification. In many localities the bodies of men and animals have been found that were mummified as a natural consequence of climatic conditions.

Various methods have been employed by different peoples in the preparation of mummies. The method usually depended upon the state of civilization and the ability of surviving friends to defray the expense incurred. Among the poorer classes the bodies were dried by salt or natron, or left entirely covered with salt for seventy days, after which they were inclosed by wrappings of coarse cloth and placed in the catacombs. The most complicated operations were employed in embalming the bodies of the rich and distinguished. In the common method it was required that the entrails be removed through an opening in the side, though the heart

and kidneys were left within the body, and the brain was taken out through the nostrils. The body was carefully shaved, washed, and soon after brought in contact with the necessary salts



MUMMY.

1, Coffin; 2, Mummy; 3, Inner Case; 4, Sarcophagus.

and spices, the process depending largely upon the ability to pay the expense. Powerful drugs were used in effecting passage into the various cavities of the skull and different portions of the body, while in some cases the nails were gilded and the toes and fingers were incased in costly inclosures of gold.

After all necessary rites and chemical treatments were completed, the bodies were carefully wrapped with bandages of linen. These bandages were extremely coarse for the poorer classes, while the finest India muslin was used for the wealthy. The strips were from two to four inches wide, and from 700 to 1,250 yards long. After the toes and fingers were carefully wrapped, the limbs were similarly inclosed, and finally a firm wrapping was made around the entire body, in many cases from fifteen to twenty thicknesses being utilized. The face was the object of especial care and was treated with a coat of fine plaster and various costly chemicals. It is thought that embalmers of cities often had from 500 to 800 corpses in their mortuaries, since it required considerable time to complete the entire process. The cost of high-class embalming was from \$500 to \$4,500 per corpse, depending entirely upon the value of the chemicals, perfume, and ornaments used. Usually the rich were provided with mummy cases, the more expensive consisting of three parts, the sarcophagus or coffin, the outer mummy case, and an inner case to contain the mummy. The outer case of the wealthy was prepared in a manner to show an outline of the person embalmed, and was richly decorated and painted with durable coloring with the view of constituting a fine representation of the individual. Embalming is now practiced by passing preservatives, such as corrosive sublimate, chloride of zinc, arsenic, and various oils, into the body. See **Embalming**.

MUMPS, a specific inflammation and swelling of the parotid and salivary glands. It is a contagious disease, sometimes epidemic, but generally is communicated by the saliva. The disease occurs principally in cold and damp weather of spring and autumn. It is most common among children and is more frequent in boys than girls. With good care it is unaccompanied by danger and seldom affects the same person twice, but when a relapse is taken the

swelling and pain are communicated in females to the mammae, and in males to the testes. Careful attention and remaining indoors soon cause the inflammation to cease, but, if care is not taken, life may be endangered by transferring the inflammation to the brain.

MUNCIE (mŭn'si), a city in Indiana, county seat of Delaware County, on the White River, 55 miles northeast of Indianapolis. It is on the Lake Erie and Western, the Chicago, Cincinnati and Louisville, the Cleveland, Cincinnati, Chicago and Saint Louis, and other railroads. Intercommunication is by electric railways and by a belt line that encircles the city. The noteworthy buildings include the county courthouse, the public library, the city hospital, the Federal building, and the Palmer University. Among the manufactures are flour, glass, farming implements, machinery, cigars, and earthenware. In the surrounding country are productive deposits of natural gas and oil. The municipality maintains systems of paving, waterworks, and sanitary sewerage. It has a large trade in grain, stock, and various articles of manufacture. Population, 1900, 20,942; in 1910, 24,005.

MUNICH (mŭ'nĭk), a city of Germany, capital of the kingdom of Bavaria, on the Isar River, 295 miles south of Leipsic. It occupies a fine site on an extensive plateau, about 1,690 feet above sea level, is connected by a number of important railroads, and is one of the most progressive commercial and manufacturing centers of the German Empire. It has electric street railways, fine public promenades, botanic gardens, and a thoroughly organized system of public schools. The municipal facilities are entirely modern and the streets are wide and clean, but in the old part are a number of quaint buildings of irregular construction. King Ludwig I. devoted much care to the general improvement of the city, adorning it with a splendid royal pal-

ace and many municipal facilities. The noteworthy buildings include the Museum of Bavaria, the royal and national library, the municipal theater, the Ludwigskirche, the Basilica of Saint Boniface, the post office, the city hall, the art building, and the central railway station. Many fine paintings and sculptures are in the museum known as the Old and New Pinakothek. It has a large number of monuments representing various German statesmen, military heroes, reformers, and historic events. The public school system is maintained on a liberal and efficient basis. It has several colleges, academies, hospitals, and seminaries. The University of Munich, a noted institution of higher learning, was opened for instruction in 1472 and was incorporated with the city in 1826. It has a fine system of courses, 180 professors and teachers, 4,500 students, and a library of 425,000 volumes.

Munich has a foremost position as a commercial and an industrial center. The wholesaling and jobbing trade is very extensive. Large interests are vested in the enterprise of exporting merchandise, especially metal products and spirituous liquors. Among the manufactures are scientific instruments, jewelry, gold and silver lace, musical instruments, carriages, glass, spirituous liquors, cottons, woolen and silk goods, machinery, engines, and hardware. The city was named from the monks that owned its site. Its history extends back to 962, when it was founded by Henry, Duke of Saxony. In 1157 Henry the Lion made it the seat of a mint and salt exchange, and in the 13th century it was strongly fortified. Gustavus Adolphus conquered it in 1632. In 1800 Munich was subdued by the French under Moreau, and in 1805 it was taken by Napoleon. The population consists largely of Catholics, but includes many Protestants and Jews. The importance of Munich dates from the early part of the last century, when most of its larger manufacturing establishments were founded, and later its trade developed by the building of railroad connections. Population, 1905, 538,983.

MUNICIPAL GOVERNMENT, the administration of a minor civil division, such as a borough, village, town, or city. In most cases a municipality is chartered by the State or the Province, hence the legal designation differs somewhat, being confined to the terms town and city in most cases, which are usually divided into classes, as a city of the first or the second class, depending upon the population. The government of a municipality is subject to the general law of the State or Province in which it is located.

The three functions of general government are recognized in a municipality. Executive authority is vested in a mayor, who is the presiding officer of the common council, or board of aldermen. In the large cities the mayor is usually assisted by executive boards, which are responsible to the mayor and the council. The mayor has large appointive power in most cases, either appointing or nominating the policemen and other officers, and is usually the presiding officer of the police court. In some instances the council consists of two houses, known as the upper and the lower, but more frequently it is composed of a single body, the members of which, as well as the mayor, are chosen for a term of years by the people. Many cities are now governed by a commission of five or more members, one of whom discharges the functions of a mayor.

The government of a municipality is an important factor in the general affairs of the country. Among the functions are to control charities and corrections, to protect life and property, to promote public improvements, and to manage or supervise public utilities, such as lighting, sewerage, transportation, communication, and waterworks. The council has power to levy taxes, grant licenses, issue bonds under certain limitations, equalize assessments, and carry out the specific instructions of the electors. The larger development of manufacturing and other industries has tended to concentrate the population in the cities. This circumstance and the general growth of the larger municipalities within the last two decades have made the problem of municipal governments one of vast importance in all the countries of America and Europe.

MUNICIPAL OWNERSHIP, the possession of public facilities by municipalities or any minor civil division of the state. In practice the term is used in describing public ownership as opposed to private ownership of all municipal facilities, such as lighting plants, waterworks, bath and lodging houses, street railways, and other industries promoted to supply the wants of the people in towns and cities. When used in this sense, the term implies operation as well as ownership by municipalities.

The problem of public control and ownership is not a new one, since cities as well as nations from remote antiquity have undertaken to construct and maintain improvements designed to promote industries of different kinds. This is exemplified in the construction of aqueducts to supply cities with water in the early periods of Rome. We have many instances in early history where revenues were derived by the public

control and ownership of docks, improvement of harbors, and construction of bath houses. However, the services of this kind were anciently confined to larger cities, such as Alexandria, Athens, Rome, and Constantinople, and, on the other hand, the smaller towns were not supplied with facilities, or had only a few of minor importance under control of the municipalities. Much development in this line took place in the 19th century, both in Europe and America, and at the beginning of the 20th century there is a growing sentiment in favor of municipal control and ownership of public utilities.

The extent to which municipal governments should adopt the policy of public ownership is still a matter of wide discussion. On the one hand is a large element who favor the so-called *municipal socialism*, which would provide for all the wants of citizens so far as they can be met, including the management of bath houses, boarding houses, bakeries, and general supply stations. This phase is termed *municipal trading* in Great Britain, where many wants are supplied by municipalities that were formerly provided for by owners of private enterprises. In the United States and Canada municipal ownership extends principally to waterworks, sewerage, electric and gas lighting, telephones, ferries, street railways, and central heating plants. Those who favored the proposition that public facilities should be controlled by municipalities claim for their position that municipal ownership operates to render more efficient the service as well as to provide prolific sources to obtain revenue. In support of their view they cite public control of schools and government management of the postal system, both of which are referred to as more efficient under the present status than they could possibly be made if they were controlled by private ownership. In opposition to public ownership the argument is made that it restricts competition and tends to discourage development. Those who hold to this view call attention to the development of mining and to railroad building in America, which have enhanced enterprises and developed new regions and new industries. There is a growing sentiment in favor of controlling at least all services that are sanitary in character, such as sewerage and waterworks. In 1908 thirty out of a total of 38 cities in the United States with a population of 100,000 both controlled and owned their waterworks, and in the same year about 85 per cent. of the municipalities in Canada controlled their waterworks under municipal ownership.

The control and ownership of sewerage is almost exclusively in municipalities, both for drainage and household wastes. Out of a total

of 1,524 places with a population of 3,000, in the United States, 1,096 are supplied with sewers and in only 47 instances the ownership is vested in private parties. On the other hand, municipal ownership of gas works is quite limited, there being only 21 municipal works in a total of 981 towns in the United States, and two of these supply natural gas. The first municipal electric lighting plant was established at Fairfield, Iowa, in 1882. Since then ownership by municipalities has increased rapidly, not only in the smaller places where private capital was not available, but also in the larger cities where private plants already existed. The official report for 1908 published by the Department of Commerce and Labor gave the total number of central electric stations at 3,620, of which number 2,805 were private stations and 815 were municipal stations. A few of the municipal lighting plants, like those in Detroit and Chicago, are exclusively for lighting streets and public buildings, but a majority supply these wants and also furnish light to private consumers at a rate ranging a trifle above the cost of production and invariably lower than the charges made by private companies.

The question of municipal ownership has been made an issue in the elections of many cities. It has been before the voters of Chicago in several campaigns, particularly in 1904, when Edward F. Dunne (born in 1853), who may be regarded a representative advocate of the doctrine that public facilities should be owned and controlled by the municipality, was elected mayor on a platform favorable to the immediate municipal ownership of street railways and other public facilities. In 1905 William R. Hearst was a candidate for mayor of New York City on a ticket pledged to municipal ownership and claimed the election, but his claims were set aside by the board that heard the contest and George B. McClellan, the Democratic nominee, was seated. Recent city elections indicate that this issue and the matter of making municipal elections nonpartisan are two prominent movements in America. The United Cities Conference, in session in Chicago in January, 1906, in which sixteen leading cities were represented, made the following recommendations favorable to the elimination of party politics from municipal elections:



EDWARD F. DUNNE.

1. That cities should be granted the largest possible measure of home rule, subject only to such general statutory safeguards and restrictions as may be necessary to protect the general interests of the state as distinguished from the local interests of the municipality.

2. That the party column on the ballot should be abolished, that the names of candidates for a single office should be printed on the ballot under the designation of that office, and that it should be made impossible to vote a straight party ticket by a single mark or cross.

3. That municipal nominations and elections should be completely separated from state and national nominations and elections, and should occur at different times, and that nominations for all municipal offices be made by petition or by an efficient method of direct primaries.

4. That the number of elective municipal officers should be reduced as far as practicable, always preserving the right to elect members of the municipal legislative body or city council.

5. That the merit principle should be applied to all departments of city administration under practical and efficient civil service laws.

MUNSEE, a tribe of the Delaware Indians, formerly occupying the region along the Delaware River. They were warlike and wise in the councils of their tribe. In 1740 they removed from the Delaware and settled on the Susquehanna, and later became widely scattered in Canada and the United States. A small number of these Indians now reside in Ontario, Canada, and others are resident in Kansas and Wisconsin. Many of these Indians have given up tribal relations and are well advanced in educational arts.

MÜNSTER (mün'stēr), a city of Germany, capital of the province of Westphalia, at the confluence of the Aa River with the Münster Canal, 76 miles northeast of Cologne. It is connected with other cities by a number of railroads, has well-improved streets, and electric lights and street railways. Münster is noted for its fine churches and educational institutions. Among the principal buildings are the Church of Saint Lambert, the Church of Our Lady, the Cathedral of Münster, the city hall, the post office, the public library, and the central railway station. Münster is the seat of a fine university with a natural history museum, a rare art collection, and a library of 115,000 volumes. It has a number of seminaries, academies, and teachers' training schools. Among the manufactures are woolen and silk goods, sugar, thread, leather, starch, carriages, clothing, and machinery. It has several large canning and meat-packing establishments. The city dates from the time of

Charles the Great. In 1535 it was the scene of disturbances by the Anabaptists. It was besieged a number of times in the Seven Years' War. The government was secularized in 1803, and soon after it passed into possession of France, but since the fall of Napoleon it has been a part of the German Empire. Population, 1905, 81,468.

MURADABAD (mōō-rūd-à-bād'), or **Mo-radabad**, a city of British India, capital of a district of the same name, fifty miles northwest of Bareilly. It is located on the Ramganga River, has railroad facilities, and is surrounded by a fertile region. The chief buildings include two mosques, several government houses, and an American Methodist mission church. The manufactures include cotton goods, clothing, and metal ware. It has electric lighting, waterworks, and a telephone system. The place was founded in 1625 by Rustam Khan. Population, 1906, 76,382.

MURCIA (mûr'shī-à), a city of Spain, capital of a province of the same name, on the Segura River, thirty miles northwest of Cartagena. It is surrounded by a rich and productive region, is well watered, and contains direct railroad connection with the Mediterranean Sea. The streets are clean but narrow, the houses are gaudily painted, and it has a number of modern facilities. Splendid gardens of orange, fig, mulberry, and palm trees surround the city. The principal buildings include the bishop's palace and the cathedral, the latter being a fine representative of Corinthian and Composite architecture. It was founded in 1353. Among the manufactures are linens, silk and woolen goods, carpets, oil, leather, cordage, baskets, ironware, glass, gunpowder, machinery, and musical instruments. Murcia was formerly the capital of the ancient kingdom of Murcia. For many years it was in the possession of the Moors. In 1263 it was conquered by Alfonso X. The city has an important trade in merchandise. Population, 1906, 113,693.

MURDER, the act of killing a human being with premeditated malice. It is criminal in case the person committing the act is sound in mind and discretion, but if the act is justifiable or excusable no penalty attaches under the law. Criminal homicide is classed as murder in the *first degree*, murder in the *second degree*, or *manslaughter*. In some countries manslaughter is termed either as *involuntary* or as *voluntary*, the former being due to accident and the latter to malice aforethought. The penalty for murder in the first degree is usually death or life imprisonment, while murder in the second degree and manslaughter are punished by imprisonment

for a term of years, depending upon the circumstances under which the act was committed.

MURFREESBORO (mûr'frês-bûr-ô), a city of Tennessee, county seat of Rutherford County, 31 miles southeast of Nashville, on the Nashville, Chattanooga and Saint Louis Railroad. The principal buildings include the county courthouse, the Mooney School, and the Soule Female College. It has manufactures of leather, flour, tobacco, utensils, and machinery. The place was first settled in 1811 and incorporated in 1817. From 1819 until 1825 it was the capital of the State. It was the scene of several engagements in the Civil War, the most important one being known as the Battle of Murfreesboro, which occurred Dec. 31, 1862, and Jan. 1 and 2, 1863. The Federals were commanded by General Rosecrans, whose army consisted of 43,000 men, and the Confederates, numbering 62,000 men, were under command of General Bragg. The Confederates were concentrated near Murfreesboro, on the Stone River, while General Rosecrans advanced from Nashville to surprise the enemy. In the contest of three days the Confederates were forced to retire. The Union side lost 13,000 men and the Confederate lost 10,000. A fine national cemetery with 6,150 graves is near the city. Population, 3,999; in 1910, 4,679.

MURPHYSBORO (mûr'fiz-bûr-ô), a city in Illinois, county seat of Jackson County, on the Big Muddy River, fifty miles north of Cairo. It is on the Illinois Central, the Saint Louis Valley, and the Mobile and Ohio railroads. The surrounding country is fertile and has deposits of coal and building stone. Among the manufactures are flour, cigars, earthenware, brick, and clothing. Electric lights, waterworks, the high school, and the county courthouse are among the noteworthy features. It has a large trade in farm produce. Population, 1900, 6,463; in 1910, 7,485.

MURRAY (mûr'ri), the principal river of Australia. It rises in the Australian Alps, near the boundary between Victoria and New South Wales, and flows in a general course toward the northwest nearly to the boundary line of South Australia. Thence it has a course toward the west and south until it flows into Encounter Bay, through Lake Alexandria. The total length of the river is 1,125 miles, the basin includes 270,000 square miles, and it is navigable for a distance of about 175 miles, though large steamers are prevented from entering the stream because of sand bars at its mouth. It overflows the lower valley periodically, causing a large scope of country to become enriched by the inundations. Its principal tributaries include the

Darling and Murrumbidgee, both large rivers. Through the latter it receives the waters from the Lachlan.

MURRUMBIDGEE (mûr-ûm-bîd'jê), a river of Australia, rises in the Blue Mountains and flows into the Murray. The length is 1,350 miles, of which about 500 miles are navigable during the wet season. It is situated wholly in New South Wales, has a general westward course, and receives the Lachlan as its principal tributary. The valley of the Murrumbidgee is productive.

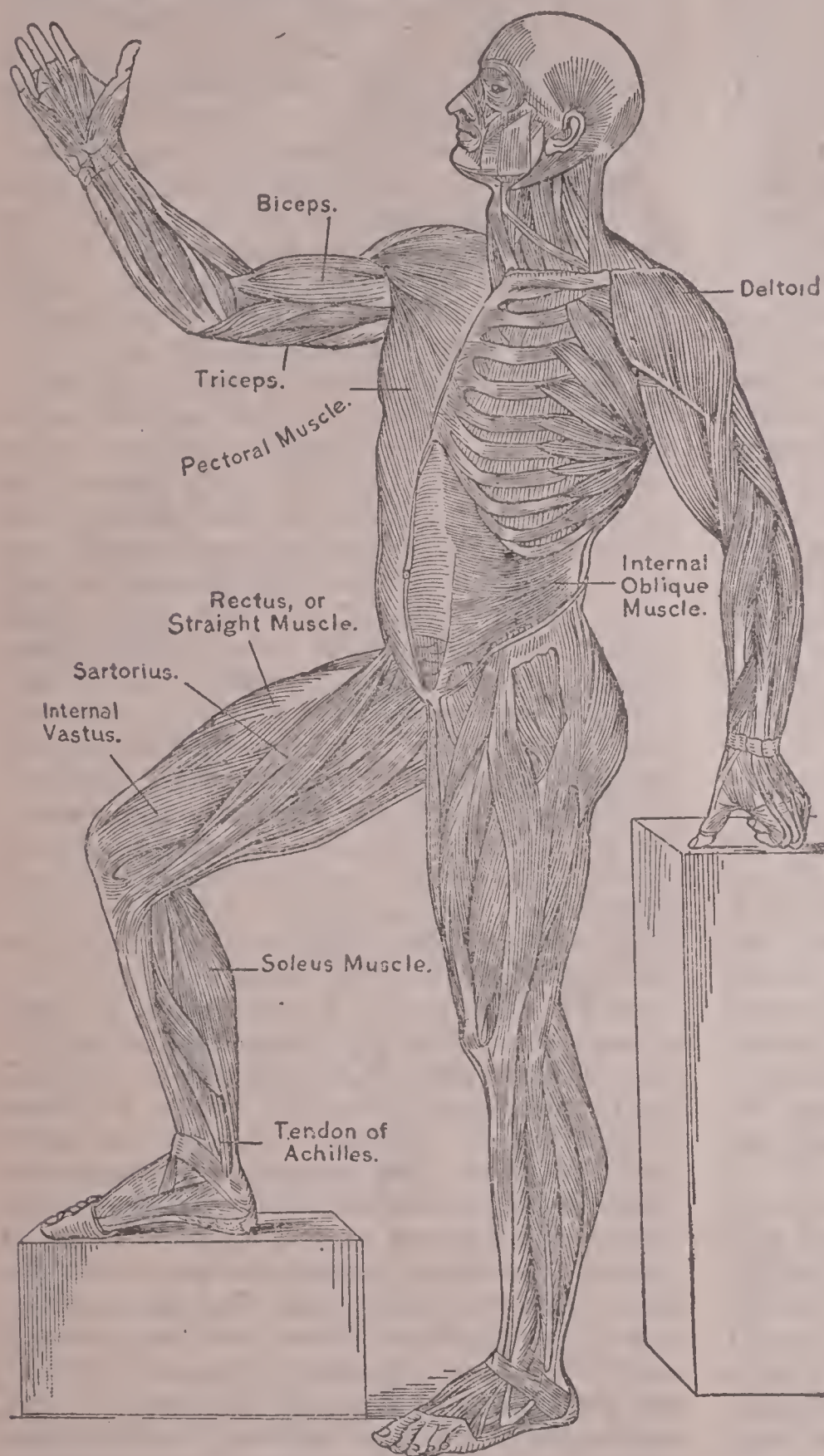
MUSCAT (mûs-kât'), or **Maskat**, the capital and principal seaport of the sultanate of Oman, or Muscat, on the Arabian coast of the Indian Ocean. It is situated in a rocky region, having cliffs about 450 feet high in its vicinity. The rocky heights are defended by forts, while the intervening spaces are protected by walls. The streets are narrow and the summer season gives the city an extremely hot climate, but its situation near the Gulf of Oman and on the route to the Persian Gulf and the Euphrates and Tigris rivers makes it an important commercial point. It has a vast trade in dyestuffs, coffee, pearls, sugar, fabrics, drugs, rice, horses, fish, utensils and tropical fruits. The city dates from remote antiquity, but its prosperity began with Portuguese occupation in 1508, when it was made a flourishing trade center for the products of Northeastern Africa, Western Asia, and the East Indies. After the Portuguese occupied it for 150 years, it passed to the Iman rulers, a class of native princes, who extended their dominion over Eastern Africa and large tracts of Western Asia. At present it forms a part of Arabia. Population, 1908, 42,500.

MUSCATINE (mûs-kâ-tên'), a city in Iowa, county seat of Muscatine County, on the Mississippi River, 25 miles below Davenport. It is on the Chicago, Rock Island and Pacific, the Iowa Central, and the Chicago, Milwaukee and Saint Paul railroads. The noteworthy buildings include the high school, the county courthouse, the Musser Library, and many churches. It has a soldiers' monument, a high bridge across the river, and a fine public park. The manufactures include pearl buttons, cigars, carriages, harness, marble and lumber products, ironware, machinery, pickled goods, flour, and earthenware. The surrounding country is fertile and is noted for the production of melons, fruits, sweet potatoes, and garden produce. It has an extensive trade in lumber and merchandise. The place was settled in 1833 and incorporated in 1839. Population, 1905, 15,087; in 1910, 16,178.

MUSCLE (mûs'1), an organ composed of contractile fibers, through the contraction of which bodily movement is effected. Muscles

constitute the flesh or meaty portion of the body, in which the framework is hidden, and, besides producing the varied movements, they give form and symmetry to the body. They vary in size from the large exterior muscles to the delicate ones hidden deeply within the body, many being

and fro. This is illustrated by grasping the arm tightly just above the elbow joint and then bending the forearm upward, when it is noticed that the muscles on the inside, called *biceps*, become prominent and hard, while the *triceps* on the outside are relaxed. Muscles on one side of the face draw the mouth in that direction when those on the other side become palsied, while squinting is caused by one of the straight muscles of the eye contracting more strongly than its antagonist.



PRINCIPAL MUSCLES IN THE FRONT PART OF THE BODY.

so small that they cannot be seen with the naked eye. The total number of muscles in the human body is estimated at about 500, most of which are arranged in pairs, each with its antagonist, so that they contract and expand alternately, and thus effect motion by moving the bone to

By close examination of ordinary muscular structure it is easily noticeable that muscles are made up of fibers, the fibrous arrangement being systematic and regular in the direction of the course in which the muscle is to contract or act. A microscopic examination reveals two classes of muscles, the striped and the unstriped. The *striped* muscles are called *voluntary*, because they are under the control of the will, and by means of them the limbs stiffen or relax as a person chooses. The *unstriped* are *involuntary* muscles and are not under control of the will, such as constitute or control the blood vessels, the intestinal canal, and the heart, though the muscles of the last named organ are classed with the striped. Striped muscular fiber consists of fine long filaments, which break up into smaller fibrillae. The fibrillae are made up of fine disclike bodies, called *sarcotic elements*, and the fibers are surrounded by a delicate, transparent, sheathlike tissue, called *sarcolemma*. Unstriped muscular fiber appears as long cells that are pointed at both ends, containing granules and nuclei. The fibers are flat, arranged in the form of bundles, and contract more slowly than the voluntary muscular fiber.

The contractile tissue of the heart differs from the ordinary striped muscular fibers, which make up the great muscles of the body, in that they have long cross-bands instead of fine ones, and alternate dim and bright cross-bands pass through the whole thickness of the fiber. Another difference is found in the fact that no sarcolemma is present. The common name applied to the muscles of the heart and similar contractile tissues is *cardiac*. Another distinguishing characteristic in muscular action is that causing the movement of

the hairlike processes, or cilia, which are found upon certain surfaces of the body. The cilia bend their ends in a given direction and recover slowly, thus causing the fluids resting upon their surfaces to move in definite currents. Ciliary motion probably is due to changes going on in the protoplasm of the cell body. Cilia found in the air passages assist in the respiratory changes, causing movements in the smaller air passages of the lungs.

Muscles are usually attached with firmness to two or more points to be acted upon. The point remaining stationary is called the *origin*, and the point yielding to muscular contraction is designated the point of *insertion*. Some muscles are attached to bones at both ends and take their origin from either extremity, while in some cases one extremity ends with attachment to soft parts, in which case the action is to draw the attached portions toward the bone. In nearly all cases where the two ends are attached to bone surface the muscles furnish power to operate levers of any of the three classes. We have an illustration of the *first class* of levers in the movement of the head. The back or front of the head is the weight to be lifted, the backbone is the fulcrum on which the lever turns, and the muscles at the back or front of the neck are the powers by which we toss or bow the head. The *second class* of levers is illustrated when we raise the body on tiptoe. In that case the fulcrum is formed by the toes resting on the ground, the muscle of the calf of the leg acting through the tendon of the heel is the power, and the weight is borne by the ankle joint. The *third class* of levers is illustrated by lifting the hand from the elbow, when the hand is the weight, the elbow forms the fulcrum, and the power is supplied by the biceps muscle at its attachment to the radius.

- In muscles illustrating any one of the three classes it is necessary that there be a joint intervening between the origin and insertion of these muscles, and the ease with which the work is done depends upon the nearness of the power to the weight or resistance. In the hand there is a marked loss of force from its being applied at a long distance from the weight, but there is a gain of velocity, since the hand moves a long distance by a slight contraction of the muscle. On the other hand, in the lower jaw the jaw itself is the weight, the hinge joint at the back is the fulcrum, and the muscles on each side form the power, and, since the muscular action is much closer to the resistance, there is a great force, but a much smaller speed. The muscles are attached to the bones by strong, flexible, but inelastic tendons, and from the sides of these

spring the muscular fibers, thus permitting more to act upon the bone than if they went directly to it.

The *tendons* are much better fitted for exposure in passing over joints. They are less sensitive to pressure than the more delicate muscles, and serve to give both elegance of form and strength to the limbs. This is illustrated nicely in the muscles of the fingers, where the tendons give strength and beauty, but otherwise both inconvenience and bulk would exist. These tendons are attached to the muscles of the arm, but really extend only to the wrist, whence fine cords pass to the fingers. From this adjustment may be seen that here and elsewhere both beauty and strength are provided, while ample provisions are made for accuracy and efficiency in movement. The voluntary muscles are made up of small fibers composed of a row of minute cells arranged like a string of beads and the whole, being constituted of so many threads bound into one bundle, confers great strength. The efficiency of this mechanical principle is exemplified in suspension bridges, where strength to sustain vast weight is secured by small wires twisted into massive ropes, instead of heavy bars of iron. At the joints the bones are enlarged to afford greater surface for the attachment of muscles, and to enable them to work to better advantage.

Muscular contraction in living bodies is usually excited by nervous impulses, but slight electric currents are exhibited by the muscles. These currents are due, not to an external agent, but to the contractile energy inherent in the muscular elements. Heat, acid, pinching, and nervous impulse contract muscular fibers, and, if the stimuli be removed, the fibers resume their previous form and position. Acid is set free during the action. Muscular contraction produces a slight elevation of temperature. Muscular energy is exhausted by repeated contraction, and continuous activity tends readily to produce a condition under which the fiber ceases to contract. However, the muscle again responds under a different kind of stimulus, or after the contractile power has been restored by rest. Under the most extensive contraction the muscle is shortened to about three-fifths of its length. The nerves by which contraction is effected are known as motory nerves. They are under the control of the will. By skillful culture it becomes possible to call into activity muscular action of various kinds at the same time. Muscular movement is influenced quite largely by emotion and passion. Besides, some muscles are both voluntary and involuntary, especially those of the eyelid, over which we secure a par-

tial control and wink constantly without effort or attention.

MUSCOGEE (mūs-kō'gē), or **Muskogee**, a city of Oklahoma, 150 miles northeast of Fort Worth, Tex. It is on the Missouri, Kansas and Texas Railway and is surrounded by a fertile farming and stockraising country. The trade is chiefly in merchandise, grain, live stock, and machinery. It is the seat of the Harry Kendall College, a Presbyterian institution. Many Indians reside within the city and in its vicinity. Population, 1910, 25,278.

MUSCOVY. See **Russia.**

MUSCULAR SENSE, the sense which perceives muscular effort, or which reports feelings of the activity of the muscles of the body as concerned in movement. Most writers commonly agree that the senses are five in number, but some philosophers add a sixth sense, which they call the muscular sense, or the sense of resistance to muscular effort. This sense is lodged in certain sensory nerves which are lodged in the muscular tissue and are peculiarly connected with the brain, which is the seat of their centers. However, the muscle sense, or muscular sense, is not regarded by all writers as a separate sense, distinct from mere feeling.

MUSEUM (mū-zē'ūm), an institution maintained for the preservation of works of art, science, literature, and antiquities. The name is from a Greek term, meaning a temple dedicated to the muses, hence a place to study art and literature. In ancient Greece the museums were sacred to the Muses, such as the groves of Helicon and Parnassus, but in later times the term came to be applied to a place of study or a school. At present museums are maintained in all the leading countries of the world, in which are preserved the great treasures of art, science, and literature. The noted museums of Europe include those of the Vatican at Rome, the New Museum in Berlin, the Louvre in Paris, the Belvidere in Vienna, and the British Museum in London. Many noted museums are maintained in Canada and the United States, including the Metropolitan Museum of Arts, New York; the National Museum, Washington; the Field Columbian Museum, Chicago; and the Ontario Provincial Museum, Toronto. These museums and others contain splendid collections of specimens of minerals, many antiquities, and works of art and science. The ex-

hibits are classified and catalogued systematically, furnishing means for extensive study and research. Some of these institutions maintain courses of lectures and issue reports and pamphlets for the benefit of the public. Practically all are open to free admission for the public.

MUSHROOM (mūsh'rōōm), a name commonly applied to numerous rapidly growing fungi of the higher class, belonging to the natural order *Fungi* and consisting usually of a caplike expansion supported by an erect stalk. The common mushroom has a fleshy head and varies in color from white to brown. It has a smooth or scaly surface, and springs up in rich,



COMMON MUSHROOMS.

moist places. More than 1,000 species have been studied, many being widely distributed. The forms are various in the different climatic zones. All the species are cryptogamic; that is, they have no true flowers containing stamens, pistils, and seeds, but propagate by means of spores. Many of the species are edible and in some cases their food qualities are quite wholesome. In various localities of Australia, Southern South America, and Tierra del Fuego varieties thrive that supply the natives with the principal portion of their food. The cultivation of mushrooms is an important industry, particularly in Europe, where large fields are grown in beds prepared by mixing horse dung with earth. Sandy soil is best adapted to their culture, since it causes them to grow more rapidly. The stems of some species grow to a height of from eight to twelve inches and they bear tops correspondingly large, often from three to seven inches in diameter. Those cultivated for table use are largely bell-shaped, are of a whitish color, and have a pleasant odor and taste.

MUSIC (mū'zīk), the branch of fine arts which relates to the agreeable combination and succession of sounds, either vocal or instrumental, and embraces melody and harmony. Its history is older than that of civilization, extending back to the remote ages and antedating

the deluge. It is mentioned extensively in the history and fables of the Hindus and Chinese, with whom musical art is still quite like it was many centuries before the Christian era. Monuments, legends, and divers relics attest its popularity among various primitive races, who employed rude musical instruments in producing rhythmical divisions of time as accompaniments to games and amusements. Both the Hebrews and Egyptians employed music as a popular feature in divers forms of worship, and from the latter it passed to the Greeks and thence to the Romans. It is certain that music as an art began to be cultivated by the Romans largely through the instrumentality of the Etruscans, who originated several stringed instruments, and that they early became acquainted with the notes A B C D E F G, which formed the Grecian musical scale. Among them the Grecian instruments, especially the lyre, flute, and martial trumpet, were in common use and they obtained the harp and other stringed instruments from Egypt.

The syllables indicating the notes of the diatonic scale, known as do, re, mi, fa, sol, la, si, do, are of comparatively early Italian origin, but the first recognized Roman school of music may be said to date no earlier than the 16th century, when Claude Goudimel (1505-1572) exercised a wide influence. His pupil, Giovanni Piervanni Palastrina (1524-1595), did much to popularize music by adapting it to several masses, thereby establishing a sacred type still highly favored. Music in France had its rise with J. B. Lully in the latter part of the 17th century, when it also became a highly cultivated art in Germany and other parts of Western Europe. Under the influence of such masters as Handel and Johann S. Bach, Germany rose to the highest place in music by the middle of the 18th century, a position it still retains. Among the eminent musicians of Germany who introduced Italian melody are Mozart, Gluck, and Haydn, while among the masters who gave new poetic elements may be named Beethoven, Mendelssohn, Weber, Wagner, Liszt, Chopin, and Schubert. The German musician Meyerbeer popularized the new school of music in France and Handel introduced it in England. Among the new school of musicians are Rubinstein and Brahms in Germany, Bull and Grieg in Scandinavia, Paderewski in Poland, Dvorák in Austria, Sullivan and Stanford in Great Britain, Gounod in France, Boito in Italy, and Sousa in the United States.

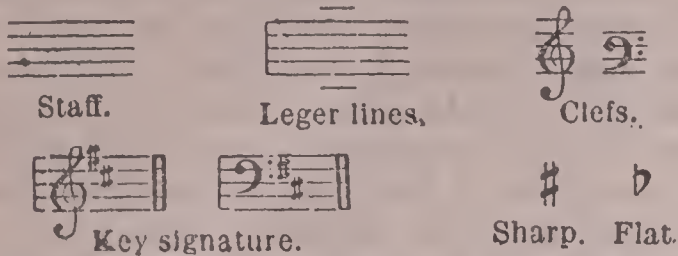
A long period of time elapsed between the production of music of a recognized high scale and its general reception as a branch of study by

the public not skilled in musical arts. Gradually the German masters cultivated an interest in music sufficiently extensive to carry musical instruction into the schools of Germany, whence it spread to the educational institutions of other European countries and to America. It is now looked upon as being equal in importance to other branches, particularly since it stimulates the aesthetic feelings, cultivates the voice, enlarges vocal powers, and supplies a valuable aid in discipline and reading. Many of the states of the United States and the provinces of Canada have added it to the school curriculum as a branch of study in which instruction is to be given daily. It is now almost universally incumbent upon teachers to pass an examination in that branch before receiving a license to teach. Much has been added to the popularity of music by competent instruction in normal schools and teachers' institutes. Many local and national associations of teachers have likewise given to it a guiding and molding influence.

In teaching music in schools the instructor should select the most familiar songs for the first lessons, as a means to gradually improve the tone and precision in singing. Tone perception is best cultivated by practicing oral dictation, and the practice of writing music is an efficient means of directing attention to the notation. However, it should be remembered that the mind rather than the vocal organs needs attention in the cultivation of tone and expression. The songs and exercises selected should embody thought and feeling, since by the agency of these a fuller and more wholesome expression is obtained.

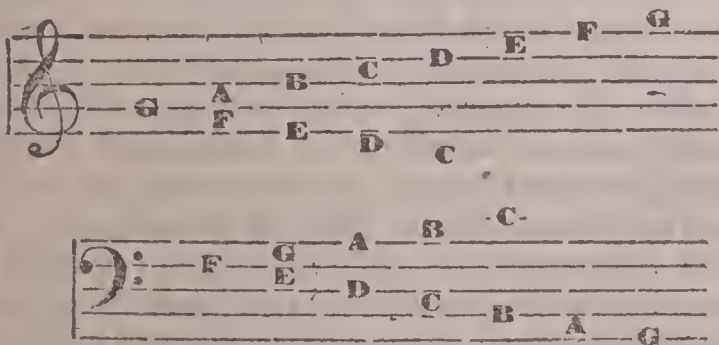
In the study of music we are to bear in mind that sound requires elastic media for its conveyance, as water or atmospheric air. Sound may be generated in the conducting medium, as by a pipe organ, or may be transmitted to it, as by the vibrations of the strings of a violin or pianoforte. Whether sound has a musical effect depends upon the number of vibrations, its musical character being limited between 16 and 8,180 vibrations per second. The frequency of the vibrations determines the pitch or relative height of a tone. The more rapid the vibrations the higher the pitch, while the grave or deep tones are produced by the lower number of vibrations. Loudness depends, not upon their number, but upon the broadness of the vibrations. Musicians take the note called the middle C of the pianoforte as the *standard* or *concert pitch*, which is produced by about 515 vibrations per second. The *diatonic scale* is used to designate the regular tones of a key or scale, in distinction from chromatic or occasional tones, and

on it seven notes, designated by the first seven letters of the alphabet, are represented. A given note is in unison with one produced by twice as many or half as many vibrations per second, and the interval between them is termed an *octave*. The tone of rest, the tone above which all the other tones in a tune are grouped, is



called the *keynote* or *keytone*. Each note of the diatonic scale has a fixed ratio to the keynote as regards *pitch*, which is determined by the number of vibrations.

Music is written on a staff made up of five equidistant horizontal lines, but the lines may be extended by leger lines both above and below. To facilitate rapid reading it is customary to employ staves instead of many leger lines, as the bass, mean, and treble staves. The lines and spaces of the staff are called *staff degrees*. Each staff degree represents a tone of a certain pitch, this being shown by a *clef* placed at the left end of the staff. The two clefs in general use are the *G clef* and the *F clef*, and they indicate the pitch of the line on which they are curled. For instance, the G clef in the illustration is curled on the second line, hence the order below is F, E, etc., while above we begin with A and proceed upward to G. In a similar manner, the F clef is curled on the fourth line, which designates the order as shown in the figure, both above and below. To determine on what staff degree the scale begins and ends it is necessary

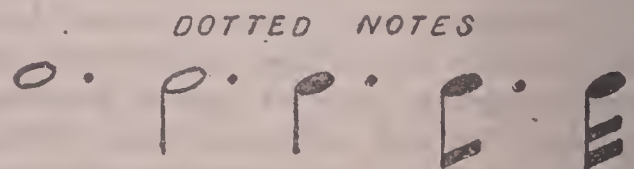
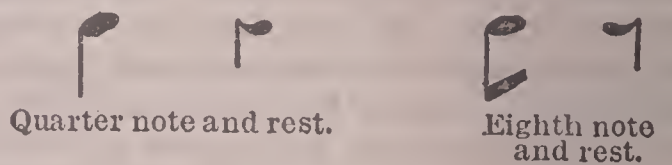
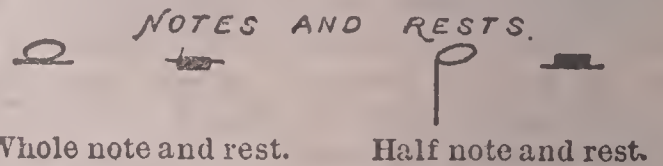
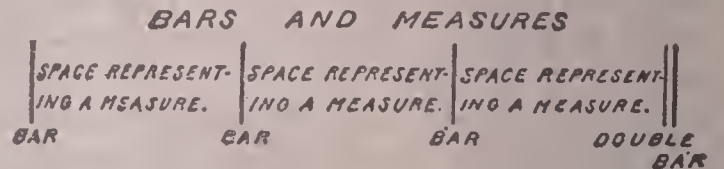


MUSICAL STAFF.

to have signs termed *key signatures* or *key signs*, and these are called *sharps* and *flats*. When a sharp is placed before a note, it indicates a tone a half step higher than the letter upon which the note is placed would otherwise represent, while a flat before a note indicates, on the other hand, a half step lower. There are five kinds of notes in common use, whose names

are determined by their shape, as shown in the illustration below.

Most writers divide music into the three departments of *melodics*, *rhythmics*, and *dynamics*. *Melodics* is that department of music which treats of the pitch of tones. Tone has pitch, length, and power. As stated above, pitch is represented on a staff, each line and space of which is called a *degree*, and is numbered from the lowest upward. *Rhythmics* is the department of music which treats of the length of tones, while *dynamics* treats of the power of tones. Melody is the chief voice part in giving a harmonic composition, or a peculiar succession of sounds produced in single part by an instrument. *Modulation* is a change from one key to another. A *concordant* is composed of two agreeable sounds, and a *chord* is three or more sounds heard together. Below is a list of the principal musical signs:

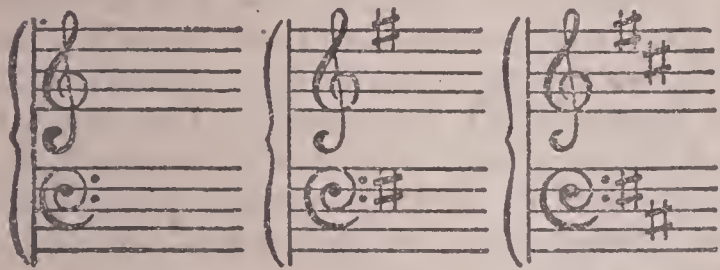


The F clef for bass. The C clef for alto. The G clef for soprano. The C clef for soprano.

b # n bb X
 FLAT SHARP NATURAL DOUBLE FLAT DOUBLE SHARP

TURN ~ TRILL OR SHAKE tr
 HOLD, OR PAUSE ◡ REPEAT:
 STACCATO MARKS .|| TIE ~
 DA CAPO D.C. R. EL SEGNO D.S. :S:

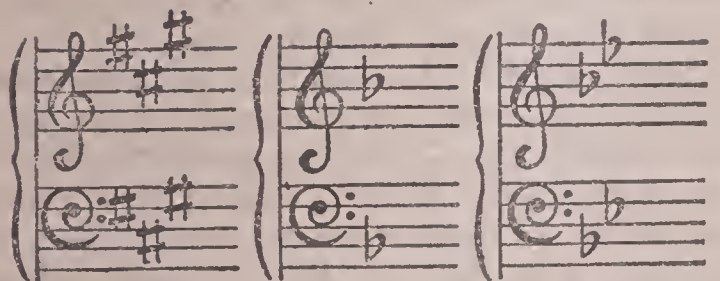
FIGURES
 2 2 2 4 4 4 3 3 3 6 6 6
 2 4 8 2 4 8 2 4 8 2 4 8



Key of C.

Key of G.

Key of D.



Key of A.

Key of F.

Key of B Flat.

MUSK, a substance obtained from the male musk deer, used in the preparation of perfumery and medicine. The musk deer is quite different from the true deer. It is found principally in the East India Islands and the continents of Asia and Africa. The musk is secreted by an abdominal gland that is equal in size to a hen's egg. Usually the entire gland is removed and transported to manufacturing centers in its natural state from Bengal and China, but the finest quality is secured from Tonquin. The secretion has a slightly bitter taste and forms the most penetrating and lasting of perfumes. It was used for embalming at an early date. Musk is an important article of commerce.

MUSK DEER, a species of deer native to Asia and Africa, about the size of the roe deer. The hair is long, coarse, and of a brownish color mottled with lighter blotches. This animal has no antlers, but a pair of long canine teeth characterizes the upper jaw of the male. The flesh is esteemed for food. Musk is derived from the male, that of the Tibet musk being of the best quality. See Musk.

MUSKEGON (müs-kē'gün), a city in Michigan, county seat of Muskegon County, on the

Muskegon River, about four miles from Lake Michigan, on the Père Marquette, the Grand Trunk, and other railroads. It has an excellent harbor on Muskegon Lake, a body of water formed by the Muskegon River, and is the center of a large trade in merchandise and farm produce. The chief buildings include the public library, the county courthouse, a manual training school, and many churches. It has a soldiers' monument, electric street railways, public waterworks, and a system of sanitary sewerage. Among the manufactures are lumber products, machinery, furniture, ironware, musical instruments, and utensils. The surrounding country is fertile. It was settled in 1834 and incorporated as a city in 1869. Population, 1910, 24,062.

MUSKET (müs'kët), a kind of firearm formerly used by the infantry of an army. It was originally fired by means of a match, or matchlock, for which the flintlock and later the percussion lock were substituted. This firearm is not in use at present, having been superseded by the rifle.

MUSKHOGEAN (müs-kō'gē-an), an important family of Indians in North America, constituting the principal tribe of the Creek Nation. Formerly they occupied a large area between the Atlantic and the Mississippi River, extending from the Gulf of Mexico north to Tennessee, but the descendants now reside in Oklahoma. Formerly they were the most warlike and politically powerful of the southern tribe. They have made marked strides of advancement in science, agriculture, and educational arts. The Muskhogean Indians at present number about 35,000, of whom 2,000 are scattered in the Gulf States and the remainder are in Oklahoma.

MUSKINGUM (müs-kin'güm), a river of Ohio, formed by the confluence of the Tuscarawas and Licking rivers, in Coshocton County. After a course of 115 miles toward the southeast, it joins the Ohio at Marietta. It is connected by a canal with Lake Erie.

MUSKMELON (müs'měl-ün), a plant native to the warmer parts of Asia, but now cultivated extensively for its fruit, which is characterized by an aromatic flavor. The seed is planted early in the spring in rich, mellow ground, and the plant is an annual vine. The fruit, which varies from three inches to about a foot in diameter, has a warty, furrowed rind, and the flesh ranges from white to yellow or reddish yellow in color. Large quantities of muskmelons are grown for the market, either to be eaten fresh or used for pickles and preserves. The pests of this plant include several kinds of beetles, which eat the leaves with great voracity.

These insects may be kept off by using an emulsion of turpentine, dusting with tobacco or slate lime, or spraying with paris green.

MUSK OX, an animal resembling an ox and a sheep, regarded as a connecting link between those two classes of animals. It is found native



MUSK OX.

in the Arctic regions of America and individuals are met with as far south as the region corresponding to 60° north latitude. Fossil remains prevailing in various portions of Siberia and Northern Europe give evidence that in former times this class of animals was abundant in those regions, but at present no living traces are found there. The hair is long and tufted. It is brownish in color and above the shoulders and neck it is sufficiently thick to give the animal an appearance of being humped. Herds of from 25 to 50 are frequently found in groups while feeding on reindeer moss, grass, and other vegetable growth. The usual size is that of a small domestic ox, but the females are somewhat smaller. One calf is brought forth by the female in May or June. The musk ox is hunted for its skin and flesh, the latter being quite pleasant to the taste and somewhat scented with the peculiar odor common to the animal. Its wool is about as soft as silk and has been used in making fabrics. The animal may be acclimated in all cold regions. Attempts at domestication have been made, but they have proven successful only to a limited extent.

MUSKRAT, a name commonly applied to several rodents that are characterized by the secretion of a musky substance, or the diffusion of a musky odor. However, several of the species classed as muskrats have otherwise little in common. The *common muskrat*, called *musquash* from its Indian name, is native to the

regions extending from Mexico to the Arctic Ocean. It has webbed toes and the tail is flattened laterally. It occurs in abundance along the banks of rivers and lakes. In many places it constructs dwellings in the water that resemble small haystacks. It sometimes excavates channels in the banks near streams, the openings into these and into their dwellings being always from under the surface of the water. Muskrats are able to live in the water for a considerable period and in the winter spend much of the time in their dwellings, where numerous chambers are provided, but at the approach of danger make hasty retreat into the water by means of an underground channel. In size they are about equal to a small rabbit, but their form is much more bulky and the color is quite similar to the muddy banks where they dwell. Thousands of these animals are taken annually for their fur, which is of much value in commerce, while the Indians pursue them for their flesh. The muskrat feeds largely on vegetable growth, but particularly on the roots of plants, and on various animal food, such as mollusks.

The name muskrat is applied to an insectivorous quadruped of the shrew family, sometimes called *desman*. It is native in southern Russia and in the vicinity of the Pyrenees. Several species of the *desman* have been described, of which the best known has a body about eight inches long, small eyes, no external



AMERICAN MUSKRAT.

ears, a flattened tail, and long hairs. Its fur is valued in the markets of Europe. It is hunted for the skin and the musk secreted by a gland in the groin. Its habitations are along the streams, where it feeds on aquatic larvae, leeches, and vegetable growth. The name is sometimes applied to an animal of the shrew family found in India, which in size and habits

resembles the common rat. The tail is long and the color is dark brown. It secretes a musk of pleasant and powerful odor.

MUSLIN (müz'lin), a thin cotton cloth, so named because it was first manufactured at Mosul, in Mesopotamia. It is now made extensively in Europe and America. Muslin is sold on the market as *bleached* or *unbleached*. It is divided into white, printed, or dyed fabric. Among the many varieties are lawn, cambric, null, leno, figured, muslinet, cord, buke, and Swiss. A fine grade of figured muslin is known as *tamboured*, from its imitation of tamboured muslin embroidered by hand, though this class of fabrics is made by a loom.

MUSSEL (müs's'l), the common name applied to several species of bivalve mollusks and to a number of equivalves. The common freshwater mussels are distributed in many regions and abound in practically all the rivers, ponds, and lakes of America. These animals are most abundant where the bottom of streams or lakes is made up largely of fine mud, where they may be seen in considerable numbers moving from place to place. Mussels common to the sea occupy regions between low and high-water mark. They are fastened most commonly by their byssus, a tuft of silken filament, to the places they frequent, but are able to move safely from place to place. The mussels common to America are rarely eaten, but are quite often used for bait by fishers. In many countries of Europe mussels are cultivated extensively for food, particularly in France, Germany, Great Britain, Holland, and Denmark. Mussels grow to maturity in about a year and are scooped up from the bottom by dredging. From the Firth of Forth and other waters of Great Britain many thousands of tons are taken annually to be used for bait in the deep-sea fisheries. This class of animal life furnishes a wholesome and highly prized human food, but, since mussels grow most abundantly in stagnant water, it is found that they are quite often affected by a dangerous poison brought on by microbes, thus making them productive of fatal diseases. The North American Indians were acquainted with the pearl mussel that yields fine pearls. They used the shells in making various kinds of small weapons.

MUSTANG (müs'täng). See **Broncho**.

MUSTARD (müs'tërd), the name commonly applied to plants of the order *Cruciferae*, of which the black and the white mustard are the most common. Both these species are annual plants. They attain a height of from three to seven feet, bear lyrate leaves, yellow flowers, and slender pods containing a number of round-

ish seeds. They are native to Europe and Asia, but have been naturalized in North America and are cultivated extensively for the manufacture of condiments. Mustard is employed to a considerable extent in medicine, in the manufacture of oil of mustard, and for poultice purposes. The wild mustard, an obnoxious weed, is found in many of the cultivated fields. This plant has a tendency to multiply rapidly and injure the growing crops, especially wheat and other small grains, and can be eradicated only by careful cultivation. Among the plants which belong to the same order are the radish, cress, turnip, and cabbage.

MUTINY ACT (mü'ti-ný), or **Army Act**, an act to invest the British crown with the power to govern the army and navy and to devise articles of war. This act is passed annually by the British Parliament, since the Bill of Rights forbids the maintenance of an army in the time of peace, and without an annual vote it would be impossible to provide for the defense of the country in the manner of the great powers. It has been universally the practice to pass the Mutiny Act annually since 1689, but this act and the Articles of War were combined in 1879, and since that year the two have constituted one bill, called the Army Act.

MUTOSCOPE, an apparatus for reproducing the motion of objects. The scenes shown in the mutoscope are obtained by making a series of photographs of the moving objects, on a long band of celluloid film at the rate of eighteen hundred pictures per minute. The time interval between the successive pictures is thus only the thirteenth part of a second.

Photographic prints are then made from a strip of negative pictures and these prints are arranged in regular order around a cylinder. When the cylinder is revolved, the cards are allowed to snap forward one after another, thus presenting the photographs to the eye in the order and at the same rate of speed at which they were originally taken. The velocity is so great that the eye does not appreciate the change from one picture to another and the observer seems to be looking at one picture in which the objects move as did the original.

By this process any moving scene may be reproduced. The rapid flight of an express train, the movements of a watch, the maneuvers of a war vessel, and the movements of an insect are scenes which may be reproduced and which illustrate the possibilities of the art.

MUTTON (müt't'n); the flesh of a sheep, constituting a nutritious and wholesome article of food. Canada and the United States are large producers of mutton, both in the form of

fresh and cured meats, and considerable quantities are exported. The fatty parts, known as *tallow*, are used largely for candles and for lubricating purposes. A rib of mutton for broiling, with the end of the bone at the smaller part chopped off, is known as a *mutton chop*. The mutton kept for sale in the markets of the cities is prepared at the packinghouses, after which it is sold to the consumers by the retail dealers. A large part of the mutton consumed in England is obtained from Australia and New Zealand.

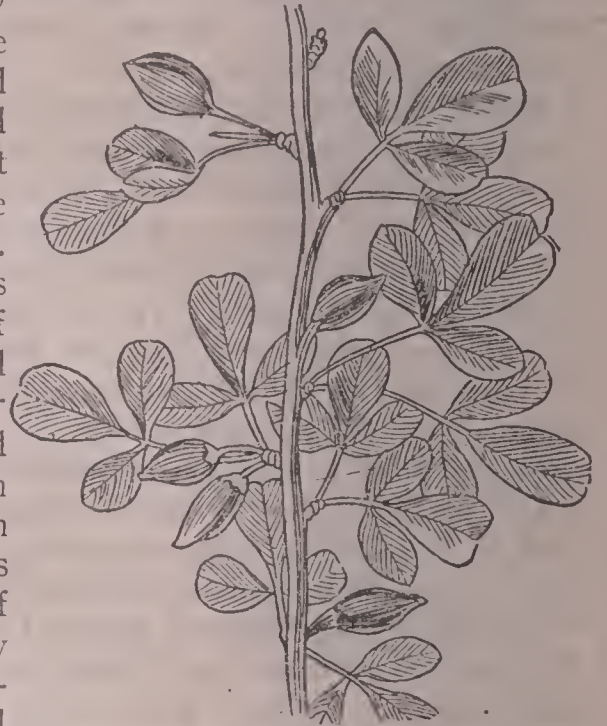
MYCENAE (mī-sē'nē), an ancient city of Greece, in the northeastern part of Argolis, in the Peloponnesus. It was founded by Perseus and was the residence of Agamemnon before the Trojan War. At that time it was considered one of the most important Grecian cities. Later the military forces of Argos destroyed much of the city, but it was again rebuilt. The ruins still remaining are of interest on account of their great antiquity, among them the Treasury of Atreus and the Gate of Lions. Many interesting antiquities have been brought to light by a series of excavations, notably those carried on by Henry Schliemann in 1876, when various weapons, tombs, ornaments, and monuments were discovered. It is thought that most of these objects of interest were constructed during the Doric invasion, for the reason that they appear to be allied to the types produced in various portions of Asia Minor and Mesopotamia.

MYOPIA (mī-ō'pī-à), a condition of the eye that produces nearsightedness or shortsightedness, due to a deformity which causes the rays from distant objects to be brought to a focus before they reach the retina, hence form an indistinct image. However, rays from objects very near to the eye are normally converged so as to produce a distinct image. Concave lenses may be used to remedy the defect.

MYRIAPODA (mīr-ī-āp'ō-dā), a class of animals closely related to the hexapod insects, differing from them in having the body made up of numerous segments, nearly all of which have jointed legs. They are singular in that the body is not divided into thorax and abdomen, as in insects, and in that the mouth is furnished with a complex masticating apparatus. The eyes are simple or compound, but in a few species the eyes are entirely absent. Some feed on vegetable matter, though the species that are higher in the scale of organization are carnivorous, feeding on insects and worms. They are found under stones and logs or in dark and damp places. The centipede (q. v.) belongs to this group of animals.

MYRMIDONS (mēr'mī-dōnz), the celebrated troops of Thessaly that accompanied Achilles in the Trojan War. They ranked among the most famous warriors of ancient Greece. Under the leadership of Peleus, they came into Thessaly and later colonized the island of Aegina. The name Myrmidons was applied to them from the legend that they converted the ants into men, the term meaning ants.

MYRRH (mēr), a gum resin that exudes from a shrub native to Arabia, Abyssinia, and Somaliland. The myrrh shrub or tree has a whitish - gray bark, is quite low and branchy, and bears a fruit about the size of a pea. Myrrh occurs in the form of roundish and irregular masses, called *tears*, which vary from small grains to the size of an egg. They are semitransparent and have a red-



MYRRH.

dish-brown color and a peculiar and agreeable fragrance. The ancients used myrrh extensively for incense, in embalming, and for perfume. At present it is still employed for perfume and in medicine. It is slightly soluble in water and alcohol, but may be dissolved readily in chloroform. The best quality in the market is known as *Turkey myrrh*, being brought from Turkish ports, and inferior grades are secured from Bombay and other Indian points.

MYRTLE (mēr'tl), a genus of plants which are classed as a suborder of the *Myrtaceae*. Although these plants are native to Western Asia, they have been naturalized quite extensively in Europe and other regions. The leaves are opposite, the flowers are axillary or terminal, and the bloom is principally white or pink colored. Most species bear black berries with a pleasant, spicy odor. They are used in the preparation of medicine for dysentery, rheumatism, diarrhoea, and internal ulcers. The leaves are employed in the preparation of perfume and for making a gargle. This class of plants has been renowned from ancient times as of service in yielding beautiful foliage for preparing wreaths and other ornamentations for adorning heroes of

war, in the performance of religious rites, and as an emblem of civic authority. The South American myrtle is found largely in Chile and



AMERICAN MYRTLE.

Peru. It supplies foliage and berries equal in value to those of Europe. Both species were utilized by natives for medicine and food from an early time. The common running plant known as periwinkle, found extensively in the United States, is frequently called

myrtle, though the appellation is improper.

MYSORE (mī-sōr'), or **Maisur**, a city of India, capital of a native state of the same name, 245 miles southwest of Madras. The streets are platted at right angles and are well improved by grading and paving. The area is four square miles, most of which lies on the slopes of Chamundi Hill. Among the principal buildings are the Maharaja's palace, the public hospital, and many churches and temples. It has considerable manufactures of silk and cotton goods, jewelry, cutlery, metal ware, and utensils. Population, 1906, 69,315.

MYSTERIES (mīs'tēr-iz), the name applied to a class of dramatic performances given in the Middle Ages. It is probable that the idea of presenting these plays originated from the Mysteries of the Greeks and Romans, but they were less cultured than the *Eleusinian* of the Greeks. They were presented originally in churches and at solemn festivals and in a manner quite similar to the miracle plays. These plays treated religious subjects and were so named because their purport was to exhibit the teaching and effect of the mysterious doctrines of Christianity. They differed from the miracle plays in that in the latter were represented more largely scenes from the lives of the saints. The mysteries offered a very effective way of attracting attention to the scriptural teachings, especially among the peoples of Europe, who had not yet learned of the purport and plan of the Scriptures as they relate to the salvation of mankind. At the time of the guilds and trades these exhibits were given in series, some of the

plays requiring several days. Among the most noted of these plays were those known as "The Wise and Foolish Virgins," "The Passion of Christ," and "The Slaughter of the Innocents." In later times Milton's "Paradise Lost" and several other writings were utilized in the exhibits. See **Miracle Plays**.

MYSTICISM (mīs'tī-sīz'm), in religion, the doctrine of the Mystics, who claimed to hold direct communion with the Deity. These worshipers asserted that they acquired a knowledge of God and of spiritual things which is unattainable by the natural intellect and which cannot be analyzed or explained, hence the name. This form of religion is very ancient, dating from an early period in the history of India. It has its modern representatives in Brahmanism, Buddhism, and some forms of Christian theology. Mysticism, as applied in philosophy, is the doctrine that an act of feeling or faith is involved in the ultimate principles of knowledge or belief. The philosophic mystics seek either to grasp the ultimate elements of knowledge by means of the reason, or to draw out in terms of the reason the data of the faculty by which it is grasped.

MYTHOLOGY (mī-thōl'ō-jy), the science that investigates the meaning of myths or legends and traces the relationship between the myths of different peoples and countries. Myths of various kinds have been common among different peoples from remote antiquity and, though they differ in various respects, there is a marked similarity among many of them. Even the savage races of the present time pass their fables, traditions, and myths from generation to generation. The myths of different peoples have been collected carefully by writers and naturalists, especially those of the ancient peoples of Hindustan, Egypt, Greece, and Rome. More recently extensive study has been given to the myths of the early races of Europe and America, especially to the folklore of Scandinavia and the Esquimos. However, the myths of civilized peoples, like those of the Greeks, Romans, Egyptians, and the inhabitants of Western Asia, remain of greatest interest. This circumstance is accounted for because they are related more nearly to the early history of the people at present representing the highest civilization, and for the further reason that they enter largely into the works of art, such as paintings, sculptures, and architecture.

Students of mythology were prevented from making material progress in mythological study until within the last few centuries, for the reason that they were confronted by orthodox traditions and because they had little knowledge of

the natural history of man and the ancient languages. It is but comparatively recent that the languages of the Chaldaeans and Egyptians have become unsealed, and still more recent that material progress began to be made in the systematic study of Sanskrit. The myths of civilized people do not fail in containing both rational and irrational elements, and, as we approach nearer to the more savage and primitive, the irrational is multiplied with rapidity. The rational elements of myths are those which represent the gods as wise, mighty, and beautiful beings, while the irrational present a series of silly and meaningless phenomena. Among the latter are such as represent unnatural and absolutely impossible conditions or changes, including many that attribute certain powers and inclinations to the gods of the Greeks and the Romans.

The Grecian god Zeus is said to have dwelt on Mount Olympus, where a great statue was erected to his honor. Homer describes him as a god who beholds all things and turns his shining eyes everywhere. By others it is said that he was buried in Crete, but later assumed the

shape of a swan and became the father of Castor and Pollux. In another instance he is spoken of as being afraid of Attes. Later the Greek god Zeus became identified with the god Jupiter of the Romans. Odin, Balder, and Thor were among the Scandinavian gods. The Egyptian mythology is closely associated with the gods Ammon, Osiris, Apis, and Serapis. The belief in the immortality of the soul of man was common in ancient Egypt, hence entered as an important factor into the Egyptian mythology and religious beliefs.

Max-Müller, one of the most thorough and successful investigators of ancient mythology, designates three predominating parts or lines common to all systems of myths; namely, religious, historical and poetical. While mythology is not religion, history, philosophy, or poetry, it comprehends elements of all these under a form of expression that is natural and intelligible in certain stages of the development of society, but, after thought and speech had sufficiently developed, it became tradition, and in that sense is largely unintelligible and unnatural.

MYTILENE (mīt-ī-lē'ne). See **Lesbos**.



N

N, the eleventh consonant and fourteenth letter of the English alphabet. The form was adopted through the Roman alphabet from the Greek. It is classed as a nasal liquid of the lingual class. The letter *n* is sounded by placing the tongue near the roots of the upper teeth and emitting a vocalized sound through the nose. Its ordinary sound occurs when used in such words as *tongue*, *knot*, and *done*, but it has a guttural nasal sound before gutturals, as *g* or *k*, when it is almost equivalent to *ng*, as in *sing*, *finger*, *song*, *drink*, and *link*. When used after *m* as a single letter it is silent, as in *hymn*, *condemn*, and *autumn*, but when preceded by *p*, *k*, *g*, or *m*, it alone is sounded, as in *pneumatic*, *know*, *gnaw*, and *mnemonics*. As a symbol, in chemistry, *N* is used to represent nitrogen and *Na*, sodium (i. e., *natrum*).

NABONASSAR, Era of, the time at which Babylonian chronology began, which was later adopted by the Greeks of Alexandria and other peoples. Ptolemy calculated by astronomical phenomena that Nabonassar ascended the throne of Babylon on Feb. 26, 747 B. C., which date became the beginning of the year according to the Era of Nabonassar.

NADIR (nä'dēr), a term used in astronomy to designate the point of the celestial sphere which is directly beneath where one stands, diametrically opposite the zenith, or the point directly overhead. The two poles of the horizon are formed by the zenith and the nadir.

NAGASAKI (nä'gä-sä'kê), a seaport city of Japan, on the western coast of the island of Kiushiu. It was the only Japanese harbor opened to European trade for about two centuries. In 1859 it was one of the five Japanese ports opened to the trade of America and several European countries, and ten years later was included in the seven seaports opened to the trade of the world. The city is beautifully situated and has a splendid harbor. Among the manufactures are chemicals, lacquered wares, silk,

NAGPUR

fabrics, tobacco products, porcelain, and utensils. It has a large export trade of Japanese products and a correspondingly important import business. Several missionary establishments are located at Nagasaki, including those supported by the Americans, Dutch, British, French, and Germans. Vast dock facilities have been built in recent years, which rank among the largest and most important improvements of this character in Japan. It has telephones, pavements, electric lights, and other modern facilities. Population, 1908, 156,392.

NAGOYA (nä'gō-yä), a city of Japan, on the island of Hondo, about 165 miles southwest of Tokio, a short distance north of Owari Bay. It formerly was the capital of the princes of Owari, and is still the chief city of the province of that name. Its seaport is at Yokai-ichi. The city is noted for its manufacture of pottery, porcelain, lacquered work, utensils, and cotton and silk fabrics. It has a number of public buildings, including a fine post officē, a hospital, a normal school, superior court, the public library, and the central railroad depot. Nagoya is the seat of a number of fine churches and temples. It has electric and gas lights, street railways, pavements, and waterworks. Population, 1908, 290,936.

NAGPUR (näg-pōor'), a city of India, capital of the province of Berar. It is the focus of several railroads, giving it trade conveniences with the leading ports of India. The city is situated in the valley of the Nag River, a small stream, is surrounded by a fertile country, and occupies a fine site. Its temperature is hot and the climate is unhealthful. Among the manufactures are cotton textiles, woolen and silk goods, turbans, metal products, machinery, blankets, and utensils. It has a large trade in salt, grain, and merchandise. On Nov. 27, 1817, it was the scene of an important battle between a force of 1,350 British commanded by Colonel Scott and a native army of 18,000 men, in which

the latter was defeated. Population, 1906, 130,870.

NAIADS (nā'yădz), in mythology, the nymphs who presided over the waters of fountains and brooks. They were supposed to inspire those who drank the water with oracular powers and the gift of poetry. In statuary they were represented as beautiful maidens, half draped, wearing long hair.

NAILS, the name of headed pins or spikes of metal, usually with rounded or flattened heads and commonly made of steel. They serve a useful purpose in that they hold together different pieces of wood, leather, or slating. In size and construction they differ very materially, depending upon their use in carpentry, saddlery, upholstery, horseshoeing, shoemaking, slating, and other enterprises. The manufacture of nails has long been an important industry and the consumption is enormous in all civilized countries, especially where lumber is used in the construction of houses and other buildings. They are made of many forms on account of the different purposes for which they are employed. Among the various kinds are spikes, fencing nails, building nails, clouts, roseheads, clasps, sprigs, brads, tacks, and many others. They are classed usually according to their manufacture into four principal divisions: *hand-wrought nails*, *wire nails*, *machine-wrought nails*, and *cast nails*.

Formerly nails were manufactured entirely by hand labor, each nail being forged from a thin sheet or rod of iron, and male and female laborers were employed in their production. An American inventor completed a device in 1810 by which it became possible to cut 100 nails per minute from a sheet of iron, the heading being done in the same operation. Subsequently vast improvements were made in the machine, whereby it has become possible to make as high as 1,000 nails per minute, the number varying somewhat according to the class of nails produced. The usual process includes the heating of strips of metal, then passing them into the machine to be cut, and, after falling to a receptacle below, they are clasped by an ingenious mechanical device to be struck with a force sufficiently powerful to form the head. Wire nails have gone largely into use for ordinary building purposes, but machine-wrought and cast nails are employed in finishing work, such as making casing and attaching ornaments. Hand-wrought nails are used in horseshoeing and for other purposes in which clinching is necessary.

NAILS, the horny plates or protective coverings on the phalanges, or fingers, and toes of many animals. They are constituted of modified

forms of the cuticle. The nails are generally set in a matrix or groove in the cuticle, from which they grow at the root in length and from beneath in thickness. In most animals the matrix is thick. It contains highly vascular papillae. As long as the papillae are not destroyed the nail is replaced after an accident. The nail structure differs largely in form and size in different animals. Nails form an elastic covering on the dorsal surface of the fingers and toes in man. In hoofed animals, like the horse and camel, they constitute a protective covering known as *hoofs*. Birds, flesh-eating animals, and sloths have modified forms of growth known as *claws*, which are especially adapted to clasping elevated vegetable forms or for scratching. In many amphibious animals, like the toad, they appear only as an enlargement or a thickening of the skin. A light spot at the base of the nails in man is known as the *lunula*. The nails of the fingers grow much more rapidly than those of the toes.

NAMAQUALAND (nä-mă'kwă-länd), the name applied to a region of Southwestern Africa. It consists of two portions, Little Namaqualand and Great Namaqualand. The former is situated south of the Orange River and now forms a part of Cape Colony, while the latter extends from the Orange River to Walfisch Bay. Since 1884 the latter has been a possession of Germany, being a part of German Southwest Africa. The original inhabitants of this region are known as Namaquas, a Hottentot tribe governed by petty chiefs. They subsist largely by following a pastoral life. At present there are about 50,000 of these people, most of whom are in the German possessions. Within recent years material progress has been made among them by missionaries and teachers.

NAME, the word or words by which a thing, place, or person is designated, including common and proper names. This article treats only of the names of persons, which are divided into *given*, or *baptismal*, names and *family*, or *surnames*. It is probable that all names originally were significant, and that in the lapse of time and the change of languages the meaning of them has been lost. This is true of the American Indians, who applied names that signified some important event in the life of the individual, hence we have Sitting Bull, Blackhawk, and Man Afraid of His Horse. A savage who killed a wolf might be afterward named Wolf, and one who dreamed of an eagle, Dream Eagle.

The early Hebrews named their infants from some peculiar circumstances relating to them. In this way they aided in commemorating the history of the family. The first son of Eve was

named Cain, meaning gotten, from the circumstance that she said, "I have gotten a man from the Lord." Other names signified some religious sentiment, though nearly all of the early names constituted a single word. Noah signifies comfort; Jonathan, gift of God; Deborah, a bee; Tamar, palm tree; and Adah, ornament. Surnames were not used among the Hebrews, Babylonians, Egyptians, Persians, or Greeks, which was true in the early times of the Romans, but the last mentioned people finally came to use three names. These were the *praenomen*, or personal name; the *nomen*, or name of the clan; and the *cognomen*, or family name, as Publius Cornelius Scipio. In many cases the daughters received the praenomen form of the father's name, as Octavia from Octavius and Julia from Julius. Those who conquered a city or nation were frequently complimented with an additional name to indicate the conquest, as Publius Cornelius Scipio Africanus.

The people of Western Europe usually applied names that signified some circumstance or the locality in which the person or family resided. This is true particularly of Holland, where this practice is still indicated by many names in common use, such as *van der Bilt*, compounded into Vanderbilt, signifying "man of the picture," the word *man* being understood without being written. Many of the Anglo-Saxon names are from Danish and German origin, such as *Ethelred*, meaning noble in speech, being a compound of the German words *edel* and *Rede*. Other names of this class include *cardwulf*, wolf of the earth; *Sigfred*, peace of victory; and *Werbürg*, hedge of the town. Many of the English names indicate descent, such as *Williamson*, meaning the son of William. The use of *-son* in English has the same force as the German *-sohn*, the Danish *-sen*, the Russian *-vitch*, the Norman *Fitz*, the Irish *O'*, and the Scotch *Mac*. In most countries the surname of the husband becomes that of the wife, though in Spain both retain their full names, leaving it optional with the son to choose whichever may be preferred, either the paternal or the maternal. The change of names is permitted without legal process in some states and nations, though most of them provide that a name cannot be changed except by the order of a court or the act of a legislature.

NAMUR (nā'mûr), a city of Belgium, capital of the province of Namur, 35 miles southeast of Brussels. It is at the junction of the Meuse and the Sambre rivers, has railway connections with the principal cities of the kingdom, and contains large cavalry barracks. Opposite the Meuse River is Jambes, which is reached by

several bridges. It has the Cathedral of Saint Aubin, a structure in the Renaissance style. Other buildings include a museum, the city hall, and a number of schools. Glass, cutlery, hardware, and leather are manufactured. The city was captured by William III. in 1695. It was besieged and reduced by the French in 1792. Population, 1906, 32,193.

NANAIMO (nā-nī'mō), a seaport of British Columbia, on the island of Vancouver, opposite the city of Vancouver, on the mainland. It is on Departure Bay, on the eastern coast, and is connected by a railway with Victoria and other trade centers. The surrounding country is celebrated for its coal fields, which yield a large output for transportation. It has gas and electric lighting, waterworks, sawmills, and a system of telephones. The first settlement on its site was made by the Hudson Bay Company in 1833 and it was incorporated in 1874. Population, 1901, 6,130.

NANCY (nān'sī), a city of France, capital of the department of Meurthe-et-Moselle, 175 miles east of Paris. It is nicely situated on the Meurthe River, has good railroad connections, and is the center of an extensive trade. The principal buildings include a bishop's palace, the Hôtel-de-Ville, a number of splendid churches, and several government buildings. Among the adornments of the city is a statue of Laszcinski, King of Poland, who was Duke of Lorraine from 1735 until 1766. It has manufactures of embroidery, cotton and woolen goods, ironware, muslin, spirituous liquors, machinery, earthenware, and artificial flowers. It is the seat of the University of Nancy and has a public library of 100,000 volumes. The Germans occupied it from 1870 until 1871. Population, 1906, 110,570.

NANKEEN (nān-kēn'), a cotton cloth of a buff-yellow color, so named from its manufacture in Nanking, China. Formerly this material was used extensively for trousers and other articles of clothing, but imitations are now made by dyeing the white cotton. However, they are much inferior to the genuine Chinese article, the color of which is natural to the material and not to the effect of a dye.

NANKING (nān-kīng'), or **Nankin**, a city of China, capital of the province of Kiangsu, 550 miles south of Peking. It is finely located on the Yangtse Kiang, is surrounded by a wall about forty feet high, and is noted as one of the centers of Chinese literature and learning. The city has an important navigation trade and manufactures of satin, porcelain, utensils, fireworks, wearing apparel, and toys. Anciently the city was known as Kin-ling. It formed the

seat of the Han dynasty from 206 B. C. to 25 A. D., and in 1368 was made the southern capital of China by the Ming dynasty. In the latter part of the 14th century its importance was lost for the reason that the capital was removed to Peking, and from 1853 to 1864 it was held by the rebellious Taipings as their seat of government. At that time the porcelain tower, a structure 200 feet in height, built in 1432, was destroyed, and in the same insurrection many of the tombs, palaces, and other public buildings were put in ruins. Population, 273,540.

NANTES (nānts), a city of France, capital of the department of Loire-Inférieure, 210 miles southwest of Paris. It is located on the Loire River, 38 miles from the ocean, and is important as a navigation and railroad city. Nantes is beautifully built of brick and stone. It has well-paved streets, electric lights and street railways, and many interesting buildings. The ducal castle served as a residence of Charles XIII. and several succeeding kings. Its cathedral, founded in 1432, has a monument to the Duke and Duchess of Brittany. Other interesting buildings include the museum of natural history, the museum of paintings, and the public library containing 60,000 volumes. The harbor can easily accommodate 250 vessels, and the river has been improved in such a manner that the largest vessels may reach the city. Among the manufactures are cotton textiles, woolen and silk goods, sugar, chemicals, salt, cordage, optical instruments, furniture, spirituous liquors, sail cloth, machinery, and sailing vessels of all kinds. Nantes has an interesting history as a seat of Gaulish influence before the Roman occupation. It was for many years a possession of the dukes of Brittany, but when Anne of Brittany married Louis XII., in 1499, it, like her other possessions, became merged into France. The Revolution was particularly disastrous to Nantes, since fully 30,000 people were destroyed in the city and in its vicinity. Population, 1906, 133,247.

NANTES, Edict of, a famous decree signed at Nantes by Henry IV. of France, on April 15, 1598. By this decree religious liberty was granted to the Protestants, who were not only permitted to hold public meetings, but were made eligible to become officeholders under the general government. Under this decree they maintained four theological colleges. However, they were required to pay tithes to the Catholic priests and celebrate the Roman Catholic festivals. Louis XIV. signed a decree revoking the edict on Oct. 18, 1685, in consequence of which France lost fully 400,000 of her most industrious and intelligent citizens. Many of the

emigrants settled in Germany, Holland, Switzerland, America, and England.

NANTICOKE (nān'tī-kōk), a borough of Pennsylvania, in Luzerne County, on the Susquehanna River, twenty miles southwest of Scranton. It is on the Central of Georgia, the Lackawanna, and the Pennsylvania railroads, and is surrounded by a productive anthracite coal region. The noteworthy buildings include the high school, the public library, and the townhall. It has manufactures of machinery, ironware, earthenware, and utensils. The place was settled about 1850 and incorporated in 1874. Population, 1900, 12,116; in 1910, 18,877.

NANTUCKET (nān-tūk'ēt), a town of Massachusetts, county seat of Nantucket County, on Nantucket Island, 27 miles south of the peninsula of Cape Cod. The island is fifteen miles long and from two to four miles wide, and has an area of 45 square miles. The town is coextensive with the island. It has railroad conveniences, modern municipal facilities, and steamboat communication. Nantucket is noted as a health resort. Cod fishing is the principal industry. It was settled in 1659. Population, 1905, 2,930.

NAPHTHA (nāf'thā), an inflammable oil distilled from organic bodies, such as bituminous shale, asphalt, and coal tar, but principally from petroleum. It is light, volatile, and colorless. Naphtha is employed for a solvent, as in the manufacture of paints and varnishes, and as a burning fluid for illumination. The ancient Egyptians prepared naphtha from bitumen and asphalt for use in their lamps, and to this product the name was limited originally. As the science of chemistry became enlarged the term was applied to a number of inflammable, mobile, and volatile liquids. At present it is extended in its application to any liquid hydrocarbon and natural petroleum, or some of its volatile products. *Caoutchouc naphtha* is obtained by the dry distillation of crude India rubber. *Coal-tar naphtha* is the volatile mixture distilled from coal tar, containing xylene, benzene, and silver-hydrocarbon. *Coal naphtha* is distilled from rich bituminous coal. *Petroleum naphtha* is the more volatile portion of petroleum, which is collected separately during the distillation and placed on the market as crude naphtha, or again separated by distillation into gasoline, benzene, and refined naphtha. *Wood naphtha* is the well-known methyl alcohol and *shale naphtha* is distilled from bituminous shales or schists. Petroleum is found in large quantities in Pennsylvania, Ohio, Canada, China, Russia, and many other regions. It yields about twenty per cent. of naphtha and this is separated into gasoline,

benzene, and benzoline. In reducing coal, a tar is obtained which yields about fifteen per cent. of naphtha.

NAPHTHALENE (năf'thā-lēn), a solid crystalline hydrocarbon obtained from coal tar by distillation, but it also occurs naturally as a mineral. It burns with a highly luminous but smoky flame, melts to a clear liquid at 79°, and crystallizes into leafy crystals. A large number of substitution products may be formed by uniting it with chlorine bromine. A hydrocarbon known as *naphthyl* and kindred products are obtained by mixing a quantity of naphthalene with sulphuric acid, manganese, dioxide, and water, and heating it to a high temperature. Naphthyl alcohol is derived from naphthyl. From this product fine yellow dyes are secured for coloring wool, silk, and other textiles fine shades of golden yellow, lemon, and orange.

NAPIER (nă'pī-ēr), a town of New Zealand, capital of Hawke's Bay County, on the eastern coast of North Island. It is located on Hawke Bay, about 150 miles northeast of Wellington, with which it is connected by a railway. Among the chief buildings are a townhall, an Anglican cathedral, a museum, and a public library. The exports consist of wool, timber, and fresh and canned meats. Furniture, earthenware, and clothing are manufactured. Population, 1906, 9,876.

NAPLES (nă'p'lz), the largest city of Italy, on the Bay of Naples, 158 miles southeast of Rome. It occupies a fine site and is famed as a center of industry and commerce. The site is five miles long and three miles wide. Although the variations of temperature are sudden, it has a fine climate. The city has well-improved streets and all the modern facilities that appertain to the general convenience, such as electric lights, street railways, telephones, telegraphs, railroads, and public parks. It has fully 325 churches, many of which possess much beauty in architecture and finish. The Cathedral of Saint Januarius is a structure of great beauty. It contains the tombs of Pope Innocent IV. and Charles of Anjou and is decorated with beautiful statues and paintings. The city has a well-organized and liberally patronized public school system, a number of colleges, hospitals, charitable and benevolent institutions, a zoölogical laboratory, and a fine university founded in 1224. This famous institution has an extensive system of university courses, 5,150 students, and a valuable museum and library.

Naples has manufactures of porcelain, cotton textiles, woolen and silk goods, chemicals, perfumery, musical instruments, glass, soap, spirituous liquors, machinery, engines, vehicles, and

ships. The export and import trade is very large, being greatly facilitated on account of the convenient harbor in the Bay of Naples, at which terminate several canals and international railroad lines. In the vicinity of Naples tourists find splendid gardens and vineyards and many ancient ruins, among them remains of Roman temples, tombs, and palaces. Here are many relics from the ancient cities of Pompeii and Herculaneum. The life of Naples is cosmopolitan, owing to the fact that it is visited by tourists at all seasons of the year. It was founded many centuries before the Christian era by the Grecians. The early colonists came from the Grecian town of Cumae and the city was named Neapolis, meaning New City. This name was applied to distinguish it from Parthenope, an adjoining Grecian city. Population, 1906, 571,405.

NAPLES, Bay of, an inlet from the Mediterranean, on the western coast of Italy. It extends from Capo di Miseno, its northern limit, to Punta della Campanella, its southern limit, a distance of 35 miles. Near its entrance are the islands of Capri, Procida, and Ischia, and just north of it is the celebrated Mount Vesuvius. The natural scenery is remarkable for its beauty. Many destructive earthquakes have made its vicinity famous in history. On its northeastern shore is the city of Naples.

NAPLES, Kingdom of, a former political organization of importance in the history of Europe, which originated from the settlements made by Grecians at Parthenope and Neapolis. The first Greek settlements were founded in the vicinity of the Bay of Naples about the latter part of the 8th century B. C. These colonies rose to power and eminence by reason of the industry and warlike qualities of their inhabitants. They existed for many centuries as municipal or federative governments. Rome conquered Neapolis, the last of the Grecian cities, in 290 B. C., and the laws and customs were modified gradually in accord with those of their conquerors. Pyrrhus and Hannibal were unable to conquer it, but in 82 B. C. it fell under the government of the Sulla party, and during that period much damage was inflicted. In the time of the Roman Empire many of the wealthy people favored the region as a residence, largely on account of the fine climate, the fertile soil, and the literary center then existing at Neapolis. It was seized by Odoacer soon after the decline of the Western Empire, and in 190 A. D. became subject to the Goths. Belisarius took the city of Neapolis in 536. Totila sacked it six years later, but soon after it passed to the Lombards, who erected various independent duchies in the region tributary to it.

The Normans conquered the whole country in the 11th century and combined Naples and Sicily into a tributary kingdom. Soon after the German Hohenstaufen dynasty secured control. Under the administration of the German rulers notable strides of intellectual and social advancement were made, but in 1266 the Hohenstaufen power was subdued by the popes, who made Charles of Anjou sovereign of Naples and united with his kingdom the two Sicilies. Sicily became independent of Naples in 1282, but the dynasty established by Charles of Anjou governed until 1441, when the Aragon rule succeeded. In the reign of the princes of Aragon, France and Spain contended for supremacy, and in the early part of the 16th century Spanish influence predominated. It was governed more than a hundred years by Spanish viceroys. Masaniello led a well-organized revolt against Spanish supremacy in 1647. In this movement he was assisted by the Duke of Guise, but after the capture of the latter the country again became subject to Spain.

In 1707 Naples passed from Spanish sovereignty to Austria, but in 1735 it was made an independent monarchy with Don Carlos, the founder of the Bourbon dynasty, as sovereign. Ferdinand IV., son of Don Carlos, succeeded his father as king when that sovereign became King of Spain, in 1759, and in 1798 Naples was formed into a republic under the influence of Republicans from France, but soon afterward the king was restored by royalists. A French army of invasion entered Naples in 1806, when it was conquered and Napoleon proclaimed his brother Joseph king. Two years later Joseph was removed to Spain and his brother-in-law, Joachim Murat, ascended the throne of Naples. Murat was defeated in 1815 by Ferdinand, who executed the king and proclaimed himself Ferdinand I. He died in 1825, being succeeded by Francis I., and, when that sovereign died, in 1830, his son became king as Ferdinand II. The latter died in 1859 and was succeeded by Francis II. In 1860 the revolution under the leadership of Garibaldi attained success in opposing the Bourbon government, and in 1861 both Naples and Sicily were incorporated with the kingdom of Italy.

NARBONNE (när-bön'), a city of France, in the department of Aude, 92 miles southeast of Toulouse. It is located about six miles from the Mediterranean and has railway connections with the principal cities of France. The streets in the older part are narrow and crooked, but the newer quarters are well improved. The Church of Saint Just, a Gothic structure, is an imposing building with towers 194 feet high.

Other buildings include the theater, a museum, and several schools. The manufactures consist principally of leather, pottery, verdigris, and machinery. It has a large trade in salt, grain, and wine. Narbonne was founded by the Romans in 116 B. C., when it was known as Narbo. The Visigoths captured it in the 5th century, and later it passed to the Saracens. It has been a possession of France since 1467. Population, 1906, 28,852.

NARCISSUS, a genus of popular flowering plants, most of which are native to Europe, but many of them have been widely naturalized and greatly improved by cultivation. The plants are bulbous, the stems are rushlike, the flowers are bell-shaped, and the fruit is formed like capsules with globose seeds. Among the favorite species are those known as daffodils, jonquils, white narcissus, and polyanthus narcissus, these and others being cultivated



NARCISSUS.

extensively in gardens for ornamental purposes. The fragrance is admired. Perfumes made of the flowers are used in India for headache. Large quantities of narcissus are marketed in early spring by gardeners located near New York and other large cities.

NARCOTIC (när-köt'ik), a substance that relieves pain and produces sleep, if administered in small doses, by diminishing nervous action. When given in moderate doses most narcotics have a stimulating effect, but in large quantities they produce stupor, coma, and convulsions, and in excessive doses cause death. In medical use narcotics produce narcotism; that is, they bring the system under the influence of narcotics. The employment of these substances, if long continued, causes *narcosis*, an exaggerated effect or influence of the continuous use of narcotic substances. Among the different substances classed

as narcotics are tobacco, alcohol, camphor, opium, belladonna, hemlock, aconite, digitalis, henbane, and many others.

NARRAGANSETT BAY (när-rä-gän'sēt), an inlet from the Atlantic Ocean, extending a distance of 28 miles into Rhode Island. Its upper part is known as Providence Bay. The bay is from three to twelve miles wide, is well guarded by lighthouses, and contains a number



NARWHAL.

of beautiful islands, among them Prudence, Rhode Island, and Conanicut. Among the rivers that flow into the bay are Pawtuxet, Providence, Taunton, and Pawtucket.

NARRAGANSETTS, an Indian tribe of the Algonquin family, formerly found in the regions of Rhode Island which extend along the west shore of Narragansett Bay. They were generally more peaceable than most of the Indians of New England. In 1636 Roger Williams found a safe refuge among them, and exercised considerable influence in maintaining peaceable relations between them and the colonists. They ceded their land to the English in 1644, but in the latter part of the 17th century several difficulties arose, and at the time of King Philip's War they were suspected and attacked by the whites. In the hostilities that followed the tribe was almost annihilated. At present they number about 150, many having been assimilated by the whites. This small remnant occupies a reservation at Charlestown, R. I., but tribal relations have not been maintained since 1880. Many of the Narragansetts have become highly skilled as artisans, and have adopted the habits and language of the whites.

NARWHAL (när'hwäl), a mammal which is native to the northern seas. It is frequently called sea unicorn, or unicorn whale, because the male has a horn from six to ten feet long extending from the upper jaw. The horn is formed by an enlargement of one of the teeth of the upper jaw, usually the left tusk, though the right is sometimes developed. It is twisted spirally and grooved, and is pointed straight forward. The tusk is formed of ivory like the tusk

of an elephant, growing from a permanent pulp. It is sometimes found in the female. The narwhal attains a length of from fifteen to twenty feet. It is whitish in color with gray or darker spots, and has no dorsal fin. The female has no true teeth. The narwhal is found in large numbers in the vicinity of the 80th parallel north latitude, where it feeds principally on mollusca. It yields an oil more valuable than that of the com-

mon whale. Its skin is of use in the manufacture of various articles. The ivory of the tusk is hard and white and takes a high polish.

NASEBY (nāz'bī), a village of England, in Northamptonshire, twelve miles east of Rugby. It is celebrated for the Battle of Naseby, which was fought here on June 14, 1645, in the Civil War between Charles I. and the Parliamentary army under Fairfax and Cromwell. The former had 7,500 and the latter had 14,000 men. The Royalists were defeated with heavy losses.

NASHUA (näsh'ū-ä), a city of New Hampshire, one of the county seats of Hillsboro County, on the Merrimac and Nashua rivers, about forty miles northwest of Boston. It is on the Boston and Maine Railroad and has communication by several electric railways. The noteworthy buildings include the public library, the United States Fish Hatchery, the high school, and the Saint Francis Xavier church. Among the manufactures are cotton and woolen goods, paper, hardware, metal products, earthenware, machinery, railway cars, engines, and vehicles. An abundance of water power is obtained from the Nashua River. It was settled in 1655 and incorporated as a city in 1853. Population, 1900, 23,898; in 1910, 26,005.

NASHVILLE (näsh'vil), a city of Tennessee, capital of the State and of Davidson County, on the Cumberland River, about 185 miles southwest of Louisville, Ky. It is on the Louisville and Nashville, the Tennessee Central, and the Nashville, Chattanooga and Saint Louis railroads. The city has an area of 12 square miles. The streets are regularly platted and paved largely with brick and macadam. The State

Capitol, located on the summit of Cedar Hill, was erected at a cost of \$1,550,000. In its vicinity are the tomb of James K. Polk, President of the United States, and a statue of Andrew Jackson. Other buildings of note include the Union depot, the city hall, the county courthouse, the Federal building, and numerous business and office buildings.

Nashville is noted as an educational center, having fine public schools and many institutions of higher learning. It contains the Peabody Normal College, the Vanderbilt University, the University of Nashville, the Roger Williams University, the Central Tennessee College, the Fisk University, the Ward Seminary, and the Belmont College. Among the industrial and charitable institutions are the State lunatic asylum, the Tennessee Industrial School, the Tennessee School for the Blind, and the State penitentiary. Watkins Institute contains the collections of the State Historical societies. It has a Carnegie library, the Howard library, and the State library. About ten miles east of the city is the Hermitage, the home of Andrew Jackson. North of the city is a national cemetery, containing about 16,750 graves.

Nashville is noted as a commercial and manufacturing center. It is a distributing point for a large section of country, hence has an extensive wholesale and jobbing trade. The manufactures include flour, timber products, fertilizers, confectionery, machinery, farming implements, tobacco and clothing. An extensive electric street railway system supplies communication with many urban and interurban points. It is lighted by gas and electricity, has an extensive sewer system, and maintains waterworks and an efficient fire department.

The first settlement on the site of Nashville was made in 1780, when James Robertson and a company of pioneers located here. It was named Nashborough in honor of Abner Nash, Governor of North Carolina, but it was incorporated under its present name in 1784. The city charter dates from 1806. It became the permanent State capital in 1843. The Federals occupied it in 1862, and two years later it was the scene of an important battle. Its growth has been rapid the past two decades, both in population and wealth. Population, 1900, 80,865; in 1910, 110,364.

NASHVILLE, Battle of, an engagement of the Civil War, fought at Nashville, Tenn., on Dec. 15 and 16, 1864. General Thomas occupied Nashville with 56,000 Federals, having been sent there to defend Tennessee. General Hood arrived with 40,000 Confederates on Dec. 2 and took a position on Montgomery Hill, but storms prevented fighting for two weeks. On Dec. 15

Steedman attacked the Confederates on the right and Smith and Wilson advanced against their left. The next day a combined attack was made against Montgomery Hill and along the entire Confederate line, when both sides lost heavily and the Federals withdrew temporarily. Another assault by Smith and Schofield won the day for the Federals. General Hood retreated across the Tennessee River and asked to be relieved from the command. Both sides lost heavily, the Federals about 3,050 men and the Confederates somewhat more.

NASHVILLE, University of, an institution of higher learning at Nashville, Tenn. It was founded by the State of North Carolina in 1785 as Davidson Academy, but was afterward changed to Cumberland College, and in 1826 was reorganized under its present name. During the Civil War it was closed, but it was reopened in 1875, when the trustees and the trustees of the Peabody Fund established a teachers' training school. Later a medical school, a preparatory department, and a collegiate department were added to it. The endowment is \$115,500, the income is about \$85,000, and the university property is valued at \$350,000. It has a library of 22,500 volumes. The enrollment averages about 900 students.

NASTURTIUM (nās-tūr'shūm), a genus of aquatic herbs of the mustard family, known generally as the water cresses. The leaves in most species are pinnate, the flowers are yellow or white, and the seeds are borne in a marginless pod in which they are arranged in two irregular rows. A species known as the *garden nasturtium* has a stem about eight feet long and is



NASTURTIUM.

cultivated as a climbing annual. The name is applied also to a number of species of climbing plants of the geranium family, with which is included the *Indian cress*. Many species are cultivated for their handsome spurred flowers, which are of various colors, but usually crimson, scarlet, orange, yellow, or spotted. The fruit and flower buds have a pungent aromatic flavor and are pickled in vinegar, while the tender shoots are used as a salad. Some species grow

from cuttings, but several kinds are raised from the seed.

NATAL (nā-tāl'), a colony of Great Britain, on the eastern coast of South Africa, bounded by the Transvaal Colony, Portuguese East Africa, the Indian Ocean, Cape Colony, Basutoland, and the Orange River Colony. Including Zululand, it has an area of 35,371 square miles. The seacoast, which is quite regular, has few harbors, the one at Durban being the most important. Much of the soil is fertile, especially for a distance of about fifty miles inland, and along the western boundary are extensive ranges of the Drakensberg Mountains. These highlands have an altitude of 9,000 feet, but several peaks are higher, including Montague aux Sources, which is 11,165 feet above the sea. Numerous rivers supply drainage, among them the Umtamvuna, the Tugela, the Umlaze, and their tributaries. The agricultural products embrace tobacco, coffee, sugar cane, oats, cotton, corn, wheat, and tea. Valuable forests extend along the tablelands of the western part and yield excellent lumber. The mineral products include limestone, coal, gold, marble, ironstone, and mineral oil.

As a whole, the climate is not only favorable to the production of fruit, vegetables, and cereals, but is agreeable and healthful. Among the domestic animals are cattle, horses, swine, and poultry. Many wild animals are still found in the newer portions, among them antelopes, hyenas, leopards, lions, ant-bears, jackals, porcupines, and many species of birds. The average temperature is about 65° and the rainfall is 34 inches, but occasionally droughts occur. Locusts and the rinderpest sometimes cause much damage. The export and import trade is chiefly with Great Britain. About 1,200 miles of railway lines have been constructed and others are projected. Common and high schools have been established by government grants. Missionary stations are maintained by a number of American and European societies. Considerable progress has been made both in educational and industrial arts among the natives.

The legislative authority is vested in a Governor, who is appointed by the crown and assisted by a Council and an Assembly. Members of the Council and the Assembly are appointed by the Governor, but the appointments are subject to the approval of the ministers. General executive authority is exercised by the Governor, who is assisted by a Colonial Secretary, Minister of Education, Premier, Attorney-General, Colonial Treasurer, Minister of Public Affairs, and Minister of Public Work. A colonial judiciary is maintained. The government main-

tains a system of schools for the native inhabitants and grants aid to higher and industrial schools. Pietermaritzburg is the largest inland city and has direct railroad connections with interior points and with Durban. Other cities of note include Richmond, Verulam, Graytown, Harding, and Newcastle.

Vasco da Gama discovered the southeastern coast of Africa in 1497 and named the region Terra Natalis. The first settlements were made by the Dutch in 1720, but they proved a failure because of the hostilities of the natives. Many Boers left Cape Colony in 1836, after it became a British possession. They founded a permanent settlement at Port Natal, now called Durban, in 1839, and established an independent republic with Port Natal as its seat of influence. Later the capital was transferred to Pietermaritzburg, where it still remains. The British considered the existence of the republic incompatible with their interests. Hence, in 1843, they entered upon a campaign of conquest and the following year annexed it to Cape Colony, but in 1856 it was made a separate colony. Many conflicts took place between the Boers and British at different times, but the colony was maintained throughout the period. In 1878 it was the scene of an extended war with the Zulus, when Zululand was overrun, but it was not annexed until 1897. The Boers of the Transvaal entered the colony in 1881 and defeated the British at Majuba Hill. Population, 1908, 1,112,540.

NATCHEZ (näch'ěz), a city and port of entry in Mississippi, county seat of Adams County, on the Mississippi River, 100 miles southwest of Jackson. It is on the Yazoo and Mississippi Valley and the Orleans and Northwestern railroads and has regular communication by steamboats. The site consists of the river front, which has the principal business and shipping houses, and a bluff about 200 feet above the river, where the most costly residences are located. It is noted as an extensive cotton and produce market. Among the manufactures are cotton goods, clothing, ice, ironware, tobacco products, and machinery. The city has good municipal facilities, including pavements, electric lights, waterworks, and street railways. Among the chief buildings are the county courthouse, the Jewish synagogue, the Roman Catholic cathedral, the Fish library, the Stanton College, the Natchez Institute, and the Pearl and Natchez hotels. Near the limits is a national cemetery with 3,159 graves. The city was first settled by the French in 1716. It was the scene of a massacre by the Indians in 1849. In 1862 it was captured for the Federals by Admiral Farragut. Population, 1900, 12,210; in 1910, 11,791.

NATICK (nā'tik), a town of Middlesex County, Massachusetts, on the Charles River, sixteen miles southwest of Boston. It is on the Boston and Albany Railroad and several electric railway lines. The noteworthy buildings include the Bacon Public Library, the Walnut Hill School, the Morse Institute, and the townhall. It has manufactures of boots and shoes, carriages, furniture, toys, woodenware, and clothing. John Eliot, the Indian apostle, secured a grant of the land now occupied by Natick and until 1721 the community had a constitution modeled after Exodus xviii. The town was incorporated in 1781. Population, 1905, 9,609; in 1910, 9,866.

NATIONAL ACADEMY OF DESIGN, a society of painters and sculptors in New York City, founded in 1825, originally called the New York Drawing Association. The present name was adopted in 1828, when Prof. S. F. B. Morse (q. v.) was elected the first president. At that time the society had 30 members, made up exclusively of artists, but at present the membership is about 100. Besides these are a number of honorary members and fellows. It holds annual exhibitions, at which certain prizes are awarded for meritorious productions. The society maintains a school of design in painting, etching, and engraving, at which about 300 pupils attend.

NATIONAL ACADEMY OF SCIENCES, an institution incorporated in 1863 under an act of Congress, the purpose being to investigate and report on any subject of art or science. Until 1870 the membership was limited to 50, but since that year it has been constituted of not more than 100. Six groups of members are recognized, styled committees, including those on chemistry, biology, anthropology, geology and paleontology, physics and engineering, and mathematics and astronomy. The institution holds two meetings annually, at which prizes and medals are awarded to those who add to knowledge by original research in the departments to which they belong. Reports of the work done by the organization are made at the request of any department of the United States government.

NATIONAL CIVIC FEDERATION, an organization whose purpose is to promote peace and harmony in the industries, especially in regard to capital and labor. It was formed in New York City in 1901, when a number of prominent representatives of labor and capital held a convention and created a commission with the view of checking labor disputes, either by timely mediation or by formal arbitration. Among the representative men at the meeting were John Mitchell, Samuel Gompers, Grover

Cleveland, Mark Hanna, Charles W. Eliot, Archbishop Ireland, and John D. Rockefeller. This organization has prevented many strikes and has been instrumental in settling a number of labor disputes, including the great anthracite coal strike of 1902.

NATIONAL DEBT, the whole amount of money that a national government has stipulated to pay, whether the payments are to be made to other governments, to corporations, or to individuals. A national debt is now an institution of all civilized countries. The ability to contract such a debt depends principally upon the stability of the government, its natural resources, its means of military defense, and its various industries. Usually a national debt is created as a means to carry on military operations or commercial enterprises. The creation of such an obligation does not depend so much upon the ability of the nation to repay the money as it does to provide sufficient revenue to pay the interest, and to keep the principal within a reasonable limit as compared to the intelligence and natural resources of the country. Besides, a nation is the sole judge of its own solvency. It may not only repudiate its debts, but even during entire solvency the original obligations upon which the money was borrowed may be materially changed by its legislative authority. However, recklessness on the part of a nation has the same effect as in an individual and, as a result of injudicious financiering, its credit may be destroyed and its power to borrow money may become exhausted. In former periods it was quite impossible to contract large national debts even by the most powerful governments. At that time a policy of collecting funds for extraordinary contingencies was adopted by many nations, as in the case of early Rome, where a sacred treasure was accumulated from certain sources and kept secure in the temple of Saturn. This policy is still a part of the existing method of the German Empire, which nation, while maintaining a national debt, has invested funds to offset its liabilities. For instance, in 1882 the debt of Germany amounted to about \$120,000,000, while the invested funds aggregated \$185,000,000, thus having to its credit \$65,000,000 above its aggregate indebtedness.

The established governments did not begin to contract national debts until extensive systems of credit became recognized. Since that time the bonds, or evidences of indebtedness, of the various nations have been kept on the markets of the world. As a general rule the quotations have varied according to the rate of interest, the time specified for payment, and the stability

of the nation issuing the bonds. Many writers on economics have advanced the theory that ultimately the vast indebtedness of nations would not only ruin their credit, but would require a widespread repudiation of their obligations. However, fears of this character are in the main groundless, since a world policy of nations requires them to meet their obligations or become merged into other governments that do have ability to make good the indebtedness. On the other hand, it has been asserted by writers of recognized authority that the institution of a national debt is the first evidence that a nation trends toward civilization. This is noticeable particularly in the case of Japan, where only a comparatively short time ago no national debt existed, but with the rise of its extensive industrial activity, such as the establishment of railroads, canals, harbors, manufactories, schools, and highways, there has grown a national debt quite as large as that of many European countries.

The usual way of instituting and maintaining a national debt is by the issuance of bonds. These bonds are made to mature at a definite time and bear a specified rate of interest, which is payable quarterly, semiannually, or annually, and the particular kind of money in which the obligation is to be paid is especially named in the bond. In the United States the bonds were formerly payable in lawful money of the United States, but at present they are payable in coin. Besides its resources of securing money upon bonds, the government has in circulation paper currency, known as greenbacks, which are virtually a part of the debt of the nation, but they bear no interest and are payable at the United States Treasury on demand. To defray the interest and reduce the national debt, the United States government maintains a tariff tax on imports and the so-called excises on spirituous liquors and tobacco. At divers times stamp taxes were levied, under which it became necessary to attach revenue stamps to various documents, and taxes upon the incomes of individuals were maintained in different periods.

The national debt of the United States dates from 1789, when the American colonies became a united nation. At that time the country suffered from the distressing war of the Revolution, when irredeemable paper money was issued and the young nation had no adequate income. Money had been borrowed from Holland and France and on Jan. 1, 1790, the United States assumed the payment of the debts of the several states, the total indebtedness amounting at that time to \$71,000,000. The War of 1812 caused a great increase of the national debt. In 1816 it

amounted to \$127,334,933, but the abounding prosperity then existing made it possible to pay off the entire sum by 1835, and for a few years the debt was but a few thousand dollars. The Mexican War caused another enormous increase, until in 1850 it amounted to \$63,452,773. At the beginning of the Civil War, in 1861, there was a national indebtedness of \$90,580,873, but the expenses of the first year of the war were estimated at \$300,000,000, while the revenue was only \$60,000,000. To make up the necessary funds the government began to borrow heavily instead of taxing, and the long struggle that followed made it necessary to resort to borrowing to an unfortunate extent. In 1900 the national debt, less the cash in the treasury, was \$1,107,711,257. The contracted national debt of the United States since the beginning of the Civil War is given in the following table:

1862.....	\$ 524,176,412	1880.....	\$2,120,415,370
1863.....	1,119,772,138	1885.....	1,863,964,873
1864.....	1,815,784,370	1890.....	1,552,140,202
1865.....	2,680,647,869	1895.....	1,676,120,983
1866.....	2,773,236,173	1900.....	1,107,711,243
1870.....	2,480,672,427	1905.....	1,282,357,094
1875.....	2,232,284,531	1909.....	2,864,931,602

It is a remarkable fact that the rate of interest has been decreasing steadily on national debts. In many countries the rates range from 2 per cent. to 5 per cent. per annum, though in some cases the interest is from 3 per cent. to 6 per cent. Where the rate of interest is favorable to investors and the country is credited with ordinary stability, bonds usually sell at a premium, though there are instances in which the bonds are sold at a considerable discount. France has been remarkably prosperous with an enormous national debt, its prosperity ranging generally with the increase of its indebtedness. This fact is accounted for by economists in that an abundance of money lessens its purchasing power, and correspondingly increases the price of labor and the products resulting from applied intelligence. Hence, with an increase of indebtedness in France and other countries there has been a corresponding increase in the amount of money in circulation per capita, and the business prosperity has been materially influenced as a consequence. See **Debt**.

NATIONAL GUARD, a kind of militia organized in France in 1789, as a protection during the Revolution. It was made up largely of citizens of the middle class and the members were under control of the municipalities. Paris had 48,000 members, who were placed under the command of Lafayette, and later he received control of the entire organization in France, about 4,000,000. Napoleon defeated and disorganized the National Guard in 1795, but it was reorganized in 1814 and in 1830. In the Franco-

German War the National Guard played an important part and after the war, in 1871, it served to oppress the insurrection of the Commune. It was abolished when the republic of France was established. In some countries of Europe and a number of states in the United States, the militia organizations are called National Guards.

NATIONAL HYMN, a popular tune or hymn used by the people of a nation, expressing the sentiments of loyalty and patriotism. In some cases hymns of this kind are selected by common consent, becoming popular through general usage, but in other instances they are selected by the legislature and made national through an enactment or a royal decree. It may be said that most national hymns are the outgrowth of folklore, or the results of a national event, the details of which are written in verse and set to music. All the nations have popular hymns of this kind, of which the following are the most important:

Argentina, Oid, mortales, el grito sagrado (Hear, O Mortals, the Sacred Call).

Austria, Gott erhalte unsern Kaiser (May God Preserve and Keep Our Kaiser).

Bohemia, War-song of the Hussites.

Brazil, Hymno da Proclamacao da Republica (Hymn of the Proclamation of the Republic).

Denmark, Kung Kristian stod ved hojan mast (King Christian stood beside the Mast).

Egypt, Salaam, Effendia (March of the Khe-dive).

Finland, Vart land (Our Land).

France, La Marseillaise.

Germany, Die Wacht am Rhein (Watch on the Rhine).

Great Britain, God Save the King.

Holland, Wilhelm van Nassau (Wilhelm of Nassau).

Italy, Royal March.

Japan, Keemee gajo (May the Empire Last).

Mexico, Menicanos, al grito de gurra (Mexicans, at the Cry of War).

Peru, Somos libres, seamoslo siempre (We are Free, let us be so ever).

Prussia, Heil dir im Siegerkranz (Hail you in Victory's Wreath). Deutschland, Deutschland, über alles (Germany, Germany, over all).

Russia, Boghe Zaria chrany (God Protect the Czar).

Spain, Himno de Riego.

Sweden, Ur svenska hjertans (Out of the Swedish Heart).

Switzerland, Rufst du, mein Vaterland (Call'st thou, my Fatherland).

United States, Star Spangled Banner; Hail Columbia.

Venezuela, Gloria al bravo pueblo (Honor to a Brave Nation).

NATIONALIST, a political party in Ireland, whose chief aim is to obtain independence from Great Britain. The adherents to this organization are more or less closely affiliated with the Land League, which was formed to promote the principle of Home Rule for Ireland.

NATIONAL MONUMENT, or the *Denkmal*, a monument of Germany, erected to commemorate the establishment of the German Empire in 1871. It is located on the Rhine, opposite Bingen, and stands 740 feet above the river. A beautifully decorated pedestal contains the statue of *Germania*, a female figure decorated with a laurel wreath and a sword, and wearing an imperial crown.

NATIONAL MUSEUM OF THE UNITED STATES, a depository of valuable collections at Washington, D. C. It is located near the Smithsonian Institution, in the south central part of the Mall, immediately west of the Army Medical Museum. Congress authorized the construction of a building in 1879, but a grant of \$3,500,000 for a new building was made in 1903. This museum includes many historic relics of the government and of many public men, including Washington, Franklin, Jefferson, and Monroe. It contains the collections secured by scientific expeditions, numerous costumes and articles that have come down from the races of America and Europe, and vast exhibits showing the minerals, manufactures, and animal life of America. It is supported by an annual appropriation from Congress. Admission is free to the public at certain hours of the day. Several publications are issued that treat of the newly acquired facts in the sciences and the discoveries made from time to time in relation to plants and animals. The building in which the collection is housed has many large rooms, all of which are more or less completely filled with exhibits of value.

NATIONAL LIBRARY. See **Library of Congress**.

NATIONAL PARK. See **Yellowstone Park**.

NATURAL BRIDGE, a remarkable natural formation of the United States, in Rockbridge County, Virginia, 115 miles west of Richmond. It is a natural bridge of rock across Cedar Creek, spanning an opening 80 feet wide. The bridge has a width of 100 feet and is 215 feet high. It is crossed by a public road.

NATURAL GAS, a product found widely distributed as a deposit in the crust of the earth. It is regarded by chemists as resulting from the decomposition of animal and vegetable remains.

The principal element is marsh gas, but it contains varying quantities of oxygen, hydrogen, nitrogen, carbonic acid, ethylene, and carbonic oxide. Natural gas varies in composition according to the different regions where it is produced, and lacks some of the elements that form manufactured illuminating gas, particularly the hydrocarbon. Accounts of burning springs and wells have come down to us from remote antiquity, especially from different regions of Asia and Europe, and fissures from which gas escaped were discovered in the early settlements of America. In 1821 the first attempt to utilize the gas in America was made at Fredonia, N. Y., where it was used for illuminating purposes.

The first extensive gas deposits were discovered in the Ohio valley, in 1866, while drilling for petroleum, but its commercial value did not become apparent until about 1884, when the enterprise of prospecting was conducted in various sections of the United States. Extensive deposits are utilized at present in Pennsylvania, Ohio, Indiana, Kansas, Texas, Louisiana, and various regions of Eurasia and Africa. It is usually found in connection with petroleum, but sometimes with salt beds, and issues from the openings with more or less force. In many cases the pressure is very great. Owing to this pressure it has been found practical to conduct the gas through pipes long distances for illuminating and manufacturing purposes.

The greatest natural gas fields extend along the west side of the Allegheny Mountains, from New York through Pennsylvania, West Virginia, Ohio, Indiana, Kentucky, and Tennessee, the most productive fields being in the Ohio valley. The gas fields of Kansas are located in the vicinity of Iola, where a single well supplies 10,000,000 cubic feet per day, and enormous quantities are used to reduce lead and zinc ores produced in the vicinity of Joplin, Mo. Remarkably productive gas deposits are located in the vicinity of Beaumont, Tex. In some cases it is necessary to go 3,500 feet to reach the gas deposits, and in many instances the pressure is sufficient to lift many tons into the air. However, it has been found that the pressure gradually lessens after flowing for a long period of time. This circumstance has led some writers to believe that the supply will become exhausted in a comparatively short period.

NATURAL HISTORY, the history of universal nature or of natural objects, treating specifically of their qualities, forces, origin, and the laws of existence. In general it embraces the branches of botany, chemistry, mineralogy, geology, natural philosophy, paleontology, and zoölogy. In a more limited sense it refers only to

botany and zoölogy, and some writers restrict the term entirely to zoölogy. In most schools as at present organized, the term natural history is confined to biology, being a study of organic nature.

NATURALIZATION (nät-ŭ-räl-ĭ-zā'shŭn), the process by which an alien or foreigner may become a citizen in the country where he wishes to reside. Naturalization laws are passed in the different nations according to the regulations and rules recognized by treaty with the countries from which the aliens have emigrated. The process involves renouncing allegiance to one country and assuming the duties of citizenship in another. This right was recognized by the United States from the beginning of its history, and a denial of it by Great Britain was one of the causes of the War of 1812. England at that time held that an Englishman always remains an Englishman and accordingly impressed citizens of the United States into its service. It undertook to punish for treason a number of individuals who had taken up arms against that country. However, in 1870 Great Britain recognized the right of its subjects to renounce allegiance to that country, although both the mother country and many of the colonies had previously recognized the right of aliens to become citizens. Before the adoption of the Constitution the several states had the exclusive control of naturalization, and accordingly the period for becoming citizens varied widely as to the time required for completing full citizenship and in other respects. At present the entire matter is regulated by national law, and the time required to complete naturalization is five years.

A declaration under oath setting forth that the alien desires to become a citizen may be made immediately on coming to United States territory, but in all cases there must be two years between the first declaration and the completion of citizenship. Persons who have served in the army or navy of the United States are entitled to a reduction from the five-year limit, by the exact length of time of such service. Children of persons duly naturalized at the time the children were under the age of 21 years become citizens when they reach the legal age of 21 years. The right to vote comes from the State, hence the State may confer upon persons who are not citizens of the United States the right to vote. Thus, in several states the right of suffrage is conferred upon persons of foreign birth otherwise qualified, who have declared their intentions to become citizens of the United States. The states where this regulation now is in vogue include Arkansas, Florida, Georgia, Indiana, Kansas, Michigan, Minnesota, Nebraska, North

Carolina, Oregon, Texas, and Wisconsin. Several of the states require that the individual shall be able to read the constitution in the English and that he shall be a taxpayer.

An alien may hold and transfer property in Canada, but he cannot vote or hold an office. Three years' residence or three years' service in the army are required before an alien may become naturalized in the Dominion. However, an alien is not required to forswear allegiance to his country of origin, as in the United States, but need only to swear or affirm allegiance to the reigning sovereign. A married woman is a citizen of the Province in which her husband is a subject. The children of parents who are naturalized are considered subjects of Canada.

The naturalization laws of Great Britain are not exclusively national, but depend upon the particular colony in which application is made, though in most cases five years' residence or military service is required. In Germany the laws permit naturalization of all persons coming from countries that recognize their right to renounce allegiance, but they make the additional requirements that the individual possess a good moral character and visible means of support. France recognizes naturalization after three years' residence, but any one residing there for ten years becomes a citizen for all purposes without any preliminary ceremony. Naturalization of the husband is recognized as sufficient to entitle the wife to all the privileges accorded to her sex in any of the countries recognizing naturalization. In nearly all countries the minor children of a father who became a naturalized citizen attain the full privileges of citizenship when they attain majority.

NATURAL SELECTION, a term applied by Darwin in relation to his theory of the origin of species. According to it some plants and animals survive and propagate under conditions of nature favorable to them, while the forms not peculiarly fitted to survive disappear. This theory implies that all species of plant and animal life vary more or less through the different climatic epochs, and that the structure of the young becomes modified in relation to the parent, and that of the parent in relation to the young. It is assumed that at first only a single kind or a few species existed. As these became perpetuated under natural selection, new characters differing widely from the original stock appeared, the new forms being different from the original both in structure and function to such an extent that they became regarded as new species. *Artificial selection* is a term applied in opposition to natural selection, and has reference to the domestication and breeding of such

animals as horses, swine, cattle, sheep, dogs, and many others. The methods employed in artificial selection are in imitation of the processes found in nature, the product derived from such process often differing to a great extent from the original type. Natural and artificial selection imply the survival of the types best fitted to be perpetuated naturally, or for the purposes of use in commercial or other enterprises. The mule is a good example of the profitable employment of artificial selection.

NATURAL THEOLOGY, the science which treats of the mutual relations between God and man as they may be learned by the study of nature, instead of through revelation. It proceeds upon the theory that the Creator is revealed through his work, by the things or beings created, and may therefore become known to those who investigate the evidences that are obtainable in the universe.

NATURE STUDY, the subject which involves a study of objects in nature, such as plants, animals, and minerals. No theme is of greater interest to students in the common schools than the material world which surrounds us. The intellectual powers of man being an essential feature of man's nature, they demand exercise. This exercise is invariably accompanied by an intense pleasure, especially if the mind is engaged in contemplating objects which awaken new knowledge and stimulate the interest by new and attractive features. Indeed, the physical well-being of man depends upon his coming into proper relations with physical nature. Since it is important for him to understand these relations, it is essential that the mind of youth be enlightened in regard to them.

The order in which the objects of nature, or the sciences which are suitable for the common schools, should be studied, may be considered of interest in contemplating the study of nature. Plants, for instance, are among the simplest and most common objects with which we come in contact. The child is interested in examining the structure of the plants and the growth of the various parts. An appeal is also made to his powers of grouping, or, in other words, of classification. In botany the pupil has a large field for these two activities. The same is true of the study of zoölogy, but the processes are a little more complicated. Therefore, the study of animals should follow the study of plants. From these the pupil may proceed to geography, the elements of physics and chemistry, the study of minerals, and ultimately to physiology. All the departments of this instruction should be accompanied by practice work in drawing and

composition, intensifying the interest by conversational lessons and the study of gems from literature. Below is an outline which serves to indicate an elementary course of what to teach in nature study for the three terms of a common school:

OBJECT:

1. To increase the power of observation in children.
2. To awaken and enlist the interest of the children in their immediate environment.
3. To give practical information about the common things of life.

I. FALL TERM.

A.—The common flowers, fruits, grasses, weeds, leaves, trees, etc.

1. Collect specimens and bring to schoolroom for study. (Where possible, children should make the collection.)
2. Make study of each specimen as to color, size, form, where found, how grown, short description, use, etc.

3. Represent each in color work in drawing. (The best drawings at the time to be collected and preserved.)

4. Collect pictures of these things and classify for study.

B.—The more common insects and worms.

1. Covering, color, size, form, habits, and use. (Specimens to be collected, brought into the schoolroom, studied, and preserved for future use.)

2. Collect and classify pictures for study.

3. Represent in color drawings. (Preserve the best.)

C.—Domestic and common wild animals.

1. Covering, color, size, habits, and use. (Children to make observations and tell what they observe.)

2. Collect and classify pictures for study.

3. Represent in color drawings. (Preserve the best.)

D.—Domestic fowls and birds.

1. Teach something of color, size, habits, dress, and use of each. (Children to be given an opportunity to make observations about these fowls and birds.)

2. Collect and classify pictures for study. (Where possible to get a stuffed specimen, do so.)

3. Represent in color drawing, as far as possible, a picture of each. (Preserve the best.)

E.—Observations on the weather.

1. Clear and cloudy days.
2. Calm and windy days.
3. Warm and cold days.
4. Rainy days.

5. Make chart indicating simplest observations and preserve it.

6. As far as possible, collect pictures.

7. Represent in color drawings little scenes showing sunshine, clouds, etc.

F.—Observations on the surface of the earth and simple directions and distance taught.

1. Hill, hollow, brooklet, stream.

2. Represent these in drawings.

3. North, south, east, and west.

4. Far and near, etc.

G.—Literature and language.

1. Memory gems and poems about nature.

2. These to be selected and suited to the topic under consideration and taught at the time.

3. Story of Hiawatha.

4. Other stories, as "Little Red Riding Hood," "The Three Bears," etc. (These to be acted and played.)

H.—Finally, as a fitting close for the fall work, the idea of the ingathering of the harvests, as represented in the Thanksgiving Celebration, etc. The Evening of Life.

II. WINTER TERM.

A.—Preparation of different things for winter.

1. Flowers, grasses, weeds, trees, etc., closing of the buds, changes in the grass, weeds, trees. Why?

2. Insects; change. What becomes of them?

3. Fowls and birds; change. Migration of birds.

4. Animals change in covering. Why?

5. Continue observations on weather—snow, ice, cold, frost, and fire.

6. Winter scenes represented in drawings.

7. Pictures collected and classified.

8. Children's sports and games.

9. Memory gems and poems suited through the season.

10. Continue the study of stories, acted and played. The idea here represented is that all nature goes to sleep. It is the Nighttime of Life.

III. SPRING TERM.

A.—Preparation for spring.

1. Opening of the buds. (Get the earliest buds and twigs for study.)

2. The springing up of the grass and weeds.

3. The leafing of the trees.

4. The flowering of the plants.

5. The coming of the birds and insects.

6. Change in the animals—shedding of their winter coverings, etc.

7. Change of fowls.

8. Memory gems and poems suitable to the season and the lesson.

9. Stories acted and played.

10. Pictures collected and classified. The idea here represented is the awakening of all nature. The Morning of Life.

NATURE WORSHIP, the worship of the personified powers of nature, forming a crude religion. It is based upon the belief that the objects of nature possess certain powers or spirits through which they are able to aid and direct mankind. Two classes are more or less distinctly recognized, one of which regards the object itself as a divinity and the other considers it merely as the abode of a divinity. Water has long been worshiped as divine, while others worship the locality or the stream rather than the water itself. Such may be said of the American Indians, who looked upon Niagara as a great spirit, but did not consider water as a divinity. The Aztecs regarded the East Wind a deity, while the Hindus look upon the Ganges as a sacred stream. Many of the early philosophers supported some form of nature worship, such as a deification of fire, of certain mountains, and of the sun.

NAUGATUCK (nə'gā-tŭk), a town of Connecticut, in New Haven County, on the Naugatuck River, 25 miles southwest of Hartford. It is on the New York, New Haven and Hartford Railroad. Among the noteworthy buildings are the Whittemore High School, the public library, the Sacred Heart Academy, and the Salem School. It has manufactures of rubber goods, clothing, earthenware, and machinery. The surrounding country is fertile, producing cereals, grasses, and dairy products. It has a considerable trade in merchandise. Waterworks, electric lights, and rapid transit are among the general improvements. Naugatuck was first incorporated in 1844. Population, 1910, 12,722.

NAUTICAL ALMANAC. See *Almanac*.

NAUTILUS (nə'ti-lŭs), the name applied formerly to a large genus of mollusks. At present it is confined to only three existing species. Fossil remains indicate that more than one hundred species lived in the different geological periods. Those now existing are found in the southern seas, where they creep at the bottom of the water. The nautilus is distinguished from the cuttlefish by a shell. It lives in the outer chamber of the shell and has a number of tentacles around the mouth. Its eyes are saclike and the head and arms protrude from the many-chambered shell, which is formed like a spiral. The animal occupies the inner chamber when young, and each chamber is occupied in succession by the animal advancing at intervals as it increases in size, forming the larger chamber and partitioning off the last one occupied.

The species known as *pearly nautilus* has a thin crust covering the shell and beneath it is a porcelainlike formation. At the interior the structure is of mother-of-pearl. Another common species is known as the *paper nautilus*, or *argonaut*, so called from its alleged tendency to lift its arms while swimming at the surface of the water. These mollusks propel themselves by means of squirting water from the arms. They are thought to be able to store air in the unoccupied chambers of the shells and, by filling or exhausting them of air, to change the total weight for the purpose of rising or sinking in the water. The food consists mostly of crustaceans. Many of the natives of the East Indies and other tropical islands catch the pearly nautilus for its shell, which they use in making ornaments, while the Fijians and others esteem it as an article of food.

NAUVOO (nə-vōō'), a town of Hancock County, Illinois, 32 miles southwest of Burlington, Iowa. It is surrounded by a farming and fruit-growing country. Nauvoo has several schools, a Catholic academy, and a number of manufactories. It was founded in 1840 by the Mormons and in 1846 had a population of fully 15,000. Joseph Smith and his followers erected a fine temple, but after the assassination of that prophet the structure was destroyed. Subsequently a community of French socialists, called Icarians, was established in Nauvoo under M. Cabet, but the experiment proved a failure. Population, 1900, 1,321.

NAVAJOES (nə'vä-hōs), or *Navahos*, an Indian tribe of North America, belonging to the Athabascan family, formerly found in the northern part of Arizona and New Mexico. They first became known to the Spaniards in 1630. Attempts made by the Mexicans to reduce them failed at different times, but in 1863 they were defeated by Colonel Carson. They now occupy a large reservation in the adjoining corners of Arizona, Colorado, New Mexico, and Utah, where they carry on farming and stock raising. The principal products are corn, wheat, fruits, vegetables, horses, cattle, mules, goats, and



NAUTILUS.

sheep. Government schools are maintained for their instruction, and many have shown remarkable aptitude in taking up the civilized arts of industry and education. However, they have been persistent in maintaining their language and customs. The tribe at present numbers 20,500.

NAVAL ACADEMY, a government training school maintained by the United States at Annapolis, Md., which trains cadets for the American navy on a similar basis as those trained for the army at the West Point Military Academy. The institution is situated on a site near the Severn River, which was formerly occupied by Fort Severn. Fifty acres of ground are inclosed by walls, but in addition there is a tract of 109 acres, and these, with the facilities afforded by the Severn River, provide ample accommodations for practical exercises and instruction, both on land and in the manipulation of vessels on water. The institution is supplied with vessels for practical training. It has an efficient corps of instructors and an attendance of about 885 students. Its course of study provides four years of academic work, which is supplemented by two years' practical instruction at sea. The course is uniform for all students the first three years, while in the fourth year the study of engineering is pursued by engineer cadets. Graduates are commissioned according to the branch of service for which the cadets have prepared, the positions being that of ensigns, second lieutenants of marines, and assistant engineers. Cadets receive their appointment from members of Congress, each Senator, Representative, and Delegate having the right to appoint a cadet every two years. Eleven additional cadets are appointed by the President of the United States. Searching examinations in relation to physical and educational matters are required after appointment, and only those showing a high degree of qualification are admitted.

NAVAL OBSERVATORY, an institution founded by the government of the United States in 1842. It is located at Georgetown Heights, Washington, D. C., and is under the supervision of the Bureau of Navigation. The purpose of this institution is to make research in astronomical phenomena, and the buildings and equipments rank among the most extensive of the kind in the world. It has many modern appliances, such as astronomical clocks, transit instruments, photoheliographs, and a library of 22,500 volumes. Among the equipments is a 26-inch refracting telescope made by Alvan Graham Clark, with which Asaph Hall discovered the satellites of Mars in 1877. Several period-

icals are issued, including the *Nautical Almanac*, which has appeared regularly since 1894.

NAVAL RESERVE, or *Naval Militia*, a force of men maintained as an adjunct to the regular naval forces. In Great Britain this reserve is divided into three classes known as the royal naval reserve, the royal fleet reserve, and the pensioners. These three classes include about 43,500 men, to which is added the coast guard of 4,200 men. In the United States the naval reserve is a part of the national guard and consists of about 5,000 officers and men. During the time of peace they are employed in various lines, including guard service and assignments in the life-saving service. France has about 50,000 naval reserves and Germany has 74,000. These men receive more or less training for their duties. In some countries they consist largely of those who serve a term of enlistment in the navy, after which they volunteer or are drafted into the naval reserve.

NAVAL SCHOOLS, a class of schools that train officers and men for service in the navy. The leading nations maintain institutions of this kind, though they differ somewhat in the requirements for admission and the courses of study offered to the students. The Naval Academy (q. v.) at Annapolis, Md., is the leading institution of this kind in the United States. At Newport, R. I., is the Naval War College, at which officers are instructed and plans are prepared for naval operations. Goat Island, in the harbor of Newport, R. I., is the seat of the Naval Torpedo School. Other institutions of a similar kind are located at Port Royal, S. C.; Lake Bluff, Ill.; and San Francisco, Cal. The leading naval school of Great Britain is located at Dartmouth, England, that of Germany is at Kiel, that of Denmark is at Copenhagen, and that of France is at Brest. A large part of the actual training is on board of seagoing ships which carry a naval instructor. In most cases instruction in pilotage, gunnery, and torpedo management is given after leaving college.

NAVARINO (nä-vá-rě'nō), or *Neocastro*, a seaport on the southwestern coast of Morea, in Greece. It is situated in the nomarchy of Messenia, on the Bay of Navarino, and is noted for its excellent harbor and importance as a strategic point. Old Navarino is located at the northern part of the bay, Navarino on the southern shore, and the island of Sphagia is at its entrance. The bay was the scene of a noted naval battle in 425 B. C., when Cleon commanded the Athenian fleet against the Spartans, and after prolonged encounters attained a decisive victory. Another decisive battle occurred here on Oct. 20, 1827, when the allied navies of the Rus-

sians, French, and British destroyed the navies of Egypt and Turkey.

NAVARRA (nā-vār'ra), or **Navarre**, a province of Spain, but formerly a European kingdom. It is situated in the northern part of Spain, being bounded on the north by France. The province contains an area of 4,040 square miles. Ranges of the Pyrenees traverse the northern part, where extensive forests abound, and the regions in the southern part are noted for their fertility, being situated in the valleys of the Ebro, Aragon, and Arga rivers. The mountainous districts contain deposits of copper, iron, lead, salt, and other minerals. Among the agricultural products are grasses, wheat, corn, rye, flax, and hemp. It has extensive interests in the rearing of cattle and the production of fruits, spirituous liquors, cotton and woolen goods, and leather. Several important railroad lines traverse the province. Pamplona is the capital. The region was formerly occupied by the Vascones, who were conquered in the 5th century by the Goths, and subsequently the district formed portions of different possessions. As a kingdom Navarra included the Spanish province of Navarra and the French departments of Landes and Basses-Pyrénées. The kingdom dates from about the middle of the 9th century and ended in 1512, when Ferdinand the Catholic annexed the larger portion to Castile. Subsequently the remainder was added to the French possessions under Henry IV. Population, 1908, 301,048.

NAVEL (nā'v'l), the depression or scar on the abdomen of man, where the umbilical cord of the foetus was attached. The foetus communicates with the parent through the placenta, but in the adult the passage is closed, the healing after separation producing the familiar depressed appearance.

NAVIGATION (nāv-ĭ-gā'shŭn), the art or science of navigating by means of vessels from one port on the sea or ocean to another by the most available route. The term is likewise applied to the art of determining the direction and distance of a vessel at sea and to the art of measuring the course and position of vessels. The general working of the vessels by managing the sails, rudder, and other appliances belongs to seamanship. In practice the position of a ship at sea is determined either by keeping a record of the course in which it sails and the distance traversed, or by observing the heavenly bodies by means of spherical trigonometry. The former gives only approximate results, while general accuracy may be obtained by the latter. Vast improvements have been made in the science of navigation

since the Middle Ages. Those of material value include the invention of Mercator's chart, in 1569; the institution of tables of meridional parts, in 1579; the invention of Davison's quadrant, in 1600; the application of logarithms by Edmond Gunther, in 1620; the measurement of degrees on the meridian by Richard Norwood, in 1631; and the computation of longitude by Harrison's chronometer, in 1764. At present careful calculation is made of a ship's position in relation to its deviation from a direct course by reason of currents and winds, which is determined by what is known as *dead reckoning*, though no method may be regarded accurate, except the measurement of heavenly bodies by spherical trigonometry.

Navigation laws were first authorized in the United States under the Constitution, the earliest being passed in 1789. By the terms of the act of 1789 a tonnage tax of six cents per ton was levied on all American vessels, and one of fifty cents per ton on those owned in foreign countries and entering American ports. An act requiring American registration was passed in 1792 and the following year the coasting trade was closed to foreign vessels. That legislation highly favorable to American commerce should follow the American war of independence was to be expected. It was designed to secure a monopoly of the foreign trade for the United States, giving American shippers the advantage in carrying foreign products. In 1816 the navigation laws of the United States were modeled largely after those of Great Britain and consuls began to receive their fees from the government. At the outbreak of the Civil War tonnage taxes were renewed. They reached a rate of thirty cents per ton.

NAVIGATION ACTS, the name given to a series of laws enacted by the Parliament of England, designed to aid and protect commerce and extend the colonial interests of the nation. The first of these acts was passed in 1645 and, as subsequently amended, they provided that all importations into England were to be made with ships built within the country or its colonies and which were manned by English citizens. In 1663 an act was passed which required that all exports from the American colonies be sent to England and imposed prohibitive duties upon imports into the colonies, except upon those obtained from British ports. Later duties were imposed upon goods imported by one colony from another, provided the imports could be obtained in England. Parliament directed legislation against the development of manufacturing enterprises in the colonies as early as 1719, thinking thereby to develop industries at home,



FLEET OF THE UNITED STATES.

The greatest squadron that ever encircled the world, taking messages of friendship which its appearance showed to be worth having. The squadron was well received in the ports where it visited, particularly in Japan and the colonies of England.

Many commodities were not permitted to be exchanged among the colonies, but these acts subsequently gave rise to the practice of smuggling, which assumed large proportions before the American Revolution. In 1798 a new policy of navigation came into practice between France and America, which declared in favor of equality and reciprocity in trade. In 1789, after the adoption of the Constitution in the United States, import taxes and tonnage duties were enacted which gave the United States a practical monopoly in America. This tended to modify the navigation system of England, where the prohibitive navigation laws were finally repealed in 1824.

NAVY, the entire marine military force of a country under the control of the government, embracing vessels, men in the service, stores, yards, and all appliances. The term is applied quite generally to the entire shipping of a country engaged in trade and commerce, though as commonly understood it refers only to marine forces for aggressive and defensive operations.

ANCIENT. In ancient times the navies consisted mostly of *beaked vessels*, which were driven with much force against each other, in a manner similar to the rams used at present, though the propelling force consisted exclusively of oars. An ancient navy was usually made up of a large number of boats, each containing from one to three tiers of oars. The oars were operated by sailors sitting or standing at a convenient place, while sails were provided to be raised when it was designed to reach a point some distance from the place of starting. In the 7th century B. C. efficient navies were supported by the Carthaginians, Persians, Phoenicians, and Greeks. The first naval engagement recorded in history occurred in 664 B. C. between the Corinthians and their settlements established in Corcyra. A notable naval engagement occurred in 480 B. C. at Salamis, when Themistocles with a Grecian fleet defeated the Persians under Xerxes by taking advantage of his position in the narrow straits.

When the fleet of Athens was destroyed in the expedition of 414 B. C. against Syracuse, Carthage became the most powerful naval force, but with the rise of Rome that country established itself as the greatest naval power. The Romans partly discarded beaked vessels and constructed those fitted to carry a large force of armed men, who were trained to fight with arrows and javelins, after running the vessels alongside those of the enemy. Swift-sailing galleys were introduced by the Moors and peoples from Northern Europe, the Norsemen being particularly efficient in the construction of vessels calculated to

serve in plundering the coasts of civilized nations. Soon after whole fleets were constructed for this purpose by Genoa, Venice, Aragon, France, and Denmark. Venice became the great naval power of the Mediterranean and laid waste the fleet of Genoa and Turkey, but the development of Mohammedanism gave impetus to the naval development of Turkey and by the 16th century that nation became mistress of the Mediterranean. To counteract Moslem power an alliance of Christian nations followed and the Turks were defeated temporarily in 1715 at the famous Battle of Lepanto. In the early part of the 17th century Spain was the principal power upon the seas, its prosperity being due chiefly to the establishment of vast colonies in America. Holland was the most powerful rival of Spain, though both France and England began to attain eminence as naval powers.

MODERN. The history of modern navies begins with the destruction of the Spanish Armada in 1588 by the English, but the Dutch for nearly a century after that were recognized as the most important naval power in the world. In the reign of Charles II. a long struggle for mastery between the English and Dutch finally gave the former precedence. Throughout the 18th century the naval forces of England and France were practically equal, though the former were threatened seriously in the reign of Louis XVI. Russia began to develop eminence as a naval power at that time and the fleets of Holland and Spain likewise were reorganized and strengthened. However, in the early part of the last century Great Britain began to take precedence as the most extensive naval power in the world and its navy is still the largest of the nations. The first effort to organize a navy in America was made in the latter part of 1775, when thirteen frigates were ordered to be constructed. Some exploits were made with them in the Revolutionary War, but most of the naval achievements of that conflict were accomplished by the privateers. By 1781 all the English vessels in America were destroyed or captured. At the beginning of the War of 1812 the United States had about twenty vessels, while England had 830. The Americans were so generally successful on the seas that Congress made larger appropriations for the construction of vessels.

The first attempt at a *protected vessel* was made at Toulon, France, in 1859, when the *La Gloire* was launched, but ironclads did not come into use until after the armored *Monitor* invented by Ericsson proved the efficiency of that class of vessels in the Civil War. In 1864 the United States government had 588 vessels, but after the Civil War the navy was reduced, and

in 1882 there were but 38 that were capable of seagoing service. However, the navy has been increased materially within the last few years and now consists of more than 100 serviceable vessels. It includes about 30 battleships, twenty cruisers, six double-turreted monitors, and a large number of torpedo boats, the ram *Katahdin*, many unarmored vessels, and several wooden vessels. According to a regulation established as early as 1819, battleships are named after the States, cruisers after cities, and frigates after the rivers of the United States. The battleship is the most important vessel of the navy. It comprises practically a locomotive force and consists of a steel hull strengthened below the water line by longitudinal and transverse bulkheads, along the water line with heavy steel armor, and at the front and back by heavy curved protected decks.

The capacity of a battleship ranges from 1,000 to 2,000 tons, the displacement from 5,000 to 17,000 tons, and the speed from fifteen to nineteen knots per hour. Cruisers are vessels next in importance to battleships, and their construction is primarily for speed. They differ from battleships mainly in having little armor along the water line, the protection being chiefly by a thick protected deck, and by lighter plates than are provided on battleships. Cruisers also are smaller, carry a lighter battery, and their offensive and defensive power has been sacrificed for speed. All important fleets are now composed of battleships, armored and protected cruisers, scouts, torpedo vessels, and torpedo boats. Monitors and rams are kept to defend

United States the navy is under the control of the Secretary of the Navy, who has headquarters at Washington. The Spanish-American War of 1898 demonstrated the superior efficiency of the American navy in every respect, particularly by the complete destruction of the Spanish fleets in Manila Bay by Admiral Dewey and off Santiago de Cuba under Admirals Schley and Sampson.

Formerly Russia occupied sixth rank as a naval power, but the severe losses in the war with Japan have reduced it to the seventh place among the naval powers of the world. Below is a table showing the eight leading navies as classified since the Russo-Japanese War:

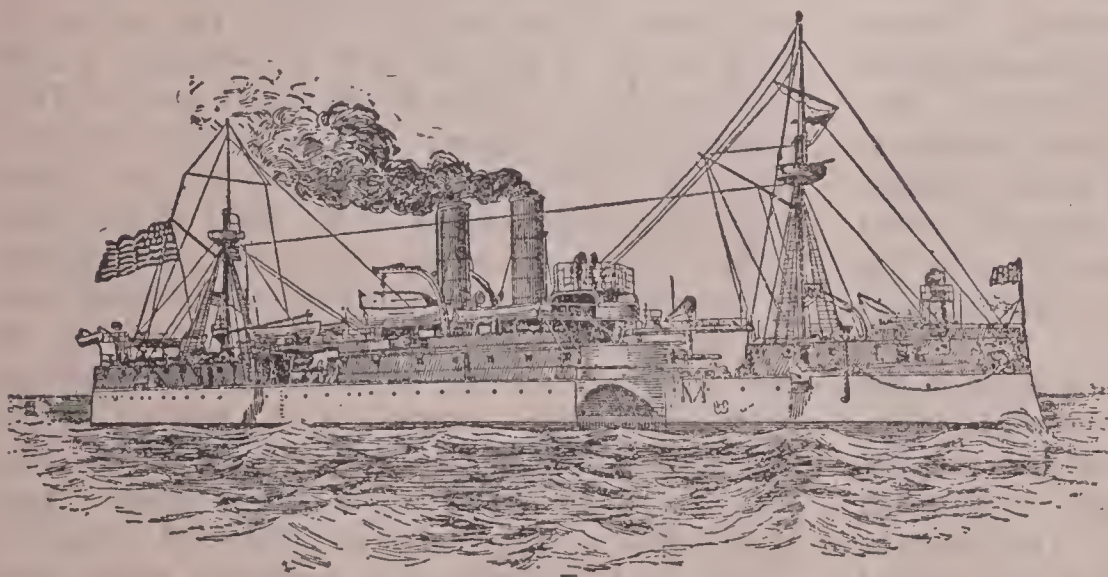
NATION.	FIRST-CLASS BATTLESHIPS.	TONNAGE.	MEN.
Great Britain.....	50	895,871	124,930
United States.....	27	316,523	32,109
Germany.....	26	441,249	37,610
France.....	16	603,721	54,300
Japan.....	15	252,661	39,942
Italy.....	8	254,510	26,950
Russia.....	7	224,237	56,770
Austria.....	2	112,336	11,000

NAVY, Department of. See United States, Departments of.

NAZARENES (năz-â-rēnz'), a term applied by the Jews to the inhabitants of Nazareth, afterward used to designate the early Christians in Judea. Later the name was applied to a sect that formed an organization near the close of the 1st century, whose adherents resided principally in Egypt. This peculiar sect, also called Ebionites, held doubts as to the divinity of Christ and adhered closely to the Mosaic law.

NAZARETH (năz-â-rēth), a town in Palestine, 64 miles north of Jerusalem, in the region comprising ancient Galilee. It is celebrated principally as the scene of the Annunciation and for being the home of Christ during his early life. The site of the town is among hills and the houses are principally of stone. It was overlooked by the early church for many years. The Christians first made pilgrimages to it in the 6th century, but at present it contains a Roman Catholic convent founded by the Franciscan monks and a

Greek Catholic church, the latter being on the scene of the Annunciation. Visitors are shown the place where Joseph's workshop stood, the table from which the last supper was eaten by the apostles, and the site of the synagogue out



BATTLESHIP.

harbors and gunboats are employed for service in time of peace, for cruising, and for police duties. The principal navies of the world include those of Great Britain, the United States, Germany, France, Russia and Italy. In the

of which our Lord was put by his townsmen. The population of Nazareth at present is 11,640, most of which is made up of Christians.

NAZARITES (năz'ă-rīts), a class of Hebrews, who were bound by oath to abstain from the use of wine and every other strong drink and from contact with the dead. Their hair was to be unshorn. Two classes of Nazarites existed at an early period, including those who took the vow for a limited period and those who took it for life. Samson was a Nazarite.

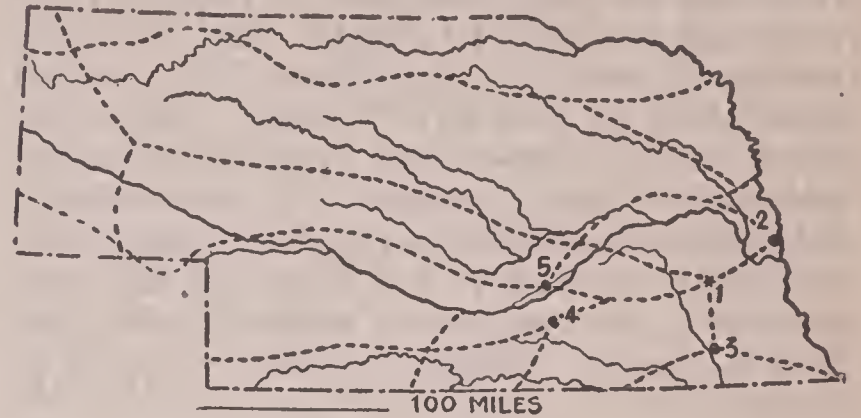
NEBO, Mount, an elevated mountain peak of Palestine, situated east of the Dead Sea. It is celebrated from the fact that Moses viewed the promised land from the summit shortly before his death, and because it is reputed to be his place of burial.

NEBRASKA (nĕ-brăs'kà), a central state of the United States, near the geographical center of the Union, known popularly as the *Planter State*. It is bounded on the north by South Dakota, east by Iowa and Missouri, south by Kansas and Colorado, and west by Colorado and Wyoming. The length from east to west is 420 miles; width, 208 miles; and area, 77,510 square miles, including a water surface of 670 square miles. Among the states it takes rank as the thirteenth in size.

DESCRIPTION. In the southeastern part of the State the elevation above sea level is 880 feet, but it gradually rises toward the west and north, until it attains an elevation of 5,050 feet, while the general elevation is about 2,350 feet. The surface consists largely of an elevated plain, but few of the eminences rise much above the general level. Valleys of considerable extent lie along the rivers in the east, but in the western part the streams flow through deep channels, along many of which are abrupt and precipitous bluffs. A large part in the northwestern corner is included in the Bad Lands, which consist of sandy ranges that extend into the State from South Dakota. In the western part are highlands that form the lower foothills of the Rocky Mountains, of which Wildcat Mountain, height 5,050 feet, is the highest summit.

The drainage is mostly toward the east, the principal rivers flowing into the Missouri, which forms the eastern boundary. An elevated ridge extends in a northerly direction from Fremont, separating the streams that flow into the Platte from those that discharge directly into the Missouri. The Platte River, formed at North Platte by the junction of the North Platte and South Platte rivers, has an eastward course and joins the Missouri at Plattsmouth. It receives the Elkhorn and the Loup rivers from the north. The Niobrara enters the State from Wyoming

and flows eastward along the northern boundary, joining the Missouri at Running Water. The northwestern corner of the State is drained by the White, which passes into South Dakota and discharges into the Missouri. A large part in the south is drained by the Republican, which flows eastward from Colorado to Superior,



NEBRASKA.

1, Lincoln; 2, Omaha; 3, Beatrice; 4, Hastings; 5, Grand Island. Chief railroads shown by dotted lines.

where it passes into Kansas. It receives the inflow from the Red Willow and the Big Blue. The southeastern corner of the State is drained by the Nemaha and the Little Nemaha. Many small lakes abound in the north central part of the State, some of which are saline.

The climate of Nebraska is continental, being quite cold in the winter and warm in the summer, but the nights of the warmer season are generally pleasant. Though subject to sudden changes, the climate is healthful and favorable to agriculture. At Fremont the mean temperature is given at 51°, while the temperature of the State ranges from 18° below zero to 95° and rarely to 108° above. The annual rainfall averages 23 inches for the State, ranging from about 32 inches in the eastern section to 12 inches in the western part. Rainfall is abundant in the eastern half of the State, but the western counties are quite arid, requiring irrigation to insure the maturity of most cereals. Nebraska is distinctly a prairie State, though originally belts of timber stretched along the streams, and at present there are splendid groves and artificially reared forests that were cultivated largely under the timber-claim law. Ash, willow, oak, spruce, pine, maple, elm, and cottonwood are the principal varieties of timber.

MINERALS. The State is not rich in mineral wealth, but the output has grown in value with each decade. Clay products stand at the head of the list, being peculiarly valuable for the manufacture of brick and tile. Limestone is abundant in several sections, especially along the North Platte and the South Platte rivers. A small coal field is found in the northeastern part of the State, but the output is not consid-

erable. Deposits of ocher are worked in the south central counties. Other minerals include red lead, glass sand, and mineral waters.

AGRICULTURE. The State takes rank as one of the leading agricultural communities. Seventy per cent. of the total land area is cultivated in farms, which average 240 acres. Corn is grown on about one-half of the cultivated area, and the yield is valuable both in quality and in the amount produced per acre. Wheat takes rank as second in acreage. Other important crops include hay, oats, rye, potatoes, and barley. Much progress has been made in cultivating sugar beets, in the yield of which the State takes a high rank. Irrigation has been installed in the western part, hence the cultivated area is greatly enlarged over that of previous years.

Originally the prairie lands were covered with buffalo grass, which has been instrumental in developing the live-stock industry. These grass lands are still abundant, but in many places blue joint and cultivated grasses have added to the available pasturage. Cattle are reared extensively for meat and dairy products, but the cattle ranches of the western part are concerned more largely with growing neat cattle, many of which are fattened on the ranges and shipped direct to market, while considerable quantities are transported to the eastern part of the State to be fed. Especially large interests are vested in swine, owing to the favorable climate and the large production of corn. Other live stock includes horses, sheep, and mules. Much of the farming is diversified and large quantities of small fruit are grown. The southeastern part of the State is especially noted for its choice varieties of apples, grapes, and plums.

MANUFACTURING. Slaughtering and meat packing are centered at South Omaha, which ranks next to Kansas City and Chicago as a leading slaughtering center of the United States. The annual output of slaughtering houses is valued at \$75,570,000. Next in importance are the products of flouring and grist mills, which are distributed quite largely in various parts of the State. Butter, cheese, and condensed milk are made in considerable quantities. Large interests are vested in the manufacture of starch, the production of beet sugar, and the canning of fruits and vegetables. Other manufactures include brick and tile, malt liquors, farming implements, stationery, clothing, and harness and saddlery.

TRANSPORTATION AND COMMERCE. None of the rivers within the State are navigable, but navigation facilities are provided by the Missouri, though it is not used extensively for that pur-

pose. Numerous trunk railways traverse the State from east to west, including the Union Pacific, the Chicago, Rock Island and Pacific, the Chicago and Northwestern, and the Burlington and Missouri River railroads. These and other lines have many branches. The lines aggregate a total of 6,125 miles. Electric railways are maintained in many of the cities, whence branches are operated to urban and interurban points. The chief exports include horses, swine, sheep, cattle, flour, and dressed meat. Clothing, merchandise, hardware, and farming implements are imported.

GOVERNMENT. The constitution now in force was adopted in 1875. It vests the executive authority in the governor, lieutenant governor, secretary of State, auditor, treasurer, attorney-general, superintendent of public instruction, and commissioner of public lands and buildings, all of whom hold office for two years. The Legislature consists of 33 senators and 100 representatives, each elected for two years by popular vote. Meetings of the Legislature are held in the odd-numbered years, beginning the first Tuesday in January. The judicial power is vested in a supreme court, district courts, and county courts. Three judges comprise the supreme court, elected by popular vote for six years. Local government is by county and township, the principal officers being elected by popular vote for two years.

EDUCATION. Nebraska bears the distinction of having the lowest per cent. of illiteracy of any State in the Union, only 2.3 per cent. in 1900. The average length of the school term per year is 141 days, or seven months, and the total expenditures for the schools aggregate \$5,775,000, an average of \$30.75 per pupil on the daily average attendance. The schools are supported by local taxation, limited in each district to 25 mills, and by the State appropriation. The latter is derived from the interest on school lands leased and sold, and interest on school funds invested in bonds and warrants. Ultimately the permanent school fund will reach the sum of \$25,000,000. The State has a very commendable free text-book system, under which it is made mandatory upon all districts to furnish text-books, without charge, to all children of school age attending school in the district. It is provided by law that each district expend not less than ten cents per pupil for school library books, hence the pupils have access to helpful reading matter, which is selected and cared for with the aid of a library commission and a reading circle board. The present administration in the office of public instruction has given encouragement to improvement in school architecture and

schoolroom decorations, and means have been provided through its influence to further agricultural education and industrial training.

State normal schools are maintained at Peru and Kearney and additional training for teachers is provided at junior normal schools at Alliance, Alma, Broken Bow, Geneva, McCook, North Platte, O'Neill, and Valentine. The junior normal schools are organized and managed under the jurisdiction of the State superintendent. Normal training is likewise provided in a large number of the strongest high schools of the State, through which has been experienced an educational uplift of much value. At the head of the whole State system stands the University of Nebraska (q. v.), which is located at Lincoln. In addition to the institutions of learning supported by public funds, there are over fifty colleges, academics, and normal and business schools. These include Bellevue College (Presbyterian), Bellevue; Cotner University (Christian), Bethany; Creighton University (Catholic), Omaha; Doane College (Congregational), Crete; Fremont College (private), Fremont; Grand Island College (Baptist), Grand Island; Hastings College (Presbyterian), Hastings; Nebraska Normal College (private), Wayne; Nebraska Wesleyan University (Methodist Episcopal), University Place; Union College (Adventist), College View; and York College (United Brethren), York.

Many charitable, penal, and benevolent institutions are maintained by the State. The asylums for the insane are at Lincoln and Norfolk, and the asylum for incurable insane is at Hastings. A soldiers' and sailors' home is maintained at Grand Island and another is at Milford, while the home for the friendless is at Lincoln. Kearney is the seat of the State Industrial School, and at Geneva is the Girls' Industrial School, while another industrial school is located at Milford. Lincoln is the seat of the State penitentiary; Beatrice, the seat of the institution for feeble-minded; and Omaha, the seat of the institution for deaf and dumb. Nebraska City has the State institution for the blind.

INHABITANTS. The larger part of the inhabitants are in the eastern half of the State and 177,347 are of foreign birth, the majority of these being Germans. The population is 14 to the square mile. Lincoln, in the eastern part of the State, is the capital. Other important cities include Omaha, South Omaha, Beatrice, Grand Island, Fremont, Kearney, Hastings, Nebraska City, and Plattsmouth. In 1900 the State had 1,068,539 inhabitants. This included a colored population of 9,774, of which 3,322 were Indians

and 6,279 were Negroes. Population, 1910, 1,192,214.

HISTORY. The region included in Nebraska was visited by the Spaniards under Coronado in 1541. Marquette made a plat of the Missouri and Platte rivers in 1673. It was secured by the United States in 1803 as a portion of the Louisiana Purchase. Lewis and Clark explored the eastern part in 1804 and 1805. It formed a part of the Northwest Territory for many years and, when the gold excitement of 1849 induced emigrants to go overland to California, settlements began to form. Nebraska Territory was formed in 1854, when it included the Dakotas, Wyoming, Montana, and part of Colorado. Stephen A. Douglas introduced the bill that organized the Territory. The provision in this bill for allowing the settlers to exercise their own choice in regard to the existence of slavery not only set aside the famous Missouri Compromise of 1820, but also aroused opposition in the northern states. The Territory was reduced to its present limits in 1863 and in 1867 the State was admitted. It has since made rapid industrial and educational development.

NEBRASKA, University of, a coeducational State institution at Lincoln, Neb., established in 1869. It embraces an industrial college, the graduate school, the college of literature, science and arts, a school of fine arts, the college of medicine, a school of music, and the college of law. This institution ranks with the best State universities in the Union. With it are affiliated the State museum, the superintendency of farmers' institutes, the botanical and geological surveys, and the United States Agricultural Experiment Station. It has a faculty of 200 professors and instructors and an average attendance of 2,800 students. The library contains 70,500 volumes.

NEBRASKA CITY, a city in Nebraska, county seat of Otoe County, 54 miles south of Omaha, near the Missouri River. It is on the Missouri Pacific and the Chicago, Burlington and Quincy railroads, and is surrounded by a fertile farming and dairying country. Near the city a fine steel railway bridge crosses the Missouri River. The manufactures include farming machinery, vehicles, vitrified brick, tobacco products, spirituous liquors, packed pork, and canned goods. It is an important grain and lumber market and has a large jobbing trade. The noteworthy buildings include the public library, the high school, the Federal building, and the State institution for the blind. Formerly the site was occupied by Fort Kearney. It was platted in 1855 and incorporated in 1871. Population, 1900, 7,380; in 1910, 5,488.

NEBRASKA STATE NORMAL SCHOOL, one of the State institutions for teachers in Nebraska, at Kearney. It was established by an act of the Legislature in 1903. An appropriation of \$50,000 was set aside for the construction of a building and succeeding sessions have provided funds for maintenance. The first regular term opened in 1905. Three courses of study are offered. The teachers' training course, which admits teachers who hold first grade certificates, or have completed two years' of a regular high school course. This work consists of a review of the branches usually taught in the common schools of the State, together with the theory of education, the elements of psychology, and the observation of expert teaching in the model schools. The second course embraces five years, the last two of which are largely professional, including careful observation of expert teaching, conferences, methods, etc. In the senior year the students do practice teaching under the direction of critic teachers. The third department is that of commerce, aiming to fit teachers for giving instruction in commercial branches in high schools and colleges. This work covers three years of strictly commercial subjects and two years of professional study and practice teaching in the model school. Upon the completion of the teachers' training course students are granted elementary State certificates. They receive diplomas and life certificates on completing the higher course and the department of commerce.

The buildings are modern in every particular, being well constructed and supplied with modern equipments. About thirty teachers and professors constitute the faculty. The attendance consists of about 1,250 students.

NEBULA (něb'ũ-là), the name applied in astronomy to a slight cloudy patch of light, which retains its form except under examination through powerful telescopes, when portions of it appear as clusters of more or less distinct stars. About 11,000 nebulae are now recognized by astronomers. A few of the nebulae are visible to the naked eye, and by the use of the most powerful telescopes a number are resolvable. It is thought that telescopes still more powerful than are in use at present would make it possible to resolve those that now are apparently irresolvable. Nebulae are generally supposed to be gaseous bodies of unorganized stellar substances and the light is probably caused by the pressure of gases, though it has been impossible to determine the character of the gases. Five classes of nebulae are recognized: *stellar nebulae*, so called from having a

condensation of light in their center; *planetary nebulae*, resembling somewhat the larger planets in appearance; *nebulae stars*, consisting of one or more stars surrounded by a circle of light; *irresolvable nebulae*, those in which no stars are observable even with the most powerful



IDEAL NEBULAE.

telescopes; and *resolvable nebulae*, which appear as a cluster of separate stars when examined by powerful instruments.

NEBULAR HYPOTHESIS (něb'ũ-lěr hĩ-põth'ě-sĩs), a theory first suggested by William Herschel (q. v.), according to which the solar system existed originally in the form of a nebula and all bodies composing the solar system were originally in a nebular state. This theory was afterward approved and developed by La Place. Astronomers who support this theory hold that originally nebulous matter was scattered quite uniformly through all space, but later it began to gravitate toward certain centers. Rotation was established by particles moving toward these centers under the influence of gravity, which likewise produced the spherical form common to heavenly bodies. As heat was lost by radiation, the masses contracted in size, but increased in velocity. Rings were thrown off by reason of excessive velocity. In this way a whole system of planets was originated by the central body, or sun, and they in turn produced satellites by throwing off zones in a similar manner. That the sun produced our earth and other planets was believed by La Place. On the same hypothesis he reasoned that the rings of Saturn were thrown off by that planet, and that they will in the course of time form spherical satellites.

When it became possible by means of powerful telescopes to resolve many nebulae into stars, it was thought by some writers that the nebular hypothesis was destroyed, but, since some are absolutely irresolvable and are yet

known to consist of gases, the nebular hypothesis is based more firmly than ever, though minor points of detail in the original theory have been revised. Although the theory as a whole is interesting and plausible, it cannot be reckoned with such astronomical theories as gravitation, since the foundation of the latter is as strong as that of any of the truths known in science.

NECKAR (něk'är), a river of Germany. It rises in the Black Forest, near the source of the Danube and, after a tortuous course of 250 miles, joins the Rhine at Mannheim. The Neckar valley is highly fertile and contains the cities of Heilbronn, Tübingen, Heidelberg, Mannheim, and Cannstatt. It has been improved for navigation. Steamers ply as far as Cannstatt.

NECROMANCY (něk'rō-män-sý), the art of foretelling events or revealing hidden knowledge by consulting the spirits of the dead. It dates from remote antiquity, when it was prevalent among the credulous and superstitious. The Old Testament condemns it and severely criticizes those who practice this art. In Greece it was encouraged by the priests, who practiced it in a system of divination, and it was later taken up among the Romans. During the Middle Ages it was believed that the arts of necromancy were entirely natural and possible, but later it became associated with sorcery and witchcraft. See **Magic**.

NECROPOLIS (ně-kröp'ō-lis), the name applied to the cemeteries maintained near ancient cities, particularly to a locality at Alexandria, Egypt, in which the bodies of the dead were received and embalmed. Later the term was applied to any burial grounds of antiquity, such as those extending along the Nile and in the vicinity of the Pyramids. Modern cemeteries located in or near towns and cities are sometimes known by the same name.

NECTAR (něk'tēr), in Greek and Roman mythology, the drink of the gods, which, together with ambrosia, constituted their favorite food. It was thought that eagles and doves brought nectar and ambrosia, the drink and solid food of the gods, to the principal deities, and by means of it they were able to enjoy eternal existence and to maintain their personal vigor, beauty, and activity. Nectar is described by Homer as a beverage of crimson color, to which he ascribes the power of conferring perpetual youth to all who partake of it, while other writers ascribe to it a taste so delightful that it surpasses all conception.

NEEDLE, an instrument of steel for carrying a thread through fabric, leather, or other

material. Needles are made in a variety of forms, such as are used for hand sewing, machine sewing, embroidery, netting, knitting, and other similar purposes. They are among the first implements invented by man. Those coming down to us as remains from antiquity are mostly of ivory, bone, and wood. Later they were made of bronze and other metals. At present fine steel is employed exclusively in making them for all kinds of sewing, but there are numerous sizes and shapes, and they are applied to many different uses. The needle trade is one of vast importance, since there is a sale for this product in all the countries of the world, though the largest manufactures are

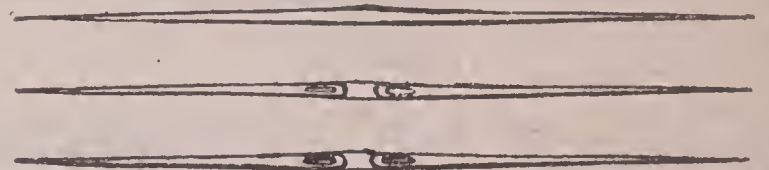


FIGURE A.

still in Europe. In the United States there are at present about fifty well-established manufactures of pins and needles, and the annual output aggregates a value of \$2,125,000.

The first modern manufacture of steel needles began at Nuremberg, Germany, in 1370, when a large quantity of square-eyed instruments were made and put on the European market. Later manufactures were established in various countries, the most important of Great Britain being at Redditch, which is still the leading center of needle manufacture of that country. However, three-fourths of the world's supply is obtained from Altona and four other towns of Germany. With the invention of sewing machines there came a marked decrease in the consumption of needles for hand sewing, though needles for hand work are still used extensively in many countries and for various purposes where sewing machines are abundant. The name is applied to modifications of ordinary needles used in bookbinding, darning, sailmaking, loom weaving, and various instruments employed in surgery. It is the name of the pointed piece of steel balanced on a pivot in a magnetic compass and of various other objects.

As many styles and classes of needles are employed, the processes for making them are very numerous. The first step involves cutting steel wire into lengths for two needles, and these are sharpened on both ends by placing about fifty at a time on a grindstone. When this has been done, the lengths are cut so as to form two needles. The heads are flattened by a hammer and the eyes are pierced with a punch as

shown in figure *A*, after which the eyes are carefully trimmed and grooved, and the head is properly rounded. In the next step the needles are straightened by rolling in a mechanical appliance as shown in figure *B*, after which they are hardened, tempered, and polished. The polishing is effected by forming a bundle of needles and placing them in the scour-

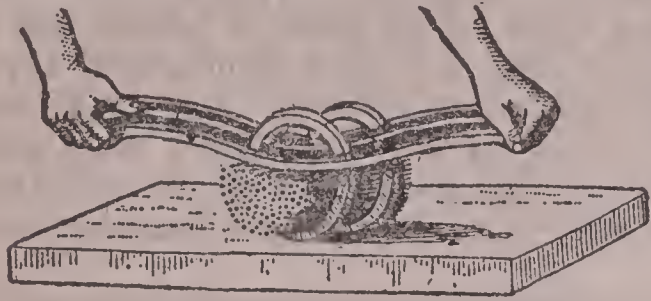


FIGURE *B*.

ing machine, this device being adjusted so that by moving them under pressure backward and forward they assume a white and silvery appearance, after which they are polished. Several stages are necessary in the polishing process, the first being effected with sand and emery and the next with a coarse canvas. The finishing polish is put on by means of a paste of putty powder. This process is merely one of many. In modern manufacture several hundred men are engaged in the different processes that a single needle undergoes. Ordinary needles for sewing are classed according to the relative fineness of their points as *sharps*, *betweens*, and *blunts*. The process of manufacture is so complicated that the labor involved possesses greater value than the material used, it being possible to make about 75,000 ordinary needles from five and a half pounds of wire.

NEEDLE GUN. See *Rifle*.

NEENAH (nē'nā), a city of Wisconsin, in Winnebago County, on the Fox River, fourteen miles north of Oshkosh. It is on the Wisconsin Central, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads and is surrounded by a fertile agricultural country. The chief buildings include the opera house, the public library, and the high school. Being on Lake Winnebago, it is popular as a summer resort. The manufactures include flour, stoves, paper, machinery, and farming implements. It was settled in 1846 and incorporated in 1850. Population, 1910, 5,734.

NEGAUNEE (nē-gā'nē), a city of Michigan, in Marquette County, about ten miles west of Marquette. It is on the Chicago and Northwestern and the Duluth, South Shore and Atlantic railroads. The site is on Iron Mountain, having an elevation of 1,250 feet above the sur-

face of Lake Superior. The surrounding country is lumbering and iron mining. It has a prosperous trade in cereals, fruits, and merchandise. Negaunee was settled in 1870 and was incorporated three years later. Population, 1904, 6,797; in 1910, 8,460.

NEGLIGENCE (nēg'li-jens), in law, the omission to do something which ought to be done, or the act of doing something which should not be done. Negligence as thus defined may be said to consist of neglect in observing ordinary care and skill toward a person, whereby the person or property of the latter may suffer injury without contributory negligence on his part. The degrees of negligence are ordinary, slight, and gross. *Ordinary* negligence arises from the absence of ordinary care or diligence, while *slight* negligence is due to general carelessness, and *gross* negligence is the result of great carelessness. In general, negligence may be classed between the acts or omissions which constitute breaches of contract and those which constitute willful wrongs. In actions at law it is incumbent upon the plaintiff to present the burden of proof to a jury. Most actions for negligence arise between employees and employers on account of defective machinery or appliances. Railway companies are sometimes charged with negligence with the operations of their roads and towns, cities, and counties for neglect in caring for bridges and streets. The negligence of a servant in most cases is chargeable to the master.

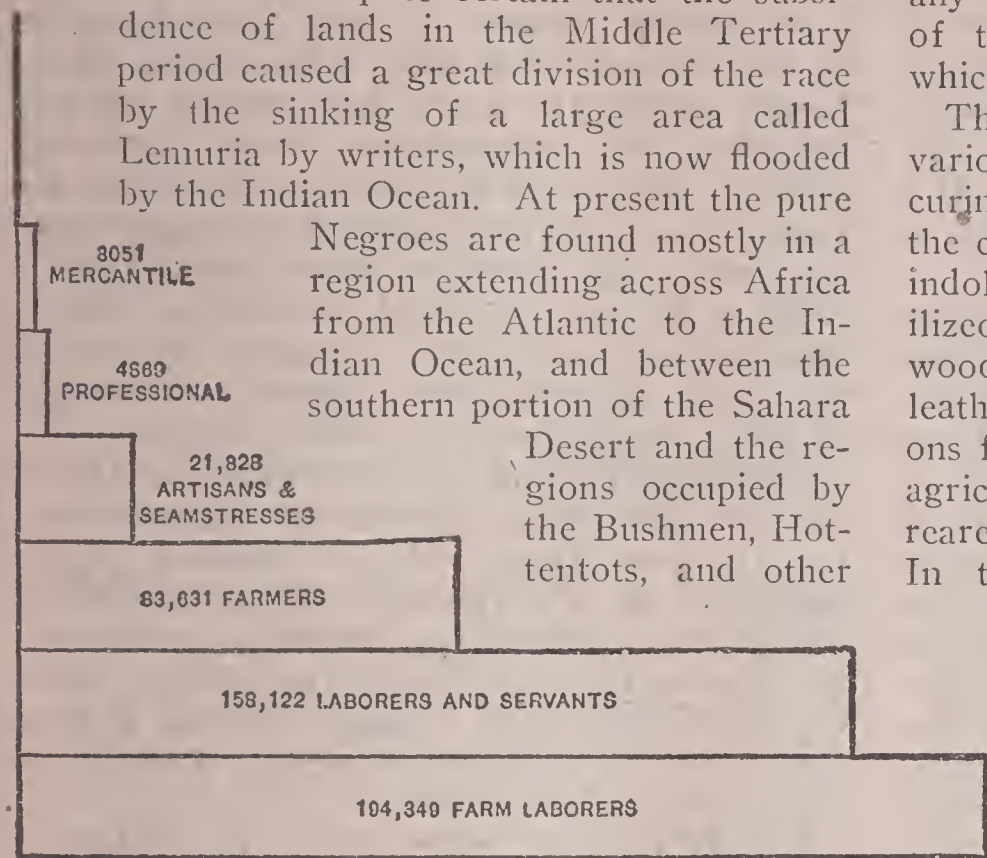
NEGRITOS (nē-grī'tōz), or **Negrillos**, a name of Spanish origin, commonly applied to a Negrolike class of people inhabiting many of the islands southeast of Asia, found especially in the interior of the Philippine Islands. Several closely related types are included with these races, of which the Aëtas, Ites Aigtas, Inaptas, and Igorrotes are the most numerous. These peoples are described as of exceedingly dark complexion, but not so black as that of the Negroes, with soft frizzled hair, a small nose, the lower part of the face projecting, and a small stature. The average height is about four feet eight inches. Large numbers of Negritos are still found in the interior of Luzón, Mindanao, Panay, Mindoro, and other islands. They support themselves chiefly by hunting and fruit culture. The language includes a number of different dialects.

NEGROES (nē'grōz), the name now generally applied to the distinctly dark-colored species of mankind as opposed to the fair, yellow, brown, and red races. Originally the home of the Negro race was probably all of Africa south of the Sahara, India south of the Indo-Gangeic

plains, Malaysia, and the greater part of Australasia. The regions occupied by these people were probably broken up, at least to some extent, by the sea in the Middle Tertiary times, and they were influenced extensively by the constant spread and mixture of the Mongolians and Caucasians. It is quite certain that the subsidence of lands in the Middle Tertiary period caused a great division of the race by the sinking of a large area called Lemuria by writers, which is now flooded by the Indian Ocean. At present the pure

Negroes are found mostly in a region extending across Africa from the Atlantic to the Indian Ocean, and between the southern portion of the Sahara

Desert and the regions occupied by the Bushmen, Hottentots, and other



EMPLOYMENT OF NEGROES IN GEORGIA.

allied classes that are not properly included with the Negroes.

Among the principal characteristics, besides the color, in which the Negroes differ from the Caucasians, are that the brain weighs about 35 ounces instead of 45 ounces and their facial angle is 70° instead of 82°. In all classes the arm is abnormally long, sometimes reaching to the kneecap, and the cranial sutures close much earlier than in other races. The color of the skin is black, the nose is flat with dilated nostrils, the lips are thick and protruding, and the cranium is exceedingly thick. As a rule, the lower limbs are weak, the foot is flat with a low instep, the hair is woolly and black, the skin is soft and almost hairless, and the frame is of medium height.

The mental differences between the Negro and Caucasian races are fully as marked as the physical distinctions, though many notable exceptions have been found. As a whole, the race is not as nervous as the whites. It has remarkable aptness for music and distinctive ingenuity in forming mechanical devices. The race possesses a peaceable disposition and is remarkably receptive and imitative. It is noteworthy that Negroes are able to flourish in hot climates possessing elements entirely fatal to

higher races, but they are less able to withstand severe cold. In civilized arts the typical Negroes of Africa have been influenced to a greater extent by the Mohammedans than by any other people. They exhibit more marked traits of Mohammedan civilization and customs than of any other class. The entire Negro population of the world is estimated at 160,000,000, of which about 25,000,000 are mongrels.

The Negroes in their native condition have various industries that they practice for procuring means of subsistence, though some of the classes are given to savagery, stupidity, and indolence. Those somewhat developed in civilized arts construct dwellings of stone and wood, work in metals, and manufacture fabrics, leather products, household utensils, and weapons for defense and the chase. In some regions agriculture is pursued successfully, live stock is reared, and commercial enterprises are developed. In the manufacture of musical instruments they display marked skill, largely because of their great fondness for music, and in their towns many mosques and other buildings of note are maintained. The whole race has been subjected extensively from an early date to impressment into slavery by other races more highly developed.

The modern institution of Negro slavery dates from 1503, when the Portuguese began to carry large numbers to the West Indies, and in 1511 the slave traffic was formally sanctioned by Ferdinand of Aragon. Negroes were first brought as slaves to North America in 1620 and Queen Elizabeth legalized slavery and the slave trade both in England and in the colonies. The Congress of the United States prohibited the slave traffic in 1794, when importation to that country ceased, but importation to the West Indies and Brazil continued until 1840. The Negroes imported to the ports of the English colonies and the United States were mostly of the typical class from the African interior, but those taken to South America and the West Indies consisted largely of Zulus, Kaffirs, and Hottentots. In many regions the higher classes of Negroes made it a business to pursue and capture large numbers of neighboring clans, which they did to sell the captives into slavery. The practice finally developed into such moral degradation that the traffic was broken up entirely by the more civilized European peoples.

Many Negroes in North America have made remarkable advancement in the arts, sciences, and industries since their liberation from slavery. They have not only taken their place as

citizens in many countries, but have gone into the schools, churches, industries, and positions of honor, and everywhere exhibit remarkable endurance and moral and mental aptitude. However, they are employed principally as farmers, servants, laborers, and farm laborers, as is shown in the accompanying illustration, which is a record of the employment of Negroes in the State of Georgia. The Negro population of the United States in 1790 was 757,000; in 1860, 4,442,000; in 1890, 7,488,788; and in 1900, 8,840,789. Of the entire population of the United States, 11.6 per cent. are Negroes. The excess of females is 54,347.

NEGROS (nă'grōs), one of the Philippine Islands, situated south of Panay, separated from Cebu by the Strait of Tanón, a channel from six to twenty miles wide. It is separated from Panay by the Strait of Guimarás. The area is 4,839 square miles, including a number of islands in the Sulu Sea, which separate Negros from Mindanao. A range of mountains extends nearly the entire length from north to south, but the coast regions are quite fertile. The productions consist of lumber, sugar, tobacco, sisal, and tropical fruits. Horses, cattle, swine, and cariboos are reared in abundance. Most of the natives speak the Visaya language. Among the towns are Bacólod, the capital, Bajo, Dumaguete, and Bacong. Population, 1907, 461,677.

NELSON, a river of Canada, rising in Lake Winnipeg, forming the lower course of the Saskatchewan. From Lake Winnipeg it first flows northward through a series of lakes, but later the course is toward the northeast into Hudson Bay. The total length is 412 miles. Navigation extends a distance of 125 miles, but by effecting projected improvements at its numerous rapids, which now retard navigation, its importance as a commercial avenue may be greatly facilitated. It discharges a large quantity of water and has a swift current.

NELSON, a town of Canada, in British Columbia, on the Kootenay River, twenty miles west of Kootenay Lake. It is on the Canadian Pacific and other railways and is surrounded by a productive mining region. The chief buildings include the high school, the townhall, and the public library. It has electric lights, waterworks, and other public utilities. It is the seat of a large smelting plant, sawmills, and machine shops. The place has a large trade in merchandise and mining supplies. Population, 1901, 5,273.

NELSON, a town of England, in Lancashire, three miles northeast of Burnley. It has steam and electric railway facilities and manufactures

of machinery, pottery, and silk and cotton goods. The chief buildings include a technical school, the townhall, and several churches. The municipality owns the waterworks, the gas and electric lighting plants, the cemetery, and a free library. It was incorporated in 1890. Population, 1907, 34,866.

NELSON, a town of New Zealand, capital of the province of Nelson, at the north end of South Island. It has a deep harbor, railway facilities, and considerable trade. Steamers drawing 18 feet of water can safely reach the railway wharf. The manufactures include leather, pottery, and clothing. In the center of the town is a large Episcopal cathedral. Electric lighting, waterworks, and sewerage are among the public improvements. Nelson was founded in 1841. Population, 1906, 8,325.

NELSONVILLE, a city of Ohio, in Athens County, sixty miles southeast of Columbus, on the Hocking River and the Hocking Valley Railway. It is surrounded by a productive farming and coal-mining country. The manufactures include car wheels, machinery, farming implements, and clothing. It has a large trade in coal and merchandise. Population, 1900, 5,421; in 1910, 6,082.

NELUMBIUM (nĕ-lŭm'bĭ-ŭm), or **Nelumbo**, a genus of plants common to the fresh waters of temperate zones. They include many species that are remarkable for their beautiful flowers. The genus includes the *Egyptian lotus*, a plant once common in the valley of the Nile, but it is not abundant there at present. However, several closely allied species are found in India, China, the Malay Archipelago, and Australasia, where they grow vigorously in the fresh waters. The leaves of several of these plants contain medical properties serviceable for fever patients, while the seeds are eaten by the Hindus. The *lotus*, or *water chinquapin*, is considered sacred in many Asiatic countries, where it is used in religious rites, and the fibers derived from the stalk serve as a wick for lamps in Hindu temples. A variety of nelumbium found in the southern part of the United States produces rhizomes, from which tuberous roots develop that resemble the sweet potato. These tubers are favorite food products, especially among the Indians.

NEMEAN GAMES (nĕ'mĕ-ān), the third of the national athletic and musical festivals of Greece, celebrated in the valley of Nemea of Argolis, in the Peloponnesus. The locality was so named from the Nemean lion, which was slain here by Hercules. These games were celebrated every two years, in midsummer, in the second and fourth year of each Olympiad. The

foundation of the games has been assigned to Hercules, but there is no history of them prior to 573 B. C. They were celebrated in eleven odes written by Pindar.

NEOCENE (nē'ō-sēn), a term applied by the Geological Survey of the United States to the Miocene and Pliocene epochs in use among European geologists. It occupies the larger part of the Tertiary or Cenozoic period. Deposits of this epoch are found along the Atlantic coast, in the Llano Estacado of Texas, and in various sections of the Rocky Mountains.

NEOSHO (nē-ō'shō), a river of Kansas, rising in Morris County and having a general course toward the southeast. It crosses into Oklahoma, joining the Arkansas River near Fort Gibson. It has a total length of 325 miles. On its banks are the cities of Oswego and Emporia. The Cottonwood is its principal tributary.

NEPAL (nē-pāl'), or **Nipal**, an independent kingdom of Asia, situated north of British India and south of Tibet. It occupies the southern range of the Himalayas for a distance of about 500 miles. The area is 54,000 square miles. A large part of the southern section is fertile and has a gently rolling surface. The mineral products include marble, jasper, copper, iron, sulphur, and rock crystal. Fine forests of oak, pine, sal, mimosa, and spruce abound in the lower slopes of the mountains. Rice, wheat, corn, pulse, potatoes, cotton, tobacco, tea, sugar cane, and fruits are the principal products. The manufactures embrace cotton and woolen goods, bell metal, ironware, copper products, brass vessels, clothing, and utensils. Cattle, buffaloes, horses, sheep, and swine are reared in abundance. The export and import trade with British India and Tibet is extensive. Highways and trade routes are maintained in the principal valleys. Nepal was occupied in the 14th century by the Hindus, but they were expelled in 1667 by a class of Mongolians. Most of the inhabitants are Gurkhas, who are a mixture of Aryans with the aborigines. The religion is Buddhism. Khatmandu is the capital and residence of the reigning sovereign. Population, 3,876,500.

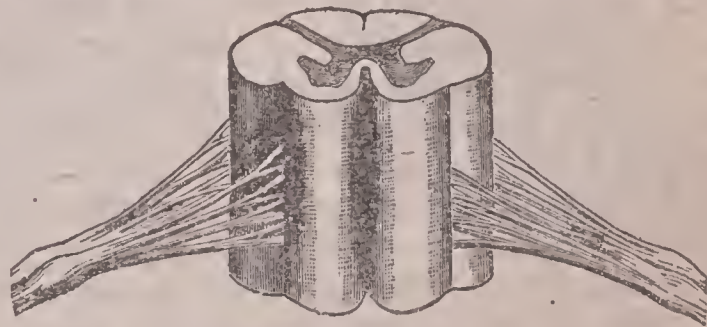
NEPHRITE (nē'frit), a mineral usually classed with jade, so named from being formerly worn as a remedy for kidney diseases. It has a greenish color, is hard and tenacious, and is used in making ornaments and utensils.

NEPTUNE, a planet of our solar system, the most distant from the sun yet discovered, being 2,750,000,000 miles from that illuminary. It is invisible to the naked eye and appears in the telescope as a star of the eighth magnitude. Its distance from the earth is estimated at 2,630,-

000,000 miles. The diameter is about 36,750 miles, the inclination of its axis to the plane of the ecliptic is $1^{\circ} 0' 7''$, and its year is 164.7 terrestrial years. The velocity with which it moves is estimated at only 12,000 miles per hour. Its density is a little less than that of water. Estimates place the light and heat received by it from the sun at about one-thousandth that received by the earth. Neptune has one satellite. This satellite has a mean distance of 235,000 miles from the planet, and revolves around it in a period of 5 d. 21 hr. 2 min. 40 sec. Leverrier discovered Neptune on Sept. 20, 1846, but it had been suspected for many years that such a planet exists, from the fact that Uranus gives evidence by its perturbations of the existence of such a body.

NERBUDDA (nēr-būd'dä), or **Narbada**, a large river of India, rises in the central plateau of that country, and after a course of 800 miles toward the west flows into the Gulf of Cambay. The Nerbudda valley is fertile, producing cereals, fruits, and vegetables in abundance. On its banks are the cities of Jabalpur, Burwani, and Barneh. It is navigable for ships of large size for a distance of fifty miles. The Hindus regard it sacred.

NERVES, the cordlike structures composed of delicate filaments by which sensation or stimulative impulses are transmitted to and from the brain and other organs. In the animals belonging to the higher scale of life the nerves proceed from the brain and spinal cord, but in the lower animals they issue from the central ganglia. The simplest nerve system is found in the mollusca. In the radiata nerves are arranged in a circle around the mouth, from which they communicate with the ganglia situated at the base of each ray. Insects possess nerve structure capable of producing sensory, reflex, and motor action, and

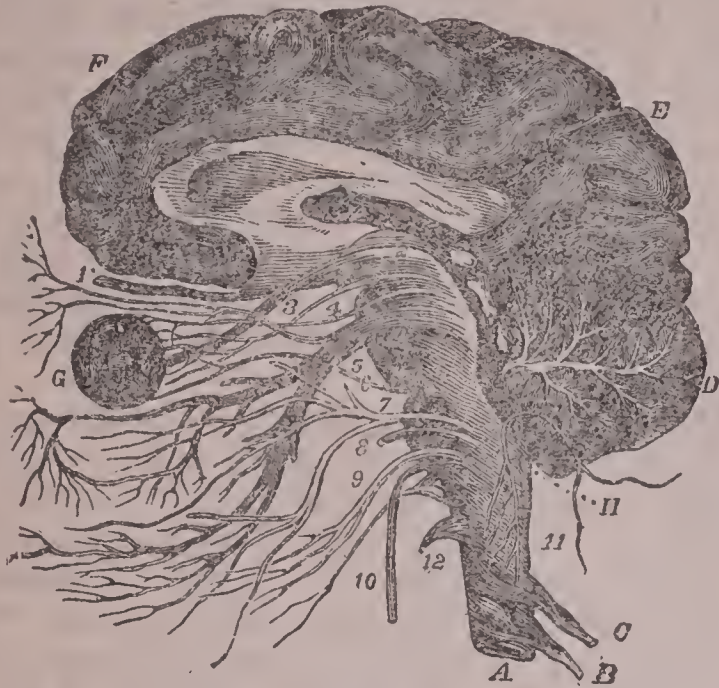


SECTION OF THE SPINAL CORD WITH NERVES.

as the scale of animal life rises there is a marked increase in the resemblance of nerves to those found in man, where their highest development and greatest sensitiveness are observed.

The nerves common to the human system are hard, silvery threads, composed of gray matter within and white matter without. They ramify all parts of the body, and, though often noticed

very near each other, they are perfectly distinct and each conveys its own impression. The nerves carrying impressions to the brain are called *sensory* nerves, while those conveying orders of the mind to the different organs are designated *motory* nerves. If the motory nerves



THE BRAIN.

leading to a particular portion of the body be cut, all motion is destroyed, though sensation remains; and, if the sensory nerves be cut, feeling is lost, but motion remains. The nervous system is made up of nerve cells, nerve fibers, and nerve end organs. *Nerve cells* form the essential part of the brain and spinal cord, and from them as a center the nerve fibers run as fine threads to the cells of the body. The outer ends of the cells touching a company of cells, or *nerve end organs*, carry impressions to the central nerve cells. Although each cell in the body acts independently of the rest, yet the central nerve cells call all into active harmony. The three general classes of nerves are designated as *spinal*, *cranial*, and *sympathetic*.

The nerves that go to different organs run together in a bundle, which divides into its separate threads upon reaching its destined place. Each nerve thread is composed of a central fiber surrounded by a protected layer of tissue, and they vary in size according to the organ in which they have their seat. The *spinal nerves* consist of 31 pairs, which issue from the spinal cord through apertures provided for them in the backbone. Each of these nerves has two roots, called the *posterior* and the *anterior*. The posterior is the sensory influence and the anterior the motory one. Animals lose motion when the anterior root is cut and the power of feeling, when the posterior root is severed.

The *cranial nerves* consist of twelve pairs, which spring from the medulla oblongata and the lower part of the brain. They are shown in the accompanying illustration. The pair of *olfactory* nerves (1) are the nerves of smell, the pair of *optic* nerves (2) are the nerves of vision, and three pairs of *motorcs oculi* nerves (3, 4, and 6) serve to move the eyes. The pair of *trifacial* nerves (5), so named from its three branches, is the influence that controls the upper part of the face and the upper jaw and teeth, and branches into the lower jaw and mouth to form the nerve of taste, where it is known as the *gustatory* nerve. Expression is given to the face by the *facial* pair (7); the *auditory* pair (8) forms the nerves of hearing; the *glossopharyngeal* pair (9) connects with the membrane of the pharynx; the *pneumogastric* pair (10) presides over the stomach, lungs, larynx, liver, and heart; the *accessory* pair (11) regulates the vocal movements of the larynx; and the *hypoglossal* pair (12) gives motion to the tongue.

The nervous system is strengthened by healthful exercise and restful sleep. Nervous diseases result from inflammation of nerve substance, from general bad health, from intemperance, and from changes due to accidental injury of nerve fibers, cells, or centers. A total of 176 special nervous diseases has been classified. These include 21 functional, 28 brain, 40 spinal cord, and 87 peripheral diseases. The condition known as *nervousness* is largely temperamental. It causes a person to be unduly emotional and to lose self-possession. Nervousness is sometimes due to disease, excesses, and overwork.

NEST, a habitation or abode constructed by birds for incubating their eggs and rearing their young. Nests are of various construction and are greatly diversified in situation. Some birds, as the auks and stone curlews, do not construct nests, while some reptiles and mammals do, among them foxes, moles, weasels, rabbits, squirrels, mice, and many others. This is true also of many insects and crustaceans. A class of swallows build the famous edible nests which are abundant principally in China and the islands southeast of Asia. These nests are formed of small leaves, grasses, and fibers, and are fastened to rocks by a substance that exudes from the salivary glands under the tongue. This substance is gelatinous and is the portion eaten. These nests are gathered by means of ladders, and the edible portions sell at from \$1 to \$35 per pound, depending upon the quality. It is estimated that fully 8,500,000 nests are gathered annually. The product is used chiefly by the wealthy for thickening soups. See **Birds' Nests**. See illustration on following page.

NESTORIANS (nēs-tō'ri-anz), a sect of Christians organized in Western Asia, so named from Nestorius, their founder. The first organization was formed about the middle of the 5th century, but the sect was repressed by the Romans. Persia gave protection to the organization and its creed was established by King Pherozes as the national faith. The fundamental doctrine was declared by a synod at Seleucia, where a resident patriarch was located. By the 12th century it had grown to an important community of ninety bishops, with a considerable number of communicants in Syria, Palestine, and Arabia. A division occurred in the 16th century, when many members began to call themselves Chaldaean Christians and allied themselves with the Roman Catholic Church. At present their principal seat of influence is in Kurdistan, but there are branches in India and other portions of Asia. The membership formerly was made up of a distinctively studious class of people, but during the ravages of Tamerlane they suffered materially, and in 1843 many of them fell as victims of persecutions by the Turks. A majority of the Nestorians are illiterate and poverty stricken, but they maintain several excellent institutions of learning and have many clergymen of eminent ability. The Persian branch of the Nestorian Church, about 30,000 persons, in 1898, joined the Orthodox Church of Russia and is now protected by the Czar.

NET, a fabric of threads woven in open meshes, knotted firmly at the intersections, employed for ensnaring birds and fishes. A variety of nets are used for various other purposes, such as protecting the face and hands of bee keepers and for preventing birds and insects from destroying fruits. *Gill nets* and *seines* are the chief nets used in fishing. The former are set across waters frequented by fish which are caught in the meshes by running their heads through, the gills preventing their withdrawing them. The seine has a line of leaden weights at the lower side to hold it near the bottom of the water, and at the upper part is a line of corks to hold it in a perpendicular position. Fishers draw the seine near the shore by means of ropes fastened to the ends, and drag it to land to remove the

fish that may be caught. The ancients used a variety of nets to catch animals, such as antelopes and gazelles, using a decoy to lure them near the entrance, when the watchers sprang suddenly forward to prevent escape. See illustration on following page.

NETHERLANDS (nēth'ēr-landz), or **Holland**, a constitutional kingdom of Europe, lying in the lowlands that border on the North Sea. It is bounded on the east by Germany, south by Belgium, and west and north by the North Sea. The area is 12,648 square miles, forming one of the smallest independent states of Europe. It has a coast line of 470 miles on the North Sea. The country is divided into eleven provinces as follows:

PROVINCES.	AREA, SQ. MI.	PROVINCES.	AREA, SQ. MI.
Utrecht.....	534	South Holland.....	1,166
Zeeland.....	690	Friesland.....	1,282
Groningen.....	790	Overysse.....	1,291
Limburg.....	850	Gelderland.....	1,965
Drenthe.....	1,030	North Brabant.....	1,980
North Holland.....	1,070		

DESCRIPTION. The Netherlands is made up largely of the lowest part of the great plain of



NESTS.

1, Oriole's nest; 2, Meadow Lark's nest; 3, Goldfinch's nest.

Northwestern Europe, hence the name. The natural drainage is inadequate to allow cultivation in all parts of the country, but a vast system of canals and dikes has been built to render cultivation of the soil possible. In some parts the surface is from ten to twenty feet below sea level, but these parts are protected from over-

flows by great embankments, while the water is pumped constantly from some distance below the surface by means of windmills. By this ingenious method it has been possible to transform marshes and lakes into the most fertile and productive regions of Europe, and the land surface has been enlarged by promoting extensive enterprises for reclaiming large surfaces formerly covered by the North Sea. The coast line of the Netherlands is exceedingly irregular, but the only inlet of considerable extent is the Zuyder Zee. Many fertile islands are situated near the coast, all of which have been improved more or less by cultivation and the construction of embankments. The more elevated portions average about 150 feet above sea level, though in the southeast there are elevations fully 680 feet high. This once uninter-

Scheldt, which enters the country from Belgium, has its delta mainly in the Netherlands. It is ascended by ocean vessels as far as Antwerp, but small boats reach the center of Belgium, and it is connected with other streams by a network of canals. Many small lakes are distributed throughout the country, though many have been drained and their beds have been converted into *polder*, as the redeemed land is called. Haarlem Lake, one of the largest to be drained, furnished 72 square miles of tillable soil. Zuyder Zee, the largest inlet, has been drained in some parts, but the work of redeeming practically the entire area of this lake or sea is in progress.

The climate is humid and changeable, but the range of temperature is small. In the spring the mean temperature is 49°, in July 64°, and in January about 35°. The heat of summer is not

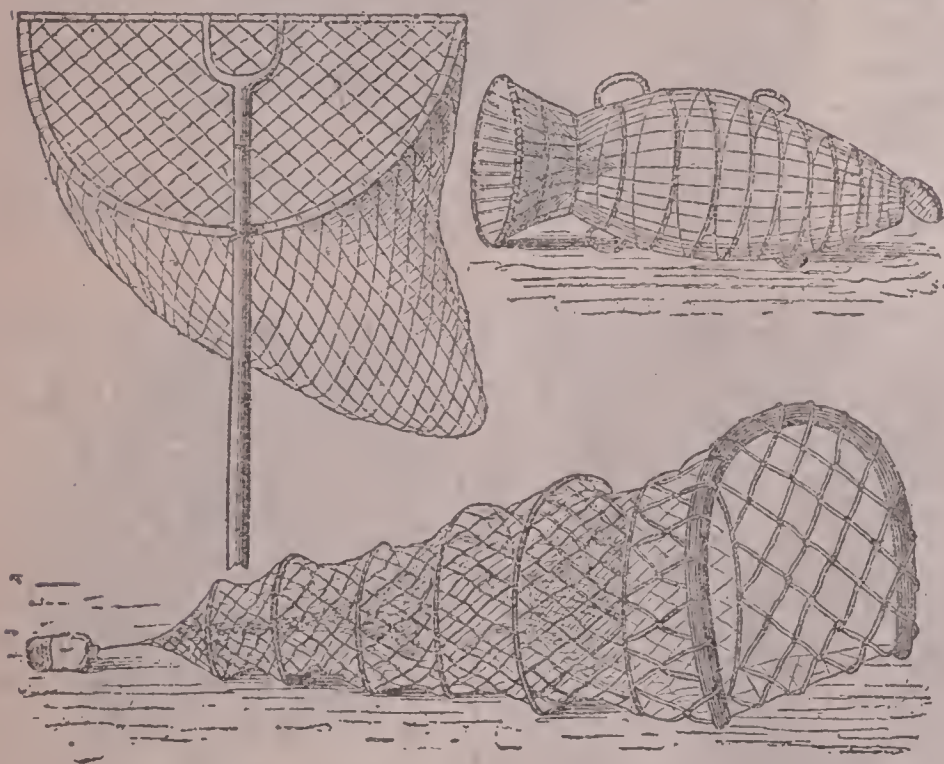
excessive and the cold of winter is not severe. Though rain falls on about two days in three throughout the year, the annual precipitation is not more than thirty inches. Damp and misty weather is frequent and sunshine prevails very rarely a week in duration. The climate is healthful as a whole, but marsh fevers are common to the boggy districts.

FISHERIES. All of the streams and the coast waters are important for fishing. Many of the inhabitants are engaged in this industry, both in coast and deep-sea fishing. The herring is a prolific source of revenue and the annual catch is more important than that of any other fish. Sprats, or herrings, are taken in large numbers and oysters are obtained near the delta streams. Other catches include cod, anchovy, turbot, and salmon.

AGRICULTURE. This branch has reached a very high state of development, but the yield is insufficient to supply the demand.

The land may be divided into sandy and clay soils, nearly all of the reclaimed lands belonging to the latter. The sandy soils yield large quantities of rye, buckwheat, and potatoes, while the clay soils are best adapted to wheat, hops, tobacco, and sugar beets. However, rye, sugar beets, and vegetables are the leading crops. Other products include barley, oats, chicory, spelt, and flowers. Haarlem is the center of the flower industry, large quantities being cultivated in the vicinity and exported from this place. Much of the farming is in small tracts. Large interests are invested in orchards and gardens.

Few countries are as well adapted to the growth of grasses, since there is an abundance of moisture without excessive precipitation. On account of this the cattle industry has been de-



NETS FOR CATCHING SMALL FISH.

esting and marshy region of Europe has been converted into a land of almost inexhaustible fertility, containing the richest alluvial deposits utilized in cultivation.

In the northern part are few streams and the country is characterized more or less by bogs and marshes. Nearly all of the drainage is toward the east, but the streams of importance are classed without exception as international. The Rhine is important as a highway between Germany and the sea. It enters the Netherlands from the west, but soon divides into numerous arms, forming a fertile and extensive delta. Chief of these arms are the Yssel, the Waal, and the Lek, all of which carry a large river trade. The Meuse, or Maas, enters the country from Belgium, and discharges into the Waal. The

veloped on a very profitable basis, though cattle thrive best in the provinces bordering on the coast. Dairy farming has developed to a high degree, and cheese made in Holland is exported to the leading markets of the world. Gelderland and Friesland are noted for their superior breed of horses. North Holland has large interests in sheep raising. Poultry of all kinds is raised profitably, and large quantities of eggs are shipped to Germany and England. Other live stock includes goats and swine.

MINING. The country is not rich in the quantity and variety of minerals, since the surface is made up largely by recent alluvium formations. Various agencies, such as the sea, winds, vegetation, and drifts during the ice age, contributed to form the alluvial strata. Coal is mined in the vicinity of Limburg, but the fields are not extensive. Turf or peat is found in large quantities for fuel purposes. Bog iron is obtained in the eastern part. Though building stone is imported to a large extent, the country has clays which are valuable for the manufacture of brick, tile, and pottery.

MANUFACTURES. The Netherlands has few great manufacturing centers as compared with those in England and Germany, owing to the scarcity of coal and iron, although both are imported in large quantities. Rotterdam, The Hague, and Amsterdam have extensive car factories and railway machine shops. The manufacture of calico is material. This product is being made for exportation to Africa and Asiatic ports, and the number of spindles in operation is placed at 350,000. Linen is made largely in North Brabant, sailcloth in North and South Holland, and calicoes in Overijssel and North Brabant. Large dye works are located at Haarlem and Leyden, woollens are made extensively in Tilburg, and carpets are produced in large quantities at Deventer. Delft is noted for its production of fine glazed ware. Raw tobacco is imported in large quantities from the East Indies and is made into pipe tobacco and cigars. Sugar refineries are centered chiefly in the vicinity of Amsterdam. Other manufactures include stoneware, gin, glassware, velvets, silks, vinegar, and brick and tile.

TRANSPORTATION. Although the country has an extensive seacoast and great ship canals, railway building has received marked attention. Electric lines are numerous in the interurban districts and the railways aggregate a total of 2,100 miles, of which about one-half are owned by the state. The canals are 2,000 miles in extent, the canal system being relatively more important than the rivers. The North Sea Canal, extending from Amsterdam to the North Sea,

has a length of fifteen miles. Between Amsterdam and Helder is the North Holland Canal, having a length of 48 miles. Some of the waterways are higher than the cultivated fields through which they pass.

COMMERCE. Commercially the country holds a high rank among the nations and a large share of the trade is maritime. It extends to all the continents, but the larger part of the exports go to Germany, Great Britain, Russia, Belgium, and the United States. Butter, cheese, oleomargarine, eggs, sugar, and live stock are the principal exports. The imports include leaf tobacco, wheat, petroleum, maize, and foodstuffs. Coal, metals, and timber are imported largely for use in the manufacturing enterprises. At present the imports exceed the exports, having a value of \$992,500,000, while the exports aggregate \$850,500,000.

EDUCATION. A splendid system of public schools is maintained, by which not only elementary instruction is provided, but there are articulated high schools, colleges, and four celebrated universities at Amsterdam, Leyden, Utrecht, and Groningen. School attendance is compulsory. The per cent. of illiteracy is remarkably low, only 2.8 per cent. of the inhabitants over ten years of age being unable to read and write. In the higher institutions classical studies are pursued, as well as courses in law, medicine, music, sciences, navigation, agriculture, horticulture, dairying, and various other industrial arts.

GOVERNMENT. The government is based upon a constitution revised in 1887, which makes the country a hereditary monarchy, with the executive authority vested in a king or queen. The legislative function is exercised by a Parliament of two chambers, known as the Upper Chamber and the Lower Chamber. In the former are fifty members elected by the provincial legislatures, while the latter has 100 members chosen by direct suffrage in the districts. A national supreme court is the highest judicial authority, and subordinate to it are five courts of appeal, 23 district courts, and 106 cantonal tribunals. The supreme court has its seat in The Hague.

The Reformed Lutheran Church is the religion of the royal family and of most the inhabitants, but entire religious liberty is granted to all. Fully three-fifths of the people are Protestants. Among the principal religions, aside from those already mentioned, are the Roman Catholic, Jansenists, and Jews. The right of suffrage is restricted to male citizens 23 years of age, paying at least ten guilders of tax. The guilder is the monetary unit, which is equivalent to 42 cents of American money.

COLONIES. The Netherlands take high rank among the colonial powers. Among the principal colonies are the Dutch East Indies, Surinam or Dutch Guiana, and the colony of Curaçao, which includes the islands of Curaçao, Saba, Buen Ayre, Aruba, Eustatius, and half of Saint Martin. These possessions have a total area of 782,850 square miles and a population of 36,875,350.

INHABITANTS. The native population of the Netherlands are descendants of the Batavians and Frisians, hence belong to the Teutonic stock. In the early historic period of Western Europe they were influenced by the Romans, but the latter were dispossessed by the Germans in the 5th century, when a large immigration of Saxons prevailed. Having more than 400 inhabitants to the square mile, the Netherlands takes rank among the most densely populated countries of Europe. The country has a small emigration, about 1,800 per year, most of which is to the United States. Those of foreign birth residing within the country aggregate 52,500 persons, most of whom are Germans and Belgians. The Hague is the capital. Other cities of importance include Amsterdam, Rotterdam, Groningen, Arnhem, Haarlem, Utrecht, Leyden, and Maastricht. In 1906 the country had a population of 5,672,237.

LANGUAGE AND LITERATURE. The official and literary language of the Netherlands is generally called Dutch, but by the people themselves it is known as *Nederduitsch*, a term used to distinguish it from the language of Germany, known as *Hochdeutsch*. The former is called Low Dutch and the latter High Dutch by some writers, though *Hollandisch*, or *Dietsch*, and German are the proper names, since Low Dutch applies more particularly to a peculiar dialect spoken by the people resident in Holstein and other adjacent provinces. Flemish is quite similar to the Dutch and both originated from the Germanic family of Indo-European languages.

The distinctly Dutch literature dates from the latter part of the 16th century, when the language was systematized and polished by such eminent writers as Spiegel, Coornhert, Van Marix, and others. Pieter Hooft (1581-1647) gave a marked impetus to prose writing and produced several excellent dramas and poems. Joost van den Vondel (1587-1679) is noted as one of the most celebrated dramatists, giving to the Netherlands poetic productions that still take high rank. His contemporary, Jakob Cats (1577-1660), was a noted writer of maxims and his works are reckoned among the classics. Constantyn Huygens is one of the noted epigrammists and satirists of Holland. Dirk Kampuhisen is a

hymn writer, Brandt is celebrated as a historian, and Oudaan is famous as a political writer. The spread of French in the 17th century caused a temporary decline in Dutch literature, but Jacob Bellamy, in 1775, began its revival. Among the writers of the early part of the 19th century are the celebrated Bilderdijk, Helmers, and Tollens. The last named is the author of "Wintering of Hollanders in Nova-Zembla," an excellent descriptive poem, while Van Lennep is celebrated as a novelist. Other prominent writers of the Netherlands include Erasmus, Grotius, Boerhaave, Spinoza, Gronovius, and Lipsius.

HISTORY. The history of the Netherlands begins about the year 150 B. C., when that region was occupied by the Frisians. At the beginning of the Christian era it belonged partly to Belgium and partly to Germany. The Romans occupied it at the time of their western invasions, but in the early part of the 5th century A. D. it was conquered by the Franks. Charlemagne came into possession of the entire region in the 8th century, and in the 11th century most of the territory comprised independent duchies. In the 15th century it was acquired by the Austrian house of Hapsburg. Soon after it was made a possession of Spain and, when Charles V. abdicated in 1556, Philip of Spain became the ruling sovereign. Religious persecutions caused Zealand and Holland to rebel in 1576, and three years later the provinces of Gelderland, Zealand, Holland, Friesland, and Utrecht concluded the Treaty of Utrecht, by which they repudiated Spanish dominion, and William of Orange became the governor. This sovereign was assassinated July 10, 1584, but he was succeeded by other efficient leaders and Holland remained a powerful country until 1713, being in that period the most important commercial and maritime nation of the world.

The decline of the Netherlands as a world power may be ascribed to the rise of Spain and other nations that preyed upon it through a series of wars. Previous to that time it was not only a powerful nation in trade and colonization, but in the development of interior resources. It was in the dominion of the Netherlands that the pendulum clock, the first optical instruments, printing, and many other useful arts and devices were invented or first utilized. The armies of France made incursions through portions of the Netherlands in 1794 and several succeeding years. Louis Napoleon became its king in 1806 and in 1810 it was formally annexed to France.

The Orange family was recalled in 1814, at the downfall of Napoleon, and the provinces of Belgium and Holland were formed into the kingdom of the Netherlands. This union remained

intact until 1830, when Belgium seceded to form a separate kingdom. An attempt to restore the union by King William I. was prevented by the intervention of the great powers, and in 1839 the governments of the separate countries were recognized practically as they exist at present. In 1840 the king abdicated, but he was immediately succeeded by his son as William II., and at his death in 1849 William III., his son, was crowned. That sovereign died on Nov. 23, 1890, and his daughter, Wilhelmina, became queen. The Hague was made the seat of the International Peace Conference in 1898 and was chosen as the permanent meeting place of the international arbitration tribunal established by that conference. The country has been unusually prosperous the past fifty years, showing remarkable growth in intelligence, industrial development, and wealth.

NETTLE, a genus of plants widely distributed, embracing species which vary in size from small plants to large shrubs. Most of the species have alternate leaves and are of herbaceous structure, and many are covered with sharp tubular hairs. The hairs contain an acid fluid, which, when pressed by the exposed hand, is injected into the flesh and causes a painful wound. The flowers of most species are inconspicuous: They are unisexual, the male and female blossoms growing on the same or separate plants. Nettles serve a useful purpose in that their seeds are nutritious. The leaves are employed to make a beverage, known as *nettle beer*, and the stalks supply fibers of value in making cloth and yarn. The Chinese manufacture grass cloth from several species of the plant. Thread is spun from the product of several species in a number of European countries, and the tender shoots of young plants are used for preparing broth and porridge. Many species of nettles are common to North America, but they are widely distributed in all the continents and principal islands. *Nettle rash* is a disease of the skin which is quite similar to the result from nettle stings, but it is caused principally by indigestion. The *nettle tree* is a deciduous plant native to North America and other continents. It attains a height of 25 to 140 feet. The wood is of value in manufacturing.

NEUCHÂTEL (nĕ-shâ-tĕl'), or **Neuenburg**, a city of Switzerland, capital of a province of the same name, on the northern shore of Lake Neuchâtel. The city has a beautiful location, is conveniently connected by railroads, and contains a number of scientific and educational institutions. Among the noteworthy buildings are the public library of 100,000 volumes, the museum of natural history, and the central railroad

station. It has manufactures of cotton and woolen goods, jewelry, clocks, and machinery. A large majority of the inhabitants are French Protestants. Population, 1907, 23,041.

NEUCHÂTEL, Lake of, a fine body of water in Switzerland, about twenty miles west of Berne. It has an elevation of 1,425 feet above sea level and covers an area of 91 square miles. The valley surrounding the lake is highly fertile and is traversed by a number of railroad lines. Near it are the cities of Neuchâtel and Yverdon. The scenery attracts many tourists. Remains of lake dwellings have been discovered in it and in the small lake of Bienne, a short distance to the northeast. The lake receives the waters from the Reuse and the Thièle rivers. Its outlet is through Lake Bienne and the Aar River into the Rhine.

NEUMECKLENBURG (noi-mĕk'len-böorg), an island of the Bismarck Archipelago, in the Pacific Ocean, about 350 miles northeast of New Guinea. It is of volcanic origin, but has considerable areas that are fertile and productive. Formerly it was called New Ireland, but it received its present name in 1884, when it was declared a protectorate of Germany. Fruit, grain, and timber are the chief products. The area is given at 4,950 square miles. The inhabitants, consisting chiefly of Papuans, number about 51,300.

NEURALGIA (nû-räl'jĭ-à), a disease resulting chiefly from overwork, debility, and general depression. It is produced directly by irritation of the trifacial nerves, or by sympathetic action with inflammation of the surrounding parts of various nerves. Neuralgia affecting the head is called *tic douloureux*; in the chest wall, *intercostal*; and in the breast, *angina pectoris*. The disease varies greatly in duration and degree, but it is most common to persons of thin blood. It often follows exposure to cold and wet, excessive indulgence in alcoholic drinks, or a wound or bruise. Neuralgia frequently accompanies rheumatism and sometimes results from sudden mental emotions. Generally it is a very painful disease and in many cases becomes chronic. Relief is obtained by an inhalation of chloroform. The treatment is generally of a tonic nature, involving the use of such remedies as quinine, bromide of potassium, and arsenic, though these should be given only under competent medical advice.

NEURASTHENIA (nû-rās-thĕ-nĭ-à), a disease of the nervous system, due chiefly to overwork and the use of stimulants and narcotics. In general it may be said to consist of nerve weakness, resulting from continuous strain and the fatigue that follows the excessive expendi-

ture of nervous energy. Both sexes are about equally affected, though overstrain is the essential element causing the disease, which in many cases becomes chronic. Among the symptoms of the disorder are irritability, headache, sleeplessness, mental depression, impaired digestion, and sensations of general fatigue. Frequently some organic diseases are connected with neurasthenia, when a cure is rendered more difficult. Besides competent medical treatment in the disease, it is essential to remove the principal causes, to practice cleanliness and outdoor exercise, to devote a reasonable time to rest, and to obtain freedom from care.

NEURITIS (nū-rī'tis), an inflammation of a nerve, causing it to become red and swollen. The disease is due to injury of the nerve, or it may be caused by the action of lead, alcohol, or some other toxic agent or drug. Persons infected by typhoid fever or tuberculosis are subject to neuritis. The symptoms are severe local pain, partial loss of the sense of touch, and a reduction in the muscular powers. Neuritis is often the cause of the partial or total loss of a special nerve of sense, or the paralysis of a particular nerve.

NEUROPTERA (nū-rōp'tē-rā), the name of a group of insects, including species widely distributed in all the continents. They are characterized by powerful jaws, four membranous wings, and the absence of a sting or piercer. The head is large and distinct from the thorax, the antennae are slender, and the larvae are peculiarly voracious and carnivorous. They include species that live on trees, in the water, and in the ground. Among the familiar insects of this group are the dragon fly, white ant, antlion, wood tick, caddis fly, and May fly. The white ants and the wood ticks are injurious to vegetation, while most other insects of this group are beneficial in that they devour plant lice, aquatic and flying insects, and other pests.

NEUROSIS (nū-rō'sis), the name given to certain functional diseases of the nervous system, in which no change or alteration in the structure of nerves is discernible. Formerly the list of affections classed as neurosis was materially large, but improved methods of research have reduced them very considerably. The influence of poisons, such as alcohol or opium, especially when taken in excessive quantities, are prolific causes of the disease. The diseases usually considered neuroses include hysteria, epilepsy, catalepsy, and paralysis.

NEUSTRIA (nūs'trī-ā), the name applied to the western part of the Frankish Empire during the time of the Merovingian and the Carlo-

vingian dynasties, from 511 to the beginning of the 10th century. It extended from the Meuse to the boundary of Austrasia, extending from the Atlantic to the Loire. Within this region were the towns of Tours, Paris, and Orleans. Later it was restricted to the region lying between the Loire and the Seine. When the maritime territory was ceded to the Normans, it received the name of Normandy.

NEUTRALITY (nū-trāl'ī-tỹ), in international law, the state of peace which a nation observes at the time two or more other nations are at war. In a state of complete neutrality the nation is neither the judge or party in the controversy. It may be the common friend of both belligerents, but in the matter of issue favors neither. The term *armed neutrality* is applied when a nation holds itself in readiness to assume a defensive position, maintaining an attitude in which it may repel any aggression that either of the belligerents may assume during the contest.

In ancient times the condition of neutrality as now understood did not exist, since wars were general and every state assumed either a friendly or hostile attitude toward one of the belligerents. The growth of nations and the development of civilization have made the neutral status quite important in modern governments. At present neutrality is looked upon as a privilege, and it is regarded quite important that the losses and evils of war be avoided. In many instances the neutral nations issue proclamations of neutrality, in which the position they take are clearly defined.

In 1856 a conference was held at Paris, France, at which the leading nations of Europe were represented, the purpose being to agree upon points of general interest that relate to the duty of neutral nations during the times others are involved in war. Among the principal questions settled was that of a neutral flag protecting the merchandise belonging to an enemy. It established the international law which requires that property of a neutral seized under the flag of the enemy be restored, and that merchandise belonging to the enemy and found under a neutral flag may be seized only in case it is contraband of war.

At the time the Alabama claims were arbitrated at Geneva, in 1872, the representatives of Great Britain and the United States agreed that a neutral government may not permit a belligerent to use its ports as a basis to obtain men or military supplies or to conduct naval operations. It was further agreed that such a government must use its offices and powers to prevent an enemy from using its ports to fit out

a vessel in which to carry on war with its antagonists, provided the latter is at peace with the neutral power. Any violation of these conditions is looked upon as a direct act of war, and it is likely to involve the neutral state in difficulties as well as make it responsible for damages resulting from such acts. In general the neutral trade must be disturbed as little as possible in time of war.

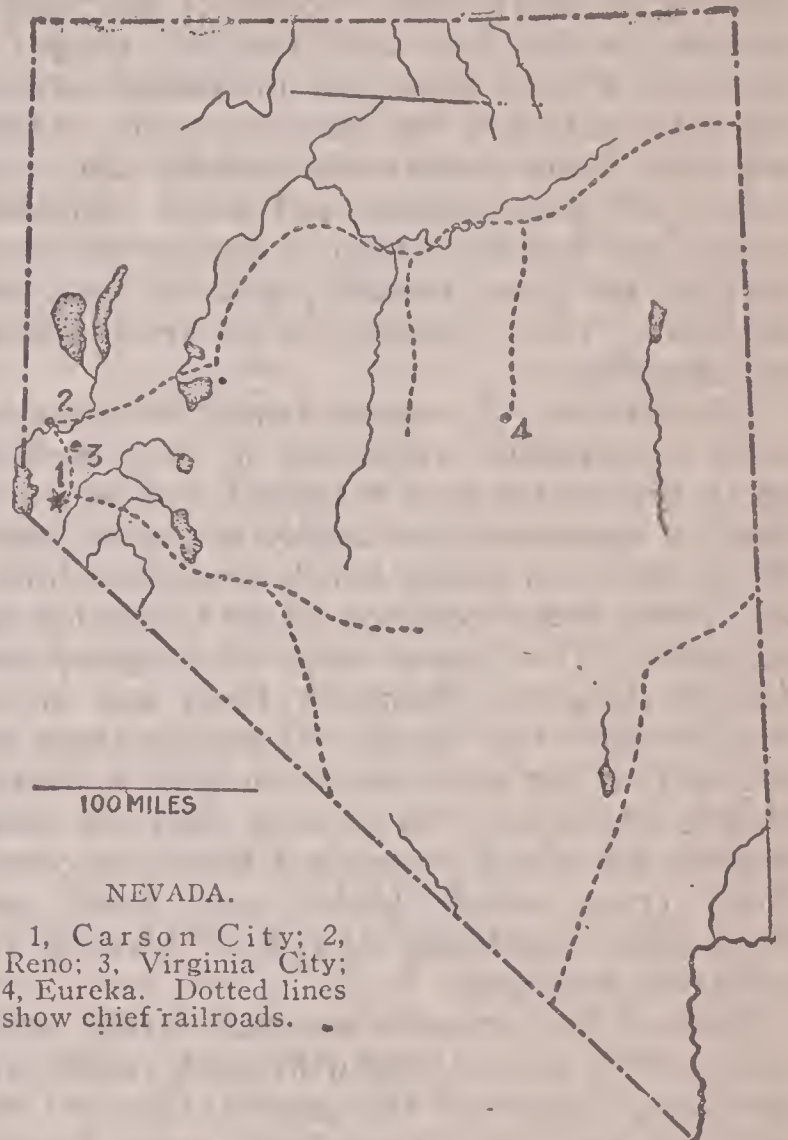
NEVA (nē'vā), a river of Russia, having its source in the southwestern corner of Lake Ladoga. It forms the outlet for that lake and Onega, Ilmen, and several others. In its course of forty miles it passes through Saint Petersburg and flows into the Gulf of Finland. An extensive system of canals enhances its commercial importance, facilitating water connection with many trade centers of Russia.

NEVADA (nē-vā'dā), a western state of the United States, popularly called the *Sagebrush State*. It is bounded on the north by Oregon and Idaho, east by Utah and Arizona, and south and west by California. In size it takes fourth rank, being exceeded only by Montana, California, and Texas. It is about 485 miles from north to south, and the greatest breadth from east to west is 320 miles. The total area is 110,700 square miles, of which 960 square miles are water surface.

DESCRIPTION. The larger part of the State lies in the great basin between the Sierra Nevada and the Wasatch Mountains, a region which was once an inland sea, and its surface is traversed by numerous cross ranges. This basin may be said to be an extensive plateau, of which the average altitude is 4,000 feet above sea level. Many of the ranges run parallel to each other in a north and south direction, extending from 10 to 25 miles apart, but they are broken in many places by passes and valleys. Wheeler Peak, elevation 13,058 feet, located near the central part of the eastern boundary, is the highest peak in the State. The principal chains include the Hot Springs, Shell Creek, Toano Range, Granite Range, Meadow Valley, Shoshone, and Monte Cristo Mountains. Some of the valleys are highly fertile, while others are rocky and barren, the latter including Black Rock Desert, in the northern part.

The drainage of Nevada is partly by the Columbia river system and partly by that of the Colorado, but much of the interior has no outlet to the sea. The northern part is drained by the Owyhee, which discharges into the Snake, a tributary of the Columbia. In the extreme southern part the drainage is into the Colorado by the Virgin River and several other small streams. The interior is drained by the Hum-

boldt into Humboldt Lake, by the Walker into Walker Lake, by the Carson into Carson Lake, by the Truckee into Pyramid Lake, and by the Reese, a river that disappears in the sand and gravel. Quinn River, in the northern part, disappears in Black Rock Desert. Pyramid Lake, the largest body of water in the State, is 10 miles wide and 35 miles long. Lake Tahoe,



from which the Truckee River carries the overflow into Pyramid Lake, is 10 miles wide and 20 miles long. Hundreds of small lakes or sinks appear during the rainy season, but they dry up in the summer and form mud flats with more or less alkaline salts.

The climate is arid, pleasant, and healthful. Snow falls chiefly in the mountains, remaining on the higher summits throughout the year, and the winters are not unpleasant or severe. Some of the valleys are entirely without rains, while in other localities the precipitation ranges from six to 23 inches, being most abundant in a part of Washoe County, in the northern part of the State, where the rainfall is 22 inches. The minimum temperature in some places is 30° below zero, while the maximum ranges from 98° to 110° above. The mean annual temperature at Carson City is given at 54°, but there is a great variation with altitude and latitude.

MINING. The State had a period of great prosperity in the decade commencing with 1870, when the importance of its mining began to grow rapidly. The Comstock lode produced \$38,000,000 worth of gold and silver bullion in a single year, and mining in its vicinity continues to be an important enterprise. At present the output of gold and silver is valued at \$20,500,000, about one-fourth of which is silver. The larger part of the entire bullion output of the State is obtained at Goldfield and Tonopah. Copper is produced in large quantities, the output increasing very materially the past five years. Other minerals found extensively include salt, zinc, soda, coal, lead, sulphur, and borax. Building stones are found in large quantities in many parts of the State, especially granite, slate, and limestone. Clays valuable for pottery and brick are abundant.

AGRICULTURE. Evidences remain of the existence of abundant vegetation in early periods, but at present the flora is limited, and irrigation must be depended upon largely to mature crops. Many species of cactus, bunch grass, sage brush, and other forms common to arid climates are abundant. The largest scope of irrigated surface is along the Humboldt River and in the western part of the State. At present about ten per cent. of the total area is included in farms. Hay is grown on a larger area than any other product and wheat is the most important cereal. Other crops include barley, oats, fruits, and vegetables. Gardening and fruit growing are profitable industries.

Much of the surface is naturally fertile, hence many native grasses useful in stock raising are abundant. Some of the grasses ripen on the foot in the fall, furnishing good grazing throughout the winter, though stock thrives best with some shelter during the colder months. Large interests are vested in sheep raising, and the annual wool clip is about 6,500,000 pounds. Cattle are grown principally for meat, but dairying is conducted in many localities. Other live stock includes horses, swine, mules, and poultry.

MANUFACTURING. The enterprises devoted to manufactures are principally in connection with the reduction and smelting of ores. Many railway repair shops are maintained, and considerable interests are vested in flour and grist mills. Other manufactures include butter, chemicals, utensils and machinery. Cedar and other evergreen trees yield material for manufacturing enterprises.

TRANSPORTATION. The trunk line of the Southern Pacific Railway crosses the northern part of the State, from which several branches extend to points inland. The line of the San

Pedro, Los Angeles and Salt Lake Railway crosses the southern part, extending through it on the route from Los Angeles, Cal., to Salt Lake City, Utah. None of the streams is navigable, but a few of the lakes are used for local communication. The lines of railways, including branches, aggregate a total of 1,200 miles.

GOVERNMENT. The constitution was adopted by popular vote in 1864, at the time the State was admitted. It vests the executive authority in the governor, lieutenant governor, secretary, treasurer, comptroller, surveyor general, and attorney-general, each elected for four years. The Legislature is limited to 75 members, and the senators must not number less than one-third or more than one-half the representatives. The senators are elected for four and the representatives for two years, the elections being held on the Tuesday after the first Monday in November of even years. A supreme court, district courts, and justices of the peace constitute the judicial branch. Town and city courts may be established by the Legislature.

EDUCATION. Ample provisions were made for public schools at the time Nevada was organized as a Territory, when flourishing schools were opened at Virginia City, Gold Hill, Dayton, Carson City, and other places. The State University was first located at Elko, in the eastern part of the State, but it was afterward removed to Reno, where it occupies a fine location in the northern limits of the city. Flourishing high schools are located in all the towns and cities, the total number exceeding 16. The courses average twelve years, including eight years in the grades and four years in the high school proper. The school population is reported at more than 13,500, the ages ranging between six and eighteen years. In the payment of salaries to teachers the State takes a high rank, paying a monthly average of \$112.51 to males and \$67.96 to females. The schools are supported jointly by local taxation and by appropriations made by the State. The distribution of funds among the several counties of the State average \$165,500, or about \$12.25 for each census child. The school term averages 8.1 months per year. Reno has a hospital for those suffering with mental diseases, and a State prison and an orphans' home are located at Carson. Several schools for the Indians are maintained by the national government, including a boarding school for Indian children.

INHABITANTS. The State has the smallest population of the several states in the Union. A large majority of the people are more or less directly interested in mining and railroading. They consist chiefly of immigrants from other

states, but include a considerable number of foreign birth. Carson City, in the western part of the State, is the capital. Other cities include Virginia City, Reno, Eureka, and Gold Hill. In 1900 the State had a population of 42,335. This included a total colored population of 6,930, of which 134 were Negroes, 228 Japanese, and 5,216 Indians. Population, 1910, 81,875.

HISTORY. The region included in Nevada was first visited by Francisco Garcés, a Franciscan friar, in 1775. Frémont, while on his route to California, in 1843, passed through it from east to west. It was included in the Mexican session of Feb. 2, 1848, when the United States acquired a large scope of country by the Treaty of Guadalupe Hidalgo. Settlements were made at various places by immigrants from states farther east as early as 1845, and four years later the Mormons established a trading post near the present site of Genoa. Silver was discovered in 1859, when it was included in Utah Territory, but it was organized as a separate Territory in 1861. The discovery of the Comstock lode caused a large number of miners and prospectors to settle in the Territory. It was admitted as a State in 1864. Subsequently the output of gold and silver declined materially, causing the State to lose in population, but in recent years it has shown considerable growth through the construction of railways and the development of mining and agriculture.

NEVADA, a city of Missouri, county seat of Vernon County, 98 miles south of Kansas City. It is on the Missouri Pacific and the Missouri, Kansas and Texas railroads. The city is surrounded by a rich agricultural country and in its vicinity are valuable deposits of coal. Among the noteworthy buildings are the Cottey College for Young Ladies, the State lunatic asylum, the high school, the public library, and the Roman Catholic convent school. It has manufactures of carriages, flour, lumber products, galvanized iron, and machinery. The general facilities include waterworks, street pavements, sanitary sewerage, and Lake Park. It was settled in 1830 and was chartered as a city in 1880. Population, 1900, 7,461; in 1910, 7,176.

NEVADA STATE UNIVERSITY, a co-educational State institution of Nevada, founded at Elko in 1873, but removed and formally reopened at Reno in 1886. It occupies a place at the head of the educational system of the State and comprises the college of arts and sciences, the college of agriculture, the State normal school, the college of applied science, and the university high school. The curriculum includes military instruction. A school of mines connected with the university is located at Vir-

ginia City. The university has a library of 5,500 volumes, an income of \$75,000, and property valued at \$250,000. It has a faculty of 25 members, including professors and instructors, and is attended by about 400 students.

NEVERS (nē-vâr'), a city of France, capital of the department of Nièvre, 140 miles southeast of Paris. It is at the confluence of the Loire and Nièvre rivers and is surrounded by a fertile plain. Some of the streets are narrow and irregular, but the newer portion is well and substantially built. The Church of Saint Étienne, the palace of justice, the lyceum, and the public library are among the chief buildings. Chemicals, porcelain, textiles, and ironware are manufactured. It has considerable trade in merchandise and grain. Population, 1906, 28,875.

NEVIS, an island of the British West Indies, one of the Leeward Islands, two miles southeast of Saint Christopher. It is three miles wide by four miles long. The area is fifty square miles. The surface consists chiefly of an extinct volcano, which rises to a height of 3,596 feet, but the slopes are fertile and well cultivated. Limes, oranges, sugar, rum, and molasses are produced in abundance. Charlestown is the capital and principal town. Columbus discovered Nevis in 1498. It was settled by the English in 1628, but was taken by the French in 1706. In 1783 it was restored to the English. Nevis is the birth place of Alexander Hamilton. Population, 1906, 12,947.

NEW ALBANY (nĕ'ă-nĕ), a city of Indiana, county seat of Floyd County, on the Ohio River, opposite Louisville, Ky. It is on the Baltimore and Ohio Southwestern, the Southern, the Pittsburg, Cincinnati, Chicago and Saint Louis, and other railroads. A railway bridge across the Ohio furnishes communication with Louisville. Among the features are the county courthouse, the Federal building, the city hall, the De Pauw College for Women, the public library, the high school, and the fair grounds. The electric street railway system extends to a number of suburbs. The manufactures include cotton and woolen goods, cigars, steamboats, packed meats, flour, glass, stoves, hardware, edged tools, engines, and machinery. It has an extensive trade with ports on the Gulf and on the Mississippi. New Albany was platted in 1813 and incorporated as a city in 1839. Population, 1900, 20,648; in 1910, 20,629.

NEWARK (nĕ'ĕrk), a city of New Jersey, county seat of Essex County, on the Passaic River, eight miles west of New York City. It is on the Erie, the Lehigh Valley, the Central of New Jersey, the Pennsylvania, and other railroads. Newark is the largest city in the

State. The site consists of 23 square miles, most of the area being level, but the residential district is on a beautifully elevated tract toward the west. Among the suburbs are Caldwell, Orange, and Irvington, which contain many beautiful homes of Newark and New York business men, and all parts of the urban and suburban districts are connected by a network of electric railways. Many of the streets are paved with granite or asphalt, and in the residential parts are beautiful parks and avenues of trees. Broad Street is the principal thoroughfare of the city. The public resorts include Lincoln, Washington, and Branch Brook parks.

The architecture is notably modern and substantial. Among the chief buildings is the public library, erected at a cost of \$350,000. The Federal building, which contains the customhouse and post office, is an imposing structure. The high school, the Prudential Life Insurance building, the city hospital, the Newark Academy, the Saint Benedict's College, the Newark Technical School, and the Essex County Hospital for the Insane are among the prominent buildings. The public library has 85,000 volumes of books. The city contains statues of Gen. Philip Kearny and Frederick T. Frelinghuysen. Many charitable institutions and historical and civic societies are well represented.

Newark is distinctly a manufacturing city. It has about 3,150 manufacturing plants, which employ on an average 50,000 persons, and the annual output is valued at \$130,000,000. Practically all of the more important manufactures are represented, but those of the largest proportions include leather, machinery, furniture, tobacco products, cotton and woolen goods, cutlery, jewelry, boots and shoes, and chemicals. Transportation facilities are afforded by the Passaic River and Newark Bay, along which the city has an extensive water frontage. The municipality owns the waterworks, which represent an outlay of \$6,500,000. Other public utilities include sewerage, electric and gas lighting, and a well-equipped fire department.

The first settlement on the site of Newark was made in 1666, when a trading post was established here by a company from Connecticut. Originally it was called Milford, but it was renamed Newark in 1667. The town charter was granted in 1712 and it was incorporated as a city in 1836. A destructive fire did much damage to the city in 1836, which was followed by a business panic the next year. Population, 1905, 283,289; in 1910, 347,469.

NEWARK, a city in Ohio, county seat of Licking County, on the Ohio and Erie Canal and the Licking River, 32 miles east of Columbus.

It is on the Pennsylvania and the Baltimore and Ohio railroads. The public utilities include electric lights and street railways, pavements, waterworks, sewerage, and a number of fine schools. Among the chief buildings are the county courthouse, the auditorium, the public library, and the high school. It has manufactures of railway cars, clothing, stoves, glass, engines, ironware, machinery, vehicles, and paper. Extensive coal works are in its vicinity. It has a growing trade in farm produce, wool, and live stock. The place was settled in 1801 and became a city in 1839. Population, 1910, 25,404.

NEW BEDFORD, a city of Massachusetts, county seat of Bristol County, on the estuary of the Acushnet River, 56 miles south of Boston. It is on the New York, New Haven and Hartford Railroad. New Bedford has an excellent harbor on Buzzards Bay, is conveniently connected by steamboat lines, and has an extensive system of electric street railways, which connect it with a number of adjacent cities. It is one of the most noted centers of cotton manufactures in the United States, having about 35 establishments which produce cotton goods of various kinds. Other manufactures include clothing, cordage, glass, leather, machinery, carriages, soap, hardware, and utensils. The Wamsutta mill is one of the largest cotton manufactories in the world and has aided in making New Bedford famous.

The site has an area of twenty square miles. Many of the streets are paved with gravel and macadam. Among the principal buildings are the county courthouse, the city hall, the public library, the Masonic Temple, the State armory, the Saint John's and the Saint Luke's hospitals, and the Merchants' National Bank. Hazelwood, Brooklawn, Common, and Buttonwood parks are fine public grounds. New Bedford was an important whaling port in the early history of America. It was settled in 1652, when it formed part of Dartmouth, but was organized separately in 1787. The place was incorporated as a city in 1847. Population, 1910, 96,652.

NEWBERN, a city in North Carolina, county seat of Craven County, at the confluence of the Trent and Neuse rivers, 106 miles southeast of Raleigh. It is on the Atlantic Coast Line and the Atlantic and North Carolina railroads and has a large coastwise trade. The noteworthy buildings include the county courthouse, the public library, and the Federal building. It has manufactures of turpentine, cotton-seed oil, furniture, tobacco products, candy, cotton goods, and gumwood plates and dishes. The fisheries in the vicinity are important. Waterworks, electric lighting, pavements, and sanitary sewerage

are among the public utilities. Newbern was founded by Swiss settlers in 1701 and until 1793 it was the capital of the province of North Carolina. In 1862 it was captured for the Federals by General Burnside. Population, 1910, 9,961.

NEW BRIGHTON (brī'tūn), a borough of Pennsylvania, in Beaver County, on the Beaver River, 28 miles northwest of Pittsburg. It is on the Pennsylvania, the Pittsburg and Lake Erie, and other railroads. The surrounding country is agricultural and dairying and contains deposits of natural gas, petroleum, and coal. Among the noteworthy buildings are the public high school, the public art gallery, the Y. M. C. A. building and Beaver Valley Hospital. It has manufactures of lumber products, glass, machinery, twine, flour, wire, hardware, and vehicles. The municipality has waterworks and sanitary sewerage. Population, 1910, 8,329.

NEW BRITAIN, a city of Connecticut, in Hartford County, nine miles southwest of Hartford, on the New York, New Haven and Hartford Railroad. It is finely located and has good municipal improvements. Among the manufactures are hardware, musical instruments, cotton and woolen goods, jewelry, edged tools, cabinets, cutlery, locks, and machinery. The chief buildings include the New Britain Institute, the high school, the public library, the city hall, and the Roman Catholic cathedral. Intercommunication is by a system of electric street railways. It was settled in 1687 and chartered as a city in 1871. Population, 1900, 25,998; in 1910, 43,961.

NEW BRUNSWICK, a Province of Canada, located on the northeastern coast of North America. It is bounded on the north by Quebec and Chaleur Bay, east by the Gulf of Saint Lawrence and Northumberland Strait, south by Nova Scotia and the Bay of Fundy, and west by the State of Maine and the Province of Quebec. The Saint John and the Saint Croix rivers form a part of the western boundary. Its extent from north to south is about 215 miles, which is a trifle more than its greatest distance from east to west. The coast line is quite irregular, including a total of 500 miles. The area is 28,200 square miles, of which 100 square miles are water surface.

DESCRIPTION. The surface is generally rolling, but the coast on the Gulf of Saint Lawrence is made up chiefly of low and sandy tracts. On the Bay of Fundy the coast is bold and rocky. A height of land extends from the northwestern part toward the southeast, dividing the head streams of the rivers that flow into the Gulf of Saint Lawrence from those that discharge into the Bay of Fundy. The ridges extending through the Province are outlying ranges of the

Appalachian system and rise from 2,000 to 2,500 feet above the sea.

The western half of New Brunswick is drained by the Saint John River, which has a general course toward the southeast, discharging into the Bay of Fundy. It receives the inflow from the Green, Tobique, Aroostook, Keswick, and Nashwauk rivers, and discharges by an estuary nearly 50 miles long. A number of small streams drain the northeastern part into the Gulf of Saint Lawrence or its inlets, in-



NEW BRUNSWICK.

1, Fredericton; 2, Saint John; 3, Moncton; 4, Chatham. Chief railroads shown by dotted lines.

cluding the Restigouche and the Little Miramichi rivers. The southeastern part is drained by the Petitcodiac into Shepody Bay, an inlet from the Bay of Fundy. Though the Province has many lakes, Grand Lake, in the central part, is the only one of considerable size. It receives the inflow from the Salmon River and the discharge is carried by the Saint John.

The climate is marked by extremes of heat and cold, but they are more marked in the interior than on the coast. In winter the thermometer falls to 30° below zero and in summer it rises as high as 90° and even 98° above. Dense fogs and mists characterize the coast region, but the climate is healthful. The average rainfall is 40 inches for the Province, but it is greatest along the coast.

MINING. The Province has mineral resources of considerable value. Nickel and iron are found in paying quantities and coal is worked to some extent, but the mineral coal is confined largely to thin seams. Gypsum of a good grade is abundant and considerable quantities of antimony and manganese are obtained. Valuable clays and building stones are distributed in many parts of the Province. Stone valuable for

grindstones and whetstones is quarried and shipped in large quantities.

FISHERIES. The fishing industry has been important from an early date in American history. Both coasts yield a large output and the Province usually holds second rank in the earnings from fisheries, being exceeded only by Nova Scotia. Among the principal catches are the herring, cod, sardine, salmon, smelt, and lobster. In smelt, herring, and sardine fishing New Brunswick exceeds all the other provinces. The fisheries yield returns annually valued at \$4,125,000.

AGRICULTURE. The valleys and lowlands are fertile, but the hilly portions have a scant vegetation and do not yield extensively. Some of the coast lands are diked, especially at the head of the Bay of Fundy, where the soil is particularly fertile. Though agriculture is the leading occupation, it is still perceptible of greater development. Oats and hay are the principal products and buckwheat, potatoes, and wheat are cultivated to a considerable extent. Root crops, especially turnips, are grown on a large acreage. Smaller fruits yield good returns, though the larger varieties do not ripen before the occurrence of frosts, except in the valleys of the Saint John and other streams, where apples are grown.

Originally the Province was covered with timber, including such varieties as spruce, fir, tamarack, balsam, and many of the hard woods. These forests have been largely removed, hence the land is either tilled or used for pasturage. Sheep raising is a growing industry. Much attention is given to rearing cattle for meat and dairy products. Horses of a superior quality are grown for domestic use and exportation.

MANUFACTURES AND COMMERCE. New Brunswick has considerable material which is useful in manufacturing enterprises, such as lumber, coal, and metals. The fisheries yield a large output for canning and curing. Other manufactures include butter, cheese, furniture, clothing, and machinery.

Lumber is exported to European ports. The manufacture of wood pulp has assumed large proportions, hence furnishes an article for exportation. Other exports include wool, metals, lumber, and fresh and canned fish. A large part of the trade passes through the port of Saint John.

TRANSPORTATION. Good harbors have been located and improved on both coasts and steamers ply regularly between them and the important cities of the Atlantic coast in Europe and America. Navigation is protected from the dangers of a foggy coast by an extensive system of light-

houses, fog horns, and fog whistles. Harbor and canal improvements facilitate a growing trade. Railway building has received considerable attention and the Province is traversed by several lines, including the Canadian Pacific, the Grand Trunk, and the Intercolonial railways. Branches extend from the main lines to many inland and coastal trade points, giving all sections reasonably good service. At present the total mileage is placed at 1,800 miles.

GOVERNMENT. The Lieutenant Governor and a council of six members constitute the chief executive officers. The Lieutenant Governor is appointed for a term of five years by the Governor General of Canada. A single chamber of 46 members, elected for four years, constitutes the Legislature. The county councils have general powers to administer local administration, there being no local municipal councils as in some of the other provinces.

EDUCATION. The public educational institutions of New Brunswick include the University of New Brunswick, which maintains faculties of arts and of applied science, a provincial normal school and model school, about 70 high schools of various grades, and 1,700 common schools. All these from the university to the elementary schools are systematically articulated from grade to grade, and are under the supervision of a chief superintendent of education. The present incumbent of that office is James R. Inch, B. A., LL. D., who has filled the position for the past eighteen years. The university and provincial Normal School are located at Fredericton, the capital of the Province.

About 67,500 pupils are in attendance at the public schools. The number of teachers is about 2,000. The total expenditure for educational purposes approximates \$750,000, of which over one-third is drawn from the provincial revenues, about \$100,000 is raised by assessment upon the several counties, and the remainder is obtained by assessment upon the local school districts. A movement has been inaugurated to improve rural education by uniting several school districts for the purpose of maintaining a central school. These consolidated schools have gardens attached and operate departments of manual training and household science. The children living at a distance from the schools are transported to and from the schools in vans. Those located at Kingston, Riverside, Hampton, and Florenceville are the first of these consolidated schools to be established. The taxable valuation of these four school districts is about \$1,000,000. They are attended by over 750 students, the total cost per pupil chargeable to the district being \$13.50.

Besides the public educational institutions, there are two denominational colleges and several private schools. The University of Mount Allison (Methodist) is situated at Sackville and the University of Saint Joseph's (Roman Catholic) is located at Memramcook, both in the County of Westmoreland, in the southeastern part of the Province. Saint John has a general hospital and Dorchester is the seat of the Dominion penitentiary. Other institutions include the asylums for the insane, an industrial home for juveniles, and hospitals for the deaf and dumb.

INHABITANTS. The larger part of the population is of British origin, including a considerable proportion of Irish descent. In an early period of American history many French settled in the region and quite an element of French descent is included at present. About two-thirds of the inhabitants are Protestants, including principally Baptists, Anglicans, and Presbyterians, and nearly one-third are Roman Catholics. Fredericton, on the Saint John River, is the capital. Other cities include Saint John, Moncton, and Chatham. In 1901 the Province had a population of 331,120.

HISTORY. The region now included in New Brunswick was discovered by Sebastian Cabot in 1498. A colony was established by the French on the Bay of Chaleurs in 1639, whence the settlements extended along the coast and in the valley of the Miramichi River. From 1604 until 1713 it was united with Nova Scotia in the French colony of Acadia. In the latter year it was ceded by France to England under the Treaty of Utrecht. The boundaries were fixed by the Treaty of Paris in 1763 and in 1784 it was organized as a separate Province. After the Revolutionary War a large number of loyalists left the United States to settle in New Brunswick, and in 1867 it was made a Province of the Dominion of Canada.

NEW BRUNSWICK, a city of New Jersey, county seat of Middlesex County, on the Raritan River and on the Pennsylvania and the Raritan River railroads. It is connected by the Raritan and Delaware Canal. Among the manufactures are India-rubber goods, boots and shoes, carpets, hosiery, needles, paper, cotton and woolen goods, vehicles, and machinery. It is the seat of Rutgers College, an institution founded in 1770, which carries advanced courses of study. New Brunswick contains a theological seminary of the Reformed Lutheran Church and the State Agricultural and Mechanical College. Other noteworthy buildings include the Sage Library, the Saint Agnes Academy, the city hall, the high school, and many churches.

It has a large trade and modern municipal facilities, including electric street railways, waterworks, pavements, and electric lighting. The place was settled in 1681, when it was known as Prigmore's Swamp, and it was named New Brunswick in 1714. It was chartered as a city in 1784. Population, 1910, 23,388.

NEWBURGH, a city of New York, in Orange County, sixty miles north of New York City, on the Hudson River. It is on the Erie, the West Shore, and the New York Central railroads. The site is a beautiful tract of ground, rising about 300 feet above the river, and the slopes have many fine residences and yards. It has a large trade in coal and agricultural products. The noteworthy buildings include the public library, the Home for the Friendless, the Saint Luke's Home and Hospital, the city hall, and the high school. An extension in the river, known as Newburgh Bay, furnishes a deep water front. Among the manufactures are cotton and woolen goods, farming implements, flour, ironware, paint, soap, brushes, leather, and machinery. The surrounding country is farming, dairying, and fruit raising, and has productive coal deposits. Newburgh contains the Hasbrouck House, a structure of stone that served in 1782-83 as Washington's headquarters. This building is maintained by the State as a depository for historical relics. German Lutherans settled the place in 1709. It was chartered as a city in 1865. Population, 1905, 26,500; in 1910, 27,805.

NEWBURGH ADDRESSES, the name applied to several letters written at Newburgh, N. Y., shortly after the close of the Revolutionary War, while an American army was in camp on the Hudson River near Newburgh. These letters called attention to the failure of Congress to provide means to pay the soldiers and were published anonymously. They urged upon the soldiers not to disband until provision would be made for their pay, and suggested that a meeting should be called by the officers with the view of demanding a satisfactory settlement even if it were necessary to appeal "from the justice to the fears of the government." Congress soon after made a satisfactory settlement with the army. It was ultimately ascertained that Gen. John Armstrong was the author of the addresses.

NEWBURYPORT (nū'bĕr-ĭ-pōrt), a city of Massachusetts, in Essex County, on the Merrimac River, 36 miles northeast of Boston. It is on the Boston and Maine Railroad and has a good harbor on the river. Among the manufactures are silverware, boots and shoes, hats, carriages, spirituous liquors, cotton and woolen

goods, ironware, and machinery. The public library was founded by Josiah Little in 1854 and contains 45,000 volumes. Other public institutions include the Old Ladies' Home, the Putnam Free School, the Y. M. C. A. Memorial Building, the Anna Jacques Hospital, and a marine museum. It has a statue of Washington, a suspension bridge, the Old South Church, and Washington Park. Electric street railways, waterworks, and a system of sanitary sewerage are among the improvements. The place was settled in 1635 and chartered as a city in 1851. Population, 1905, 14,673; in 1910, 14,949.

NEW CALEDONIA (kāl-ê-dō'nĭ-à), an island in the Pacific Ocean, located 790 miles east of Australia, about midway between New Guinea and New Zealand. It is 238 miles long, and from five to thirty miles wide. The area is 6,584 square miles. New Caledonia is of volcanic origin, has mountain ranges that reach a height of 8,000 feet, and its coasts are surrounded by coral reefs and sand banks. Fertile valleys penetrate the mountain regions and its coast plains are also productive. The principal products include coffee, tobacco, sugar cane, lumber, maize, and many varieties of fruit. It has valuable mineral deposits, notably copper, cobalt, and ironstone. The inhabitants consist principally of natives resembling the Papuan race, but many are descendants of persons sent there by France as convicts. The natives are Canaques, who were formerly cannibals, but in the latter part of the last century they became quite highly civilized, and now engage in various industries, but principally in agriculture and sheep raising. The island was discovered in 1774 by Captain Cook and in 1853 became a possession of the French, who made it a penal settlement in 1872. Numea, on Numea Bay, is the capital. Population, 1906, 53,358.

NEWCASTLE, a city of New South Wales, at the mouth of the Hunter River, 102 miles northeast of Sydney, with which it is connected by lines of steamers and railways. The city is finely located on elevated ground, has regularly platted streets, and many of the thoroughfares are well paved with brick and macadam. The noteworthy buildings include the city hall, the public library, the courthouse, the high school, and a number of fine churches. It has a large trade in wool, grain, hides, and coal, and is the most important coaling station in the Southern Hemisphere. Among the industries are iron foundries, boot and shoe factories, copper-smelting works, flouring mills, machine shops, and shipbuilding yards. It has electric lighting and street railways, a system of public waterworks, and a deep and spacious harbor. Two break-

waters and two forts protect the harbor, which has an area of 540 acres. Population, 1906, including suburbs, 55,842.

NEW CASTLE, a city of Pennsylvania, county seat of Lawrence County, on the Shenango River, fifty miles northwest of Pittsburg. It is on the Pennsylvania, the Erie, the Pittsburg and Western, and other railroads. The surrounding country is farming and dairying, producing cereals, live stock, and dairy products. Among the noteworthy buildings are the public library, the high school, the county courthouse, the opera house, and many churches. It has extensive manufactures of street cars, flour, nails, tubes, rods, ironware, machinery, glass, vehicles, and pottery. Its municipal facilities are modern, including pavements, waterworks, and electric street railways. It was settled in 1812 and chartered as a city in 1869. Population, 1900, 28,339; in 1910, 36,280.

NEWCASTLE-UPON-TYNE, a city and river port of England, on the Tyne River, sixty miles northeast of Liverpool. It is located within the confines of Northumberland County, but forms a county by itself. It has a fine site, being partly on an elevated plateau, and owes its prosperity largely to the immense deposits of coal in the vicinity and to its convenient harbor. The manufactures include steamships and other sailing vessels, locomotives, cannon, marine engines, machinery, carriages, cables, clothing, anchors, sails, shot, harness, glass, cement, and earthenware. The city is extensively connected by steamboat and railway lines. It has a fine street car system, electric lighting, pavements, several well-improved parks, and fine schools and colleges. Among the noteworthy buildings are the Saint Mary Hospital, the Alan's endowed schools, the Mechanics' Institution, the Institute of Mining Engineers, a female orphan institution, the Trinity Almshouse, the Hospital of the Holy Jesus, the Saint Nicholas Cathedral, the Earl Grey Monument, the public library, and the Tyne Theater. The place was a military station at the time the Romans occupied Britain, having been fortified under Hadrian. Robert, the son of William the Conqueror, built a castle and fort here in 1080, when it was named Newcastle. It declared in favor of the king during the Civil War, when it was besieged by an army of Scots. Population, 1907, 272,969.

NEW ENGLAND, the name applied collectively to the six northeastern states of the United States, including Maine, Vermont, New Hampshire, Massachusetts, Connecticut, and Rhode Island. The total area of these states, including a number of adjacent islands, is 67,-

384 square miles, and the population is equal to about one-thirteenth of that of the Union. The entire region was granted by James I., in 1606, to the Plymouth Company as North Virginia, but in 1614 John Smith made a map of the coast and named the region New England.

NEWFOUNDLAND (nū'fūnd-land), a British colony in North America, situated east of Canada, comprising the island of Newfoundland and the coast of Labrador. The island



NEWFOUNDLAND.

1, Saint John's; 2, Harbor Grace; 3, Port aux Basques. Dotted lines indicate chief railways.

of Newfoundland is in the Atlantic Ocean, opposite the mouth of the Saint Lawrence River, and is separated from Quebec and Labrador by the Strait of Belle Isle, ten miles wide. In form it is somewhat triangular, measuring 315 miles from Cape Norman, its most northerly point, to Cape Ray, its extreme southwesterly point, while the extreme distance from east to west, that is, from Cape Spear to Cape Anguille, is 314 miles. The area of the island is 42,200 square miles and the coast of Labrador, which belongs to it as a dependency, is usually reckoned at 120,000 square miles, but the boundary line at the west has not been definitely located. Extending eastward from the mainland toward Europe, the island is the nearest point at which to anchor the submarine telegraph lines.

DESCRIPTION. Numerous bays indent the coast, some of them extending into the interior as narrow fiords, and countless islands lie adjacent to the shores. Rocky headlands and bold cliffs characterize the shore, presenting rugged lines that rise abruptly from 200 to 400 feet high, and in some localities from 800 to 2,120 feet. The surface of the interior is hilly or

undulating, assuming in some places ridges that terminate in the headlands. Long Range, the principal ridge, extends along the western coast, rising in peaks from 1,450 to 2,000 feet high. Vast stretches of forests are found inland, where the country is quite hilly.

Three rivers, the Gander, Exploits, and Humber, furnish the larger part of the drainage. Both the Gander and the Exploits flow toward the northeast, discharging by estuaries into Notre Dame Bay. The Exploits is the largest stream, having a length of 200 miles and a basin of about 4,000 square miles. The Humber River, which is the only large stream that flows toward the west, passes through canyons of great depth and beauty. Other streams include the Victoria and the Saint George rivers. Many lakes abound in the interior, including Victoria, Grand Pond, Red Indian, and Great Gander lakes. The surface of Labrador, like that of Newfoundland, is hilly and undulating, and has a rocky and broken coast. See **Labrador**.

The climate is modified to a considerable extent by the Gulf Stream, but its modifying influence gives rise to extensive mists and fogs. Heavy gales and blizzards are not uncommon in winter, when the weather is cold. As a whole the climate is healthful and quite equable, but the interior of Labrador has cold and severe winters. The thermometer falls below zero quite frequently in the colder months and rises to 80° and 85° in the summer, when the climate resembles that of New Brunswick. In the southern part of Newfoundland the mean annual temperature is somewhat higher than in the adjacent parts of the neighboring continent, the thermometer rarely sinking below zero in winter and seldom rising above 80° in summer.

NATURAL RESOURCES. The fisheries have been of vast value from the early settlement of America, and at present are the principal resources of its inhabitants. Grand Banks, noted as a submarine plateau, lies southeast of the island, where vast schools of cod are found in the fishing season. Other extensive cod fisheries are along the coasts of the island and Labrador. The seal fisheries rank in importance next to those of the cod, but in value it is followed closely by the lobster catch. Other varieties taken in large numbers include the herring, salmon, and smelt. Nearly one-third of the inhabitants are engaged in the fisheries, and the value of the annual catch is placed at \$9,500,000.

The colony is rich in mineral resources, especially in iron and copper. Both of these minerals are mined extensively on Belle Island, which is unusually rich in these minerals. Iron ore deposits are abundant on the western coast

and in many places the deposits extend under the sea. Gypsum, lead, nickel, silver, and some gold are found. Coal fields exist in the vicinity of Saint George's Bay.

Forests of commercial value abound in many places, consisting chiefly of pine, spruce, fir, birch, tamarack, and red maple. The pine forests of the northern part are particularly valuable, where the timber industry yields a large output of lumber.

The soil is barren and rocky in many localities, while extensive marshes are found in the interior. Arable land in large tracts is located at the heads of the bays and along the river valleys, and a bonus is offered for cleared land by the government. Not more than one-tenth of the arable land is under cultivation. Potatoes and turnips are the principal crops, but oats, hay, and barley are grown successfully. Gardens are worked extensively by the fishermen, who cultivate many vegetables, especially cabbage. Cattle are reared profitably for meat and dairy products. Other domestic animals include horses, sheep, swine, and Newfoundland dogs. Many wild animals are abundant, such as the reindeer, caribou, bear, beaver, marten, wolf, and wild cat.

GOVERNMENT. The executive power is vested in a Governor, who is appointed by the British crown and assisted by an executive council of nine members. The legislative branch consists of a Legislature, made up of a council of not more than 17 members and an assembly of 36 representatives, the latter being elected by manhood suffrage. At present the colony is divided into electoral districts, but distinct local governments are not maintained, owing to the concentration of population. For many years there has been more or less advocacy with the view of incorporating the colony with the Dominion of Canada, but action has been postponed largely through unsettled points in regard to the fishing industry.

COMMERCE AND TRANSPORTATION. Foreign trade is chiefly with Canada, Great Britain, and the United States. Nearly half of the trade is with Canada. Among the chief exports are dried cod, whale oil, timber, and minerals. Flour, machinery, salt, meat, and petroleum are imported. Canned and cured fish, lumber products, clothing, butter and cheese, and farming and mining utensils are the chief manufactures. Communication is largely by water, owing to the extensive coast and many inlets that afford fine harbors. A government railway extends from the southwestern part in a direction toward the northeast, thence eastward beyond Great Gander Lake, and thence southeast to Saint

John's. Several branches and private lines are operated, the total being 800 miles. Cable lines connect the island with the American continent. The first Atlantic cable line built to Europe extends from the island to Heart's Content Harbor, Ireland. The length of telegraph lines in operation is given at 3,125 miles.

EDUCATION. The schools are denominational, the school funds being appropriated according to the number of pupils of each denomination. At present 27 per cent. are Methodist, 33 per cent. are Anglicans, 34 per cent. are Roman Catholics, and the remainder belong to various Protestant denominations. The Governor appoints three superintendents of education, one for each denomination, who supervise and inspect the schools of their respective denominations. The Methodist and Anglican superintendents, every year, alternately, inspect the other Protestant schools, belonging chiefly to the Presbyterians and Congregationalists. The superintendents are required to visit annually, if possible, all the schools and training institutions of their respective denomination. They are required to present an annual report of the schools under their charge, to give advice to teachers and boards of education, and to utilize every available means to improve the character and efficiency of the educational work.

Although attendance is not compulsory, the public schools are well attended and very few private schools are maintained. Four colleges are located at Saint John's, belonging respectively to the Methodists, Roman Catholics, Anglicans, and the other Protestant denominations. These institutions prepare students for the examinations of the University of London, England. Ample provisions have been made in support of charities and for correctional purposes. Colonial institutions for the deaf and dumb, incorrigible, insane, and other public charges are maintained at public expense, most of which are located at Saint John's.

INHABITANTS. Fully 96 per cent. of the inhabitants are native born and are chiefly of Irish, English, Scotch, and French descent. A majority are Protestants, belonging chiefly to the Methodist and Anglican churches, but the Roman Catholics have a large membership. Saint John's, in the southeastern part, is the capital and largest city. Other cities include Harbor Grace, Bonavista, Carbonear, and Twillingate. Port aux Basques is important as a port of entry. The population of Labrador is 4,890, mostly Esquimos, and during the summer about 30,000 fishermen exploit the region. In 1901 the island had 217,037 inhabitants. Population, 1906, 223,755.

HISTORY. The Northmen probably explored Newfoundland in the year 1000, when, according to *Islandic Sagas*, it was visited by Lief Eric. It was discovered by John Cabot in 1497 and was visited by Sebastian Cabot the following year. Fishermen from France were attracted by the value of its fisheries, but the settlements made by them were not permanent. Sir Humphrey Gilbert took formal possession of it in the name of Queen Elizabeth in 1583, but a long struggle for supremacy between the English and French interfered with the development of settlements. The first English settlement was founded in 1621 and it remained constantly under British control. The Treaty of Utrecht, in 1713, gave the French the right to fish along its coasts and to occupy a portion of the coastal plains for curing purposes. Its government was administered directly from England until 1833, when a more satisfactory form was granted, and a second modification was made in 1855, by which greater powers were vested in the local authorities.

NEWFOUNDLAND DOG, a large and intelligent dog originated in Newfoundland, though not an aboriginal of that island. This dog is about 27 inches high at the shoulders, weighs from 80 to 100 pounds, and has a double coat of warm and thick hair, consisting of a short woolly fur, through which the longer hairs protrude. The color is almost uniformly black and white, or entirely black. The head is broad and massive, the eyes are small and deeply set, and the legs and feet are powerful. This dog is excellent for watching and is used extensively in cold countries as a beast of burden and to draw sledges. It can be trained for swimming, hence is useful in saving the lives of human beings near the coast or in inland waters.

NEWGATE, a London prison of historic interest, located at the west end of Newgate Street, opposite the Old Bailey. The name was derived from its being at one time a new gate; the name was compounded prior to 1218. It is no longer used as a prison proper, but serves as a place to detain prisoners temporarily, or until they are tried in the central criminal court near by. Newgate is the place where execution by hanging is carried out. The walls are high and windowless.

NEW GUINEA (gĭn'ĕ), or **Papua**, a large island situated north of Australia, separated from that continent by Torres Strait. The island was probably connected with Australia at an early date, since the strait is not more than 300 feet deep. It has a length of nearly 1,500 miles and is from 22 to 430 miles wide.

The area is estimated at 310,000 square miles, thus being the largest island in the world. Careful explorations of the interior were not made until within recent years. Chains of mountains trend across it, including the Bismarck ranges, which attain to a height of about 20,000 feet. In various parts are rocky formations that render cultivation impossible, but vast tracts of it are fertile. It has extensive forests of tropical trees, many of which rank among the largest in the world. The animals include lizards, crocodiles, opossums, wild hogs, tree kangaroos, serpents, and many species of beautiful and curious birds, including pigeons, parrots, birds of paradise, kingfishers, and the cassowary.

The climate is warm and damp, rainfall is abundant, and in many parts the vegetable growths are very luxuriant. Among the principal coast indentations that furnish good harbors are the Gulf of Papua, Huon Gulf, Humboldt Bay, and Geelvink Bay. The chief rivers include the Amberno and Fly, these being navigable for some distance at all times of the year, but during the rainy season they rise considerably and form an extensive navigation area. Papuan natives make up the principal part of the inhabitants, but there are also a considerable number of Malays, Karons, and eastern Polynesians. The principal products include lumber, sweet potatoes, rice, tobacco, yams, sugar, rum, maize, wheat, millet, sago, cocoa, oranges, and other species of tropical fruits.

New Guinea is a possession of three European powers—Germany, England, and Holland—which occupy respectively Kaiser Wilhelm's Land, British Guinea, and Dutch Guinea. *Kaiser Wilhelm's Land* occupies the northeastern part. It has an area of about 70,200 square miles and a population of 175,000. The region was formerly governed by the German New Guinea Company and an imperial commissioner, but in 1899 it was placed directly under imperial control, and with it are included the islands of the Bismarck Archipelago. Stations are maintained at Constantinhafen, Finschhafen, Hatzfeldhafen, and elsewhere, and the exports embrace principally lumber, bamboo, dates, tobacco, and tropical fruits. *British Guinea* embraces an area of 88,500 square miles and a population of 360,000. The principal settlement is at Port Moresby and the exports consist of pearl shells, tobacco, areca, cabinet woods, and tropical fruits. *Dutch Guinea* has an area of 151,500 square miles, about one-half of the island, and the government is administered from the settlement at Ternate. The colony embraces the western portion of the island. Its soil is less fertile than the regions under German and English control,

though there are valuable forests and extensive deposits of minerals. The population is 212,000, thus making the population of the entire island about 750,000.

New Guinea was discovered by the Portuguese in 1511 and was so named by Inigo Ortiz de Rez, who visited the island in 1546. Dutch navigators landed to obtain fresh water in 1676, but little attention was paid to the island until in 1828, when the Dutch formed a settlement on its western coast. Progress was extremely slow until in 1858, when the Dutch established a colony that has since become prosperous. They have made extensive explorations along the coast and in the interior. England annexed the southeastern part in 1883. The claims of Germany are based upon explorations and settlements founded in 1884.

NEW HAMPSHIRE (hămp'shîr), one of the thirteen original states of the United States, belonging to the New England group, popularly called the *Granite State*. It is bounded on the north by Quebec, east by Maine and the Atlantic Ocean, south by Massachusetts, and west by Vermont, from which it is separated by the Connecticut River. A part of the eastern boundary is formed by the Salmon Falls River. The length from north to south is 178 miles, its greatest width is 98 miles, and the area is 9,305 square miles.

DESCRIPTION. The general slope of the surface is toward the south. It has an average elevation of about 1,190 feet. A large section in the northern part is mountainous, while low hills and broad valleys characterize the central and southern sections. The White Mountains occupy the north central part and culminate in Mount Washington, with an elevation of 6,295 feet. These highlands have an altitude ranging from 2,000 to 3,000 feet and cover an area of 1,400 square miles. They belong to the Appalachian system and consist of the White and Franconia ranges, being divided by the Notch, as the valleys of the Saco and the Ammonoosuc rivers are called. The White Range is picturesque and is sometimes called the "Switzerland of America." In the Franconia Range is a profile of projecting rocks, known as the "Old Man of the Mountain," which is visited by tourists during the summer. Forests of considerable value cover the highlands, consisting chiefly of white pine, spruce, oak, beech, and hickory.

The drainage is principally by the Connecticut and its tributaries, which include the Ashuelot, Sugar, Ammonoosuc, and Mohawk rivers. A large part of the northern section is drained by the Androscoggin, which carries the outflow from Lake Umbagog and after an irregular

course passes the border into Maine. Somewhat farther south is the Saco, which receives the inflow from several streams and passes eastward into Maine. The Merrimac, which

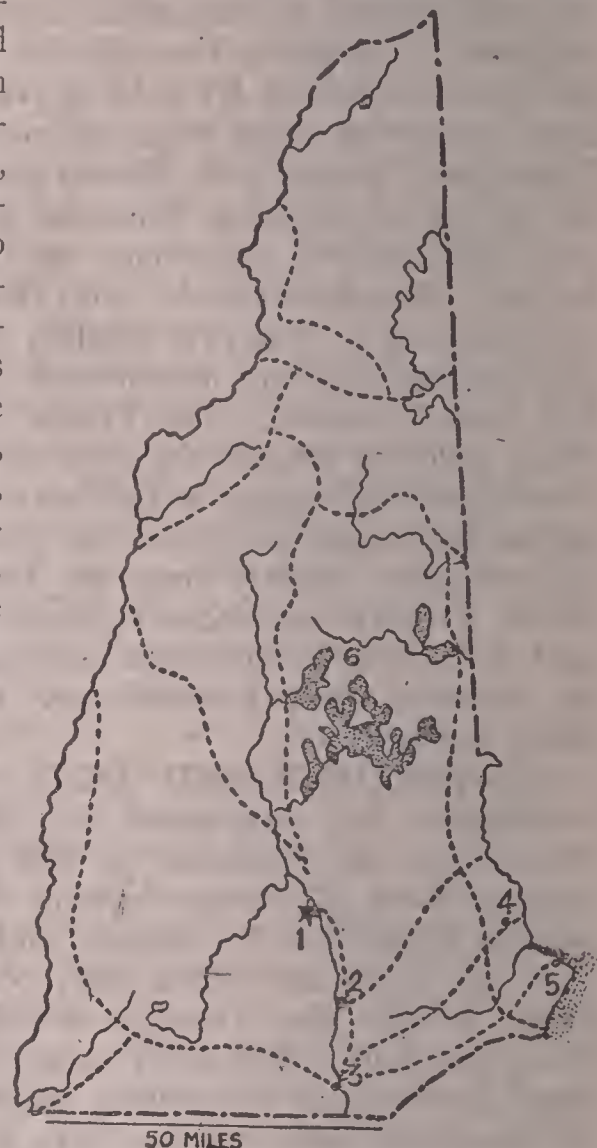
rises by several head streams in the Franconia Range, flows southward into Massachusetts, receiving in its course the Contoocook, Piscataqua, and Souhegan rivers. Many of the streams are noted for the swiftness of their currents, hence are of vast utility in furnishing power for various manufacturing enterprises. Numerous lakes are located

1, Concord; 2, Manchester; 3, Nashua; 4, Dover; 5, Portsmouth. Chief railroads shown by dotted lines.

of which Lake Winnepesaukee is the largest, being six miles wide and eighteen miles long. Other lakes in the central part include Squam, Newfound, and Sunapee. Lake Umbagog is in the northern part, on the boundary with Maine.

The climate is healthful and agreeable, although it is quite cold in the winter. Snow falls to a great depth in the northern section, where the climate is colder than in the southern part. The mean annual temperature is given at 49°, while the extremes range from a few degrees below zero to 95° above. All parts of the State have an abundance of rainfall, which averages 45 inches, but is somewhat heavier in the highlands.

MINING. Copper is mined to some extent and ranks among the more important metals. Small quantities of gold and silver are found and some interests are vested in mining lead, tin, iron, and zinc. A superior quality of stone for making whetstones is found in the White Mountains,



NEW HAMPSHIRE.

where it is quarried extensively. The State produces about three-fourths of the mica obtained in the United States and is noted for its extensive and valuable deposits of granite, large quantities being quarried for monuments and building purposes. Clays suitable for brick and pottery are abundant. Other minerals include ocher, precious stones, and mineral waters.

AGRICULTURE. Less than one-third of the surface is utilized in farming, much of it being too broken for agriculture. The farms average 123 acres and are worked largely by the owners. Hay and forage crops are grown on a larger acreage than all other products combined, the yield being utilized in the live-stock industry. Other crops include corn, oats, potatoes, barley, and buckwheat. Apples are a source of much revenue. Much attention is paid to the cultivation of grapes, small fruits, and vegetables.

Dairying is an important industry. The dairy cows exceed in number all other cattle. Horses, sheep, and swine are grown profitably, but none of these classes of animals is represented by large numbers. Cut-over timber land is utilized to a considerable extent for grazing.

MANUFACTURING. The State is noted as a manufacturing community. It has had a gradual increase during the last half century in the number of wage-earners. Excellent water power is afforded by the Merrimac and other streams, along which the larger manufacturing centers are located. The cotton mills stand at the head of the industrial establishments, employing about 1,500,000 spindles. Granite is converted extensively into building materials and monuments. Other manufactures include boots and shoes, hosiery, paper and wood pulp, flour, machinery, ironware, timber products, leather, and woolen goods. Many of the manufacturing industries are centered at Nashua, Manchester, and Portsmouth.

TRANSPORTATION. Railway building received attention at an early date and nearly all parts of the State are provided with lines, though the northern section is not well equipped. Several trunk lines cross the State, including those of the Grand Trunk, the Boston and Maine, and the Maine Central railway companies. Electric railways are operated in the cities and adjacent territory. The steam railways aggregate a total of 1,300 miles. During the summer a railroad built up Mount Washington is operated. It is a little more than two miles long and makes an ascent of 3,625 feet. Foreign trade, though not large, is centered at Portsmouth.

GOVERNMENT. The constitution now in force was adopted in 1877. It vests the executive authority in the Governor and a council of five

members, who are chosen by popular vote for two years. Other State officers include the treasurer, secretary of State, and commissary general, who are chosen by joint ballot in the Legislature. The legislative functions are discharged by a General Assembly, consisting of 24 senators, chosen by districts, and a house of representatives, whose members are apportioned among the towns and wards of cities according to population. Members in both houses of the Legislature are elected for terms of two years. A supreme court has appellate jurisdiction and to it are subject the courts of record and other courts. All the judicial officers serve during good behavior, except justices of the peace, who are elected for five years. Local government is administered by counties, cities, and towns.

EDUCATION. Every child between the ages of eight and fourteen must by law be sent to school in the town or city in which he resides. The law bears upon the parent or guardian and not upon the child, the former being subject to penalty for failure to send the child to school. Entrance upon the public school is through the elementary department, whether rural or urban, graded or ungraded. The subjects taught vary considerably, but in general they may be said to embrace the recognized fundamentals of learning, with the addition in some instances of music, drawing, handwork, etc. A few of the more progressive and wealthy towns and cities supply good kindergartens prior to the elementary school. About 1,112 of the elementary schools are graded and 1,014 are ungraded. However, the graded schools are constantly increasing in number, with a corresponding decrease in the ungraded schools. After eight years, or in a few cases nine years, of attendance upon such elementary schools, the pupil is expected to pass an examination or give other proof of qualification to enter a high school or academy, called a *secondary school*.

The secondary school is an institution properly equipped for teaching such subjects as are required for admission to college, or equivalent subjects. It must be approved as being of college-preparatory standard by the State superintendent. The secondary school system is made up of city and village high schools, about 50, and an additional 20 endowed academies. Other institutions included with these schools are Brewster Free Academy, Wolfboro; Saint Paul's School, Concord; and Phillips Exeter Academy, Exeter, both of the latter being secondary institutions of international reputation. A normal school of high grade is maintained by the State at Plymouth. It has a course of two

years and pupils are admitted only upon graduation from an approved secondary school.

Collegiate instruction is furnished by the New Hampshire College of Agriculture and Mechanic Arts, at Durham, and by Dartmouth College, at Hanover. Every child in the State who is qualified is entitled to preparation for either of these institutions at public expense, and, once within the college, numerous free scholarships and other means of providing for the expense of collegiate education make it possible for every one of determined temper to win his way through college. The State college is coeducational. Saint Anselm's College (Roman Catholic) is located at Manchester. Laconia has a school for feeble-minded children, Concord has a hospital for the insane, and Franklin has an orphans' home. The industrial school is at Manchester and the State penitentiary is at Concord.

INHABITANTS. The density of population is about 46 to the square mile. A large number of emigrants have left the State to settle in the west central part of the Union, but this has been compensated for by the immigration of foreigners, especially Canadians, who constitute the larger part of those born in foreign lands. Nearly all the inhabitants are Protestants, including chiefly Congregationalists, Baptists, and Methodists. Concord, on the Merrimac River, is the capital. Other cities include Manchester, Nashua, Dover, Portsmouth, Keene, Rochester, Somersworth, Laconia, Claremont, Berlin, and Exeter. In 1900 the State had a population of 411,588. This included a total colored population of 797, including 112 Chinese and 662 Negroes. Population, 1910, 430,572.

HISTORY. The first settlements in New Hampshire were made in 1623 near Dover and Portsmouth, under a grant of land to Sir Ferdinando Gorges and John Mason, the grant covering the region between the Merrimac and the Kennebec rivers. In 1629 Mason obtained a separate grant for the territory between the Merrimac and the Piscataqua. From 1641 to 1679 the region formed a part of Massachusetts, to which it was joined again from 1689 until 1692 and again from 1699 to 1741. Colonial governors ruled during the intervening dates. A temporary government was formed in 1775, when it entered the American confederacy, and the present constitution was adopted in 1792. The State actively supported the Revolution and on June 21, 1788, ratified the national Constitution. Portsmouth was the capital of the colony and later it was removed several times, but Concord became the permanent capital in 1805. The Union was supported with much enthusiasm at the time

of the Civil War, when the State furnished a large number of volunteers.

NEW HAVEN, a city of Connecticut, county seat of New Haven County, on Long Island Sound, 72 miles northeast of New York City. It is at the head of New Haven Bay, on many steamboat lines and on the New York, New Haven and Hartford Railroad, and ranks as the largest city of the State. The streets are regularly platted and many of them are finely paved with granite and asphalt. The site consists of a level plain of 24 square miles, bordered on the east by the Quinnipiac and on the west by the West River. Near the city are ranges of hills, from which two spurs known as East Rock and West Rock extend some distance, rising to heights of about 400 feet.

The city has many beautiful parks, including one in which East Rock is a prominent feature, on the summit of which is a monument erected to the memory of the soldiers and sailors. About 1,200 acres are included in the parks of the city, some of which overlook the harbor, and others are located at convenient points. In the heart of the city is a public square known as The Green, which is bordered by stately elm trees, hence New Haven is popularly called the *City of Elms*. Many of the buildings are commodious and modern, while others are noted for their historic associations. An old burial ground on Grove Street contains the graves of Eli Whitney, James B. Dana, Timothy Dwight, Noah Webster, Theodore Winthrop, and Samuel F. B. Morse.

New Haven is the seat of Yale University, one of the most celebrated institutions of higher learning in America. It has a public library of 54,500 volumes. The educational institutions include a State normal school, the Boardman Manual Training School, the Hopkins Grammar School, and the Hillhouse High School. It has many hospitals and civic and charitable institutions, and contains valuable collections in history and the sciences. Many of the public schools and churches are fine buildings, and the latter include structures erected at an early date. The public buildings are substantial structures, such as the county courthouse, the Federal building, and numerous business and office buildings.

New Haven is noted as a manufacturing center. It has a commodious harbor, hence carries a large coast and inland trade. The manufactures include firearms and ammunition, hardware, carriages, clocks and watches, needles, textile fabrics, musical instruments, and slaughtering and meat-packing products. Large railway repair shops are located within the city. It has a growing wholesale and jobbing trade. An

extensive electric railway system affords communication with suburban and interurban points. A sewer system of 98 miles is maintained. The city has an efficient waterworks system, electric and gas lighting, and well-organized police and fire departments.

A company of Puritans settled on the site of New Haven in 1638, when the place was called Quinnipiac. The settlement flourished under the direction of John Davenport, a Puritan minister, and Theophilus Eaton, a wealthy merchant of London. In 1640 the name was changed to New Haven and at the same time it was made the capital of New Haven Colony, which was united with the New England Union in the same year. It was made a part of the Connecticut colony in 1662 and was jointly the capital of the State with Hartford from 1771 until 1873. The British captured the town in 1779. It was incorporated as a city in 1784, but its growth dates properly from 1848, when the first railway was completed. Fair Haven was annexed to the city in 1870. Population, 1910, 133,605.

NEW HEBRIDES (hĕb'ri-dĕz), a chain of islands in the Pacific Ocean, located east of Australia and north of New Zealand. They embrace about thirty islands of volcanic origin, the entire group containing an area of about 5,000 square miles. Among the principal islands are Espiritu Santo, area 1,850 square miles; Mallicolo, 1,150 square miles; Ambrym, 500 square miles; Sandwich, 435 square miles; Tanna, 175 square miles; and Erromango, 650 square miles. The islands contain a number of active volcanoes, but possess much fertile soil and excellent timber. They produce sugar cane, yams, bananas, cocoanuts, and other varieties of tropical fruits. Horses, cattle, and sheep are reared in abundance. The Portuguese discovered these islands in 1606, but they were claimed by the British on the strength of explorations made by Captain Cook in 1773. The inhabitants are mostly Melanesians. A commission of French and English officers has general administration of the islands. Population, 1906, 52,456.

NEW IBERIA (i-bĕ'ri-à), a city of Louisiana, capital of Iberia Parish, twelve miles north of Vermilion Bay, an inlet from the Gulf of Mexico. It is 125 miles west of New Orleans, on the Southern Pacific Railroad, and is surrounded by a fertile farming country, producing cotton, cereals, fruits, and sugar cane. The chief buildings include a Federal post office, a city hall, a public market, and several schools and churches. Among the industries are sawmills, shipyards, machine shops, foundaries, and brickyards. The city has waterworks, electric lights, and sanitary sewerage. Avery's Island, located

near the city, has large deposits of salt rock. In the vicinity are points of interest, some of which figure in Longfellow's "Evangeline." Population, 1900, 6,815; in 1910, 7,499.

NEW JERSEY (jĕr'zĭ); one of the original thirteen states of the United States, classed with the Middle Atlantic group, popularly called the *Jersey Blue State*. It is bounded on the north by New York, east by New York and the Atlantic Ocean, south by Delaware Bay, and west by Pennsylvania, from which it is separated by the Delaware River. The Hudson River and Staten Island Sound separate it from New York. Its seacoast on the Atlantic has a length of 120 miles. The length from north to south is 167 miles, the average width is 50 miles, and the area is 7,815 square miles, including 290 square miles of water surface.

DESCRIPTION. The State is included largely in the Atlantic coast plain, only its northwestern part being traversed by chains of the Appalachian Mountains. In the extreme northwest is the Kittatinny Range, which belongs to the Blue Mountains of Pennsylvania, reaching its highest point in High Knob, near the boundary of New York, which has an elevation of 1,800 feet. Through this range flows the Delaware River, forming the celebrated Delaware Water Gap. Somewhat farther south is a region known as the Highlands, which comprises a plateau about 1,350 feet above the sea. Still farther south is the Piedmont Plain, consisting of an undulating plain which extends from the Hackensack valley to the Palisades along the Hudson. In the southern part, lying south of a line drawn between Trenton and Raritan Bay, is a belted coastal plain, most of which is about 100 feet above sea level, though rising in some places 400 feet above the sea.

The State is well watered and drained, but all of the western part belongs to the basin of the Delaware, which receives the inflow from many small streams. In the northeastern part are the Passaic and the Hackensack rivers, which discharge into Newark Bay. The Raritan flows into Raritan Bay, the Great Egg Harbor into Old Inlet, and the Maurice into Delaware Bay. Several mountain lakes are in the north, including Hopatcong and Greenwood, the latter being partly in New York. Among the noted natural scenery are the Palisades of the Hudson, the Delaware Water Gap, and the Falls of the Passaic River. Sandy Hook and Cape May are the principal projections into the Atlantic.

The climate in general is healthful, but varies according to altitude and proximity to the sea. The difference in the mean annual temperature

of the north and the south is about 8° , being 46° in the former and 54° in the latter. Excessive humidity is sometimes produced by a meeting of the land and sea breezes. The rainfall averages between 44 and 50 inches, being somewhat greater in the eastern portion than along the Delaware. Atlantic City, on the southeastern coast, has a rainfall of 49 inches and an average temperature of 52° .

MINING. The State has large deposits of clays, which are mined extensively for the man-

ufacture of brick and pottery. In the highland belt is a productive iron ore field, but it is not worked as extensively now as it was before the iron regions of the Great Lakes were opened. Granite deposits of much value are found in the north, where this mineral is quarried extensively for monuments and building purposes. In the output of zinc the State takes second rank, being exceeded only by Missouri. Large fields containing rock valuable in the manufacture of Portland cement are worked, and in the output of this product New Jersey holds



NEW JERSEY.

1, Trenton; 2, Jersey City; 3, Camden; 4, Paterson; 5, Atlantic City. Chief railroads shown by dotted lines.

second rank among the states. Sand suitable for glass making is obtained in the southern part. Other minerals include slate, copper, limestone, and coal, the last mentioned showing a decided gain in the output the last decade.

AGRICULTURE. Sixty per cent. of the land is included in farms, and much of the surface has been increased in productiveness by the use of fertilizers. Many of the farms are small, but they are worked with great care. Corn is raised in all parts of the State and is the principal cereal, but it is exceeded in acreage by the area utilized in growing hay and forage. Other crops include wheat, oats, rye, potatoes, and buckwheat. Many small tracts are devoted to gardening and small farming, especially in the cultivation of tomatoes and sweet potatoes. Apples and peaches are grown in large quantities,

and the marsh lands along the coast yield a fine grade of cranberries. New York, Philadelphia, and Jersey City are markets for a large quantity of vegetables, such as cabbage, melons, and sweet corn.

Milk cows are more numerous than other classes of cattle, which is accounted for by the fact that the State produces a large output of milk and cheese, both of which are marketed to an advantage. Other domestic animals include swine, horses, sheep, mules, and poultry. However, the larger share of the total income from the animal industry is obtained from dairying.

MANUFACTURES. As a manufacturing State New Jersey occupies a leading place. It holds second rank in the output of pottery and third in the manufacture of clay products. For silk and silk goods produced it has first rank, and likewise holds a high place for the production of cotton and woolen goods. In the manufacture of jewelry it ranks fourth, the chief center being in Newark. Other manufactures include iron and steel, leather and saddlery, cotton and woolen textiles, rubber and elastic goods, hose and rubber belting, pipe tobacco and cigars, boots and shoes, and slaughtering and packing-house products. The industries devoted to manufacturing are located chiefly in the northern part of the State.

FISHERIES. The extensive and greatly indented coast line is well adapted to fishing. All but four counties of the State participate in this industry and about 17,500 persons engage in it. Oysters constitute the leading catch, and the output is either marketed fresh or is preserved by canning. Other catches include clams, shad, cod, and bluefish. Small menhaden are canned in large quantities.

TRANSPORTATION AND COMMERCE. The State is favored by being located on the Hudson and Delaware rivers and the Atlantic, hence is provided with extensive transportation facilities by water. Two important canals are maintained, including the Delaware-Raritan Canal, extending from the Delaware to Raritan Bay, and the Maurice Canal, connecting Jersey City with the Delaware River at Phillipsburg. Railroad lines penetrate all parts of the State, including several of the great railways which connect New York City with Philadelphia, Chicago, and Saint Louis. The total lines aggregate 2,500 miles. Camden, Newark, and Jersey City are the principal railway centers. Electric lines are operated in many parts of the State.

The export trade is chiefly in fruits, vegetables, and various articles of manufacture. Large quantities of coal are imported from Pennsylvania for use in the industries. The State is a

good market for raw cotton and silk, using large quantities in the textile industry. Jersey City, opposite New York City, is the terminal for a number of railways, though much of the passenger traffic is carried across the Hudson River by ferries and through the railway tunnel completed in 1908.

GOVERNMENT. The constitution now in force was ratified in 1844 and was subsequently amended at a special election. Executive power is vested in a Governor for three years, and this officer cannot be reelected to succeed himself. Other State officers include the treasurer, comptroller, attorney-general, secretary of State, clerk in chancery, adjutant-general, commissioner of banking and insurance, clerk of the supreme court, and superintendent of public instruction. Meetings are held annually by the Legislature, which is composed of 21 senators, elected for three years, and not more than 60 representatives, elected for one year. The highest court is known as the court of errors and appeals and is composed of the chancellor, the justices of the supreme court, and six additional judges. The chancellor presides over a prerogative court and the supreme court, which is composed of a chief justice and eight associates, holds sessions in different parts of the State. Subject to these courts are the county courts of common pleas, the courts of oyer and determiner, an orphans' court, and the court of general quarter sessions of the peace. A distinction is still maintained between courts of law and courts of equity.

EDUCATION. The illiteracy is given at 5.9 per cent., but among native whites it is only 1.7 per cent. Public schools are under the supervision of the State superintendent and a board of education, consisting of sixteen members, both being appointed by the Governor and senate. School attendance is compulsory and supplies and textbooks are furnished free. The State has long supported a vigorous policy in regard to public instruction, which may be said to have been organized in 1661, when a school was established at Bergen. All parts of the State have a good grade of elementary schools, while the towns and cities maintain high schools, and the whole system is supplemented by a number of institutions of higher learning. Princeton University, at Princeton, founded in 1746, is one of the most efficient institutions in North America. Rutgers College, at Brunswick, has affiliated with it the State agricultural and scientific school. Three public normal schools are maintained, one at Trenton, which is the chief training school for teachers, the other two being the Model and the Farnum preparatory schools.

Among the leading institutions of higher learning, aside from those named above, are the Stevens Institute of Technology, at Hoboken; the Seton Hall College, South Orange; the Bordentown Female College, Bordentown; the Saint Peter's College, Jersey City; the Blair Presbyterian Academy, Blairstown; the Drew Theological Seminary, Madison; and the Pennington Seminary, Pennington. Trenton has a school for the deaf, Kearny has a home for disabled soldiers, and Trenton and Morristown have hospitals for the insane. The State penitentiary is at Trenton, the reformatory is at Rahway, and industrial schools are located at Trenton and Jamesburg. Vineland has homes for feeble-minded women and children. A village for epileptics is located at Skillman. Formerly the convicts were employed under contract, but now they are required to work upon goods that are used by the State institutions.

INHABITANTS. The density of population is about 250 to the square mile. Fully 68 per cent. of the inhabitants reside in fifty cities with a population of over 4,000. About one-fourth of the people are of foreign birth, including chiefly Germans and Irish. Trenton, on the Delaware River, is the capital. Other cities include Newark, Jersey City, Paterson, Trenton, Camden, Hoboken, Elizabeth, Bayonne, New Brunswick, Atlantic City, Passaic, Bridgeton, Plainfield, Union, Perth Amboy, Orange, Millville, Phillipsburg, Long Branch, and Harrison. In 1900 the State had 1,883,669 inhabitants. This included a total colored population of 71,352, of which 1,393 were Chinese and 69,844 Negroes. Population, 1910, 2,537,167.

HISTORY. The first settlement made in New Jersey was at Bergen, in 1617, by the Dutch. A fort was built near the site of Camden by the English under Cornelius May in 1623, and settlements were founded about the same time by the Swedes. In 1655 the Dutch under Governor Stuyvesant erected Fort Nassau on the Delaware and compelled the Swedes to recognize their authority. The Duke of York received a grant of the region from Charles II., and he transferred the country between the Delaware and the Hudson to Lord Berkeley and Sir George Carteret. Soon after the region was divided by its proprietors into East and West Jersey, the boundary line running from Little Egg Harbor northwest to the Delaware, and in 1682 East Jersey was purchased by William Penn and his associates. In 1702 the two colonies became united in a royal colony. After 1738 it was under the direction of royal governors. Indian troubles were avoided by purchasing titles, but, when the Revolutionary War began,

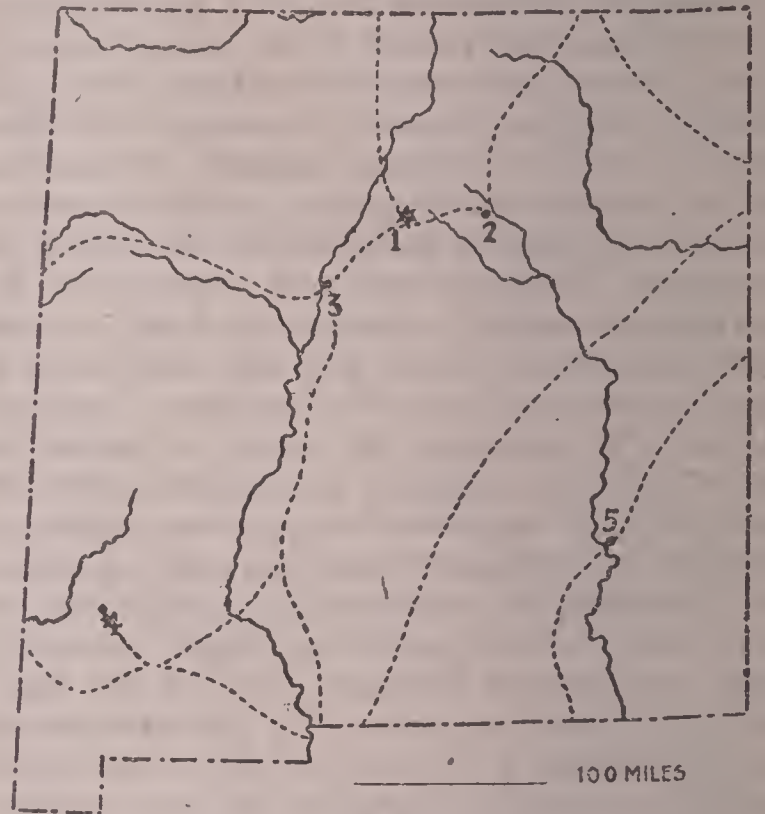
the colony became a principal seat of contention and battled strenuously for American independence. It ratified the national Constitution on Dec. 18, 1787, and adopted its present constitution in 1844. The growth and prosperity have been almost without intermission.

NEW LONDON, a city in Connecticut, one of the county seats of New London County, on the Thames River, three miles off the coast of Long Island Sound and seventy miles northeast of New York City. It is on the Central Vermont and the New York, New Haven and Hartford railroads. The harbor is defended by forts Trumbull and Griswold and has direct communication by steamboat with New York. The noteworthy buildings include the public library, the city hall, the high school, and several fine churches. It has the Boulder Park on the Thames, the little schoolhouse in which Nathan Hale was a teacher, and the Old Town Mill, erected in 1646 and still in operation. Among the manufactures are hardware, cotton and woolen goods, crackers, sewing silk, ships, boilers, machinery, and utensils. The city has electric street railways, waterworks, pavements, and a system of sanitary sewerage. It is an important seat of trade in whale and seal products. The place was settled by John Winthrop in 1646, when it became known as Naumeag, but the name was changed to New London in 1658. General Arnold attacked the place with a British force in 1781 and burned the stores and wharves. Population, 1910, 19,659.

NEW MEXICO (mĕks'ī-kō), a southwestern State of the United States, bounded on the north by Colorado, east by Oklahoma and Texas, south by Texas and Mexico, and west by Arizona. It is larger in size than any of the states, except Montana, California, and Texas. In form it is almost a perfect square, being broken only on the southern boundary. Measured along the western boundary from north to south, it extends a distance of 400 miles, and the greatest width is 358 miles. It has an area of 122,580 square miles.

DESCRIPTION. Ranges of the Rocky Mountains traverse it from north to south, with various separated groups of hills and mountain ranges in different parts. The altitude in the northern part is from 5,000 to 7,000 feet and there is a gradual slope toward the south, where the altitude is from 3,000 to 4,000 feet above the sea. A considerable portion of the Staked Plains, or Llano Estacado, extends from Texas into the southeastern part, where the elevation above the sea is about 3,250 feet. The lowest land is in the Pecos valley, in the southeastern part, where the elevation is about 2,900 feet, but

from that locality it rises toward the north and northwest. West of the Pecos valley is the Front Range, an elevated ridge of the Rocky Mountains, which has a number of peaks ranging over 12,000 feet high. The deep and narrow valley of the Rio Grande, west of the Front Range, extends across the entire Territory from north to south. Near the western boundary is the Continental Divide, which forms a broad



NEW MEXICO.

1, Santa Fé; 2, Las Vegas; 3, Albuquerque; 4, Silver City; 5, Roswell. Chief railroads shown by dotted lines.

plateau, dividing the tributaries of the Colorado from those of the Rio Grande.

The drainage is principally toward the south, the only exception being in the northeastern corner, where the drainage is carried by the Canadian River and its tributaries toward the east. In the southeastern part is the Pecos River, which receives the inflow from the Hondo and the Penasco, and discharges into the Rio Grande after entering Texas. The Rio Grande, entering from Colorado, flows through the central part, crossing the southern border to form the boundary between Texas and Mexico. Among its tributaries within New Mexico are the Chama, Jemes, and San José rivers. The southwest is drained by the Gila, the west central part by the head streams of the Little Colorado, and the northwest by the Rio San Juan. The streams rise largely from springs, but when the mountain snow melts in the summer season they become greatly enlarged.

The climate is pleasant and healthful, being remarkable for its pure air and clear sky. The mean temperature is about 49°, and the extremes

range between 85° above and a few degrees below zero. In no part is the rainfall sufficient for the needs of agriculture, being only about 15 inches on the average. However, nutritious grasses are abundant in many places, while some sections of the plains are covered with sage brush. Fine forests of pine, spruce, and cedar abound in the mountains. Many of the valleys have timber of oak, sycamore, cottonwood, and dwarf cedar.

MINING. New Mexico has vast deposits of mineral wealth and presents a prolific field for profitable investment in mining. The coal area is extensive, the fields having rich veins both of bituminous and anthracite coal, and the quality is among the best obtained west of the Mississippi. The annual output is about 2,750,000 short tons. Gold and silver are mined extensively, the output of both showing a decided increase the past decade. Copper mining is an important enterprise, the annual output having doubled within the past ten years. Other minerals worked to a considerable extent include emerald, lead, zinc, iron, and gypsum. Valuable fire clays and fine building stones are abundant, but the output of these is not large.

AGRICULTURE. New Mexico has a large area of fertile soil, but agriculture is dependent upon irrigation. The region that may be improved for farming is necessarily limited, owing to a lack of large lakes and rivers. The principal irrigated districts are adjacent to the Rio Grande, San Juan, Pecos, Gila, and Canadian rivers. At present the irrigation ditches aggregate a length of 2,650 miles, and about 650,000 acres are accessible to the ditches. Hay and forage crops are cultivated on the largest acreage. Wheat of a fine quality is grown, especially in the Taos valley, and corn yields abundantly in the valleys. Other crops include oats, beans, fruits, and vegetables. It is noted for the production of fine varieties of pears, peaches, apples, plums, apricots, and grapes. The valley of the Rio Grande is noted for its fine quality of grapes.

New Mexico has a large area suitable for pasturage, hence vast interests are vested in the live-stock industry. It is exceeded in the number of sheep only by Montana, and the annual wool clip is placed at 16,500,000 pounds. Mesquite and other native grasses are most abundant in the eastern part, where the larger interests in ranching are centered. Cattle are grown chiefly for meat, though a considerable number of dairy cows are reported. Other live stock includes horses, mules, and swine.

MANUFACTURES. The output of the factories has increased about 50 per cent. since 1900.

Wool scouring is an extensive enterprise. Large interests are vested in the smelting and refining of ore and in railroad repair work. A number of flour and grist mills are operated and lumber milling is carried on where transportation is accessible. Other enterprises include cigar factories, distilleries, fruit canneries, and beet sugar factories.

TRANSPORTATION. Several trunk railway lines cross the State, and branches extend from them into various mining and agriculture sections. The Southern Pacific passes through the southern part, while the Atchison, Topeka and Santa Fé parallels the Rio Grande, and the El Paso and Northwestern line crosses the eastern part. Pack animals and stage lines are used for transportation to interior points. The total railway lines are placed at 2,125 miles. Large quantities of wool, cattle, sheep, coal, and metals are exported. The imports include clothing, machinery, and merchandise.

GOVERNMENT. New Mexico is governed under the rules and regulations respecting the territory of the United States, hence the executive power is vested in a Governor, who is appointed for a term of four years by the President with the consent of the Senate. Two chambers constitute the local Legislature, the members of which are elected by manhood suffrage. This body may pass any legislation that is not inconsistent with the national laws and Constitution, but Congress may veto any law passed and approved by the Governor. The courts are a part of the Federal judiciary, hence the judges of the higher tribunals are appointed by the President for four years. One Congressman represents the State in Congress, who is elected by popular vote each even year. The State has two national Senators. Local government in the towns, cities, and counties is similar to that of the states.

EDUCATION. The public school system is in a large measure patterned after the systems in the states of the middle west. A territorial board of education, appointed by the Governor, has entire charge of the certification of teachers and the management of county institutes. The territorial superintendent of public instruction has supervision over all public schools, acting through the county superintendents, who are elected every two years by popular vote. City school systems are in a measure independent and under the direct supervision of city superintendents. The educational institutions include the University of New Mexico, Albuquerque; the Normal University, East Las Vegas; the Normal School, Silver City; the New Mexico College of Agriculture, Las Cruces; the New Mexico School of Mines, Socorro; the New

Mexico Military Institute, Roswell; the New Mexico Institute for the Blind, Alamogordo; and the New Mexico Institute for the Deaf and Dumb, Santa Fé. Illiteracy is placed at 33 per cent., but there is a general compulsory school attendance law, which is having the effect of placing educational work on a more satisfactory basis. Indian education is provided for in a number of schools by the United States government.

INHABITANTS. A large per cent. of the inhabitants are of Spanish descent and speak the Spanish language. Roman Catholic is the religion of a majority of the people, but the leading Protestant denominations are well represented. Santa Fé, in the north central part, is the capital. The principal cities include Albuquerque, Las Vegas, Socorro, Raton, Roswell, and Silver City. In 1900 the population was 195,314. This number included 15,103 colored inhabitants, of which 1,610 were Negroes and 13,144 Indians. Population, 1910, 327,301.

HISTORY. The region now included in New Mexico is among the sections which were explored at an early date by white men, being visited by the Spaniard Cabeça de Vaca in 1536. It was explored in 1581, when it was named New Mexico from its mineral wealth. Santa Fé was founded about 1609 and is one of the oldest cities in the United States. The Pueblo Indians carried on a protracted warfare against the Spaniards. When Mexico secured independence, in 1822, it was included in that country. General Kearny captured Santa Fé in 1846. New Mexico, by the treaty of Guadalupe Hidalgo, became a possession of the United States, being ceded in 1848. It was organized as a Territory on Sept. 9, 1850, when it included Arizona and a part of California and Colorado, and in 1853 a portion of the Gadsden Purchase was annexed. The present boundaries were established in 1866. With the beginning of railroad construction, in 1878, it began to develop rapidly. It was admitted as a State in 1910.

NEW MEXICO, University of, a coeducational institution at Albuquerque, New Mexico, incorporated under an act of the Legislature in 1889. It was opened for instruction in 1892, when it contained the normal, preparatory, and collegiate departments, and later were added schools of art, music, science, and commerce. With it is affiliated the Hadley Climatological Laboratory. It is endowed by a grant of land and has a library containing about 8,500 volumes. The attendance is 160 students.

NEW ORLEANS (ôr'lê-anz), an important city of the United States, the largest in the State of Louisiana, on the Mississippi River,

105 miles from its mouth. It is popularly called *Crescent City* from the older portion that extends round the curve of the river, being in the form of a crescent. The corporate limits inclose an area of 191 square miles, including all of Orleans and a portion of Jefferson parishes, although the city proper covers a space of only 38 square miles. In the sense of its larger area it includes the town of Algiers, or Fifth District, located on the right bank, across from the principal part of the city. The site is on a level with the normal water lines in the Mississippi, and is protected from overflow during high water by levees which are from 12 to 20 feet in height. The river, which is about half a mile wide and from 50 to 200 feet deep, furnishes a frontage of about 12 miles within the city.

DESCRIPTION. The streets are broad in the newer portion, which is separated by Canal Street, 200 feet broad, from the French Quarter, where many of the streets are narrow and irregular. Canal Street is the principal business thoroughfare, extending from the river entirely through the city and containing the larger business houses and principal electric railway connections. Esplanado Avenue, the finest street in the French Quarter, contains the residences of many French and Creole families. Other noteworthy streets are Prytania Street, Saint Charles Avenue, and Clayborne and Rampart streets. Fine avenues of trees beautify the streets and avenues in the residential sections, including the fig, palm, orange, palmetto, and magnolia. The odor of roses and sweet olive may be noted in the atmosphere even in winter, and on every hand may be seen such growths as the banana and live oak. The streets have an extent of 800 miles, but not more than half are improved by paving. However, the street railways are well systematized, extending to all parts of the city and many suburban points, such as West End and Chalmette, the site of the Battle of New Orleans. Until recently the sewerage was carried chiefly in gutters on both sides of the streets, but an extensive system of sewerage was installed in 1907. Well-organized police and fire departments, waterworks, gas and electric lighting, and other public utilities are maintained.

BUILDINGS. The post office and customhouse was erected at a cost of \$5,000,000 and is built of massive granite. In the Cabildo, now used as the supreme court building, was made the transfer of Louisiana from France to the United States in 1803. The principal hotels include the New Saint Charles, the Denechaud, and the Greenwald. The city hall is modeled after a

Greek temple and the new courthouse is constructed on a modern plan. Other buildings of note include the Sugar Exchange, the Masonic Temple, the Odd Fellows' Hall, the Baldwin building, the Hennen building, the Board of Trade, the Young Men's Christian Association building, the Howard Memorial Library, the Athenaeum building, the Harmony Club, and the Morris and Globe buildings. A new library building, the gift of Andrew Carnegie, was erected in 1907. The city has many fine ecclesiastical buildings, including the Cathedral of Saint Louis (Catholic), the Christ Church Cathedral (Episcopal), the Prytania Street Church (Presbyterian), the Coliseum Place Church (Baptist), the First Presbyterian, the Church of the Immaculate Conception, and the Temple Sinai (Jewish). New Orleans has a government mint, located in the center of the city and constructed of massive stone.

INSTITUTIONS. The city has a number of fine libraries, including the State library, the city public library, the Howard Memorial Library, and the Tilton Memorial Library of Tulane University. Of these the State library with 28,500 volumes and the city library with 60,500 volumes are considered the more important, and the collections as a whole are surpassed by those of few cities in the Union. New Orleans is the seat of Tulane University, with which is affiliated the Sophia Newcomb Memorial College for women, one of the prominent institutions of higher learning. Four universities are maintained for the education of Negroes, including the New Orleans University, the Leland University, the Straight University, and the Southern University. The College of the Immaculate Conception was established by the Jesuits in 1847. Other educational institutions include Spencer's Business College and Institute of Shorthand, the Blake Institute, and the Soule Commercial and Literary Institute. Many handsome buildings are maintained in the system of public schools. It has a large number of charitable institutions, such as the Charity Hospital, one of the largest of the kind maintained by cities in the United States. Many charities are supported by religious societies. The leading civic orders and educational associations are represented by a large membership.

INDUSTRY AND COMMERCE. New Orleans is the focus of six great railway lines, including the Southern Pacific, the Queen and Crescent, the Southern, the Illinois Central, the Texas and Pacific, and the Louisville and Nashville. It has excellent communication by the Mississippi River, which admits of entrance by the largest seagoing vessels, and steamers ply regularly

between its port and many trade centers of the West Indies, Central America, and the Atlantic coast of America and Europe. A direct line is maintained by way of the Suez Canal to ports in Japan. It has a large foreign trade in the exportation of cotton, grain, live stock, lumber, and manufactured products. The imports include cordage, sugar, tobacco, and raw materials used in manufacturing.

As a center of manufacturing it possesses a number of advantages, such as proximity to raw materials and extensive avenues of communication. Rice cleaning and sugar refining are important enterprises, representing large institutions and extensive investments. It is a center for the manufacture of clothing, furniture, cigars and pipe tobacco, boots and shoes, and cotton-seed oil. As a wholesaling and jobbing center it takes unusual prestige, supplying a large scope of country inland with merchandise, fruits, and supplies for local trade. As an export city it takes second rank in the United States, being exceeded in the volume transported only by New York City.

PARKS AND CEMETERIES. The parks have an area of 750 acres. Between the city and Lake Pontchartrain, on Metairie Road, is the City Park. It occupies the site of a former plantation, containing 160 acres, and is beautified with many semitropical plants. Audubon Park, in the vicinity of Tulane University, consists of 250 acres. It contains a fine herbarium, a State experiment station, several artificial lakes, and fine groves of magnolia, live oak, and other trees. Jackson Square, in the heart of the city, has an equestrian statue of General Jackson, and in its vicinity is the French market. At Chalmette, the site of the Battle of New Orleans, is a national cemetery and on the battlefield is a fine monument.

The cemeteries of New Orleans are visited by tourists at all seasons of the year. Owing to water being near the surface of the ground, it is impossible to bury the dead in excavations, but they are placed in vaults rising in tiers from six to twelve feet. In many of the vaults are two apartments, the one above being a receptacle for the corpse, which, in due course of time, decays, when the bones remaining may be removed to the apartment below. The vaults are mostly constructed of fine Georgia marble or granite, and are hermetically sealed after receiving the corpses. These structures, interspersed with fine ornamentations and monuments, present a scene most beautiful. Metairie Cemetery, the handsomest in the city, contains the tomb of the Army of Tennessee, above which is an equestrian statue of Albert Sid-

ney Johnston. Other cemeteries of note include Saint Louis No. 1 and Saint Roch's Campo Santo.

HISTORY. New Orleans was platted in 1718 by Jean Baptiste Le Moyne and named in honor of the Duke of Orleans, who was at that time regent of France. It was made the capital of the French territory on the lower Mississippi in 1722, when the town consisted of only a few wooden buildings. Spain acquired the whole of Louisiana in 1762, but the people of New Orleans forcibly expelled the governor sent over from Spain in 1766. Those who took part in the revolt were punished by Alexander O'Reilly, then governor of Louisiana. The Treaty of Ildefonso, in 1800, ceded the territory to France, and in 1803 it became a part of the United States by virtue of the Louisiana Purchase. The city was incorporated in 1805 and subsequently had a long period of rapid growth, owing to its location on the Mississippi.

General Pakenham attempted to capture New Orleans for the British in the War of 1812, but he was defeated by General Jackson at Chalmette in 1815. It became an important commercial and military seat of the Confederacy in 1860, but in 1862 Commodore Farragut captured it for the Federals, and it was soon after occupied by General Butler as military governor. During the remainder of the Civil War it was important as a base of supplies for the Union army in the South, and after the close of the war it suffered from misgovernment a number of years. Federal troops were stationed in the city until 1877, at which time the *carpetbag rule* ended and free government was restored. The capital of the State was removed to Baton Rouge in 1880. In 1884 it was the seat of the Cotton Centennial Exposition. At present it ranks as the twelfth city of the United States. Population, 1900, 287,104; in 1910, 339,075.

NEW ORLEANS, Battle of, the last engagement of the War of 1812, fought at Chalmette, near New Orleans, La., Jan. 8, 1815. The city was defended by General Jackson with 5,000 men. In December, 1814, General Pakenham and 7,000 British troops came from Jamaica with the view of capturing the city and thus obtaining control of the territory adjacent to the Mississippi. The Americans had built extensive breastworks of earth, timbers, and cotton bales, and were attacked by the British on Jan. 8, 1815, who were repulsed with a loss of 2,500 men, including many officers and General Pakenham. The Americans lost only eight killed and thirteen wounded. The battle was fought after the Treaty of Ghent had been

agreed upon, but this fact was not known to the commanders. This battle stimulated a feeling of nationality in America, and was one of the causes that won general popularity and the Presidency for General Jackson. It is frequently called the Battle of Chalmette.

NEW PHILADELPHIA, a city in Ohio, county seat of Tuscarawas County, on the Tuscarawas River, 98 miles south of Cleveland. It is on the Pennsylvania and the Baltimore and Ohio railroads. The surrounding country is fertile and contains extensive deposits of coal, salt, and iron ore. Among the chief buildings are the county courthouse, the public library, and the high school. It has manufactures of woolen goods, machinery, paper, flour, agricultural implements, hardware, nails, cast iron pipes, and earthenware. Waterworks, sanitary sewerage, and Springer's Park are noteworthy features. It was settled in 1805 and incorporated in 1808. Population, 1900, 6,213; in 1910, 8,542.

NEWPORT, a city of Kentucky, in Campbell County, at the junction of the Licking and Ohio rivers, opposite Cincinnati, with which it is connected by an extensive iron bridge. Communication is by the Chesapeake and Ohio and the Louisville and Nashville railroads. It is handsomely located on a fine site, has good municipal facilities, and is a favorite residence of many Cincinnati business men. The manufactures include watch cases, hardware, stoves, machinery, engines, textiles, and earthenware. Among the features are the post office, the German National Bank, the Masonic Temple, the United States Military Post at Fort Thomas, and the public library. It has brick and asphalt pavements, a sanitary sewer system, and electric street railways. The place was settled in 1791 and was chartered as a city in 1850. Population, 1900, 28,301; in 1910, 30,309.

NEWPORT, a city of Rhode Island, in Newport County, on Narragansett Bay, about thirty miles south of Providence. It is on Rhode Island and on the New York, New Haven and Hartford Railroad. The surrounding country is agricultural, yielding cereals and fruits. Forts Adams and Geble are at the entrance to the harbor. The noteworthy buildings include the city hall, the Sayer House, the Trinity Church, and the Vernon House, built in the 18th century. It contains some of the finest summer residences in the world, which have given it a reputation as one of the most popular summer resorts of America. Near it, on Coaster Harbor Island, is the United States Naval War College, and in connection with it is a naval training school and torpedo station. The city has excellent schools, finely improved streets, beautiful parks,

and several large libraries, notably the Red Wood Library, founded in 1747. It has a considerable trade and manufactures of textiles, metal goods, clothing, webs, and utensils. Paved streets, waterworks, and electric street railways are among the improvements. Newport was settled in 1639 and had the first public school in America. It was incorporated in 1784. Population, 1900, 22,034; in 1910, 27,149.

NEWPORT, a port city of England, in Monmouthshire, on the Usk River, about four miles from Bristol Channel and twelve miles north-east of Cardiff. It is situated in a picturesque region, having hills almost surrounding it, and contains manufactures of machinery, anchors, chain cables, sails, and earthenware. The docks and wharves are extensive. It is the seat of the Saint Woolos Church and contains the old castle built in 1130 by Robert, Earl of Gloucester. Population, 1907, 75,585.

NEWPORT NEWS, a city in Virginia, county seat of Warwick County, fourteen miles west of north of Norfolk, near the mouth of the James River. Communication is furnished by the Chesapeake and Ohio Railroad, of which it is the terminus. It is a port of entry and has a fine harbor. The features include Casino Park, the public library, the county courthouse, and a summer resort on the James River. It has extensive wharves and large elevators and it has connection with neighboring cities by an electric railway. The city has modern municipal facilities, including pavements, electric lights, and waterworks. Peanuts are produced extensively in the surrounding country. It is one of the four largest grain shipping ports of the United States. Population, 1900, 19,635.

NEW RED SANDSTONE, a geologic formation belonging partly to the Carboniferous and partly to the Triassic formations. It is so-called to distinguish it from the Old Red Sandstone group, which is similar in construction, but lies below the coal measures. It consists chiefly of shales, loams, and sandstones and in color is reddish. The name is used chiefly in Great Britain, while in America the formations of this kind are usually called Newark System.

NEW ROCHELLE (rō-shēl'), a city of New York, in Westchester County, sixteen miles from New York City, on Long Island Sound. It is on the New York, New Haven and Hartford Railroad and is noted as a popular summer resort. New Rochelle is the residence of many New York business men. The features are a monument of Thomas Paine, the high school, the Ursuline Seminary, and many large business establishments. Among the manufactures are scales, cigars, utensils, and earthenware. It was

founded by Huguenots from France in 1687 and was so named from La Rochelle. Population, 1905, 20,480; in 1910, 28,867.

NEW SIBERIA (sī-bē'rī-ā), or **Liakhov**, the name of a group of islands in the Arctic Ocean, north of Eastern Siberia, with an area of 9,575 square miles. The principal islands are Kotelnoi, Liakhov, and New Siberia. These islands are uninhabitable on account of severe cold. They contain neither bushes nor trees, but are visited by hunters and for many fossils deposited in the soil, including bones and teeth of buffaloes, mammoths, and rhinoceroses.

NEW SOUTH WALES, a State in the southeastern part of Australia, bounded on the north by Queensland, east by the Pacific Ocean, south by Victoria, and west by South Australia. A part of the southern boundary is formed by the Murray River and part of the northern by the parallel 29° south latitude. The area is 310,367 square miles, or more than five times greater than that of England and Wales.

DESCRIPTION. The surface is diversified by ranges and groups of mountains, which are classed with the highlands known as the Great Dividing Range. In the south it is known as the Australian Alps, in the center as the Blue Mountains, and in the north as the New England Range. As a whole, these highlands are rugged and broken by deep ravines. Near the southern boundary is Mount Kosciusko, height 7,308 feet, the highest summit. West of the highlands is a gently rolling plateau, which declines toward the west, but gradually rises from the Darling River toward the northwest, where the Stanley and Grey ranges have an altitude of 2,000 feet. Along the eastern coast is a narrow and fertile plain, characterized in various places by headlands extending into the Pacific.

The drainage is chiefly toward the west and southwest, but a number of small rivers flow from the highlands toward the east into the Pacific. The latter include the Hawkesbury, which has a general course toward the northeast, flowing into the Pacific a short distance north of Sidney. Practically all of the drainage east of the Great Dividing Range is by the Murray and its tributaries, which include the Darling and the Murrumbidgee. The Culgoa and Bogan flow into the Darling and the Lachlan is a confluence of the Murrumbidgee. Many of the streams sink away in the sand or become dry during dry season, but during the periods of rain they assume large proportions, frequently covering extensive tracts of land.

The climate is pleasant and healthful, but in the north it is subtropical. In the coast region the mean temperature is 76° and the maximum

for January seldom exceeds 102° , but in the interior it frequently registers 130° . Hot dust winds frequently blow during the dry season to which the interior is subject. The heaviest rainfall is in the vicinity of Bombala, in the south-east, where it averages seventy inches, while the coast farther north has a precipitation of fifty inches. In the interior the rainfall ranges from eighteen to twenty inches, but in the northwest it seldom exceeds ten inches. Scant vegetation, including stunted shrubs, is found in the arid plain, but the eastern part has fine forests of eucalyptus and other trees.

MINING. The geological formations on the east side of the Great Dividing Range belong mostly to the sandstone of the carboniferous system and contain extensive deposits of coal. The western slopes are formed largely of granite, basalt, and volcanic trap. It is estimated that the coal fields cover an area of 25,000 square miles and the yearly output shows a constant increase since 1905. Gold has been mined from an early date in the history of Australia, but the output is at present exceeded in value by silver and coal. Iron ore is mined extensively and copper and lead are obtained in considerable quantities. Other minerals include zinc, tin, graphite, mercury, bismuth, and diamonds. Petroleum is obtained in the Blue Mountains and clays valuable for brick and pottery are abundant.

AGRICULTURE. Many products can be grown profitably on the coast, where rainfall is ample and the climatic conditions are favorable to farming. Fruit culture is especially profitable, the yield including oranges, grapes, and bananas. Corn is grown on the largest acreage, but it is followed closely by the cultivation of grasses suitable for hay. Other crops include oats, barley, sugar cane, and vegetables. The mulberry tree and silk culture have been introduced successfully. Though the climate is favorable in practically all parts, large areas have insufficient rainfall for the growing of cereals, hence stock raising takes rank in those sections as the leading industry.

Although plants suitable to an arid climate have been introduced, the larger part of the State is utilized for grazing. In some seasons the water supply is insufficient, hence the flocks of sheep are reduced to a considerable extent during the droughts. The number of sheep is given at 58,500,000. Most of the sheep are kept on State land which is leased to stockmen. Cattle are grown chiefly for meat, though dairying is an important enterprise in the older settlements of the east. Other stock includes swine and horses.

MANUFACTURES AND COMMERCE. The manufacturing enterprises are centered largely at Sydney and in its vicinity. Most of the manufactures consist of clothing, machinery, and foodstuffs. Considerable lumber products, earthenware, leather, ironware, soap, and spirituous liquors are produced. Sugar is manufactured from native-grown sugar cane and considerable wine is made for export from home-grown grapes.

A large domestic and foreign trade is carried on, but it is confined chiefly to Newcastle, Broken Hill, and Sydney. Wool is the chief article of export and it is followed in order by silver, coal, copper, gold, tallow, hides, and fruits. The imports consist chiefly of manufactured products, such as chemicals, textiles, and machinery. England, the United States, Germany, and France have the larger share of the trade. The State has 3,500 miles of railways, about twice that extent of improved government roads, and a large mileage of telegraph and telephone lines.

GOVERNMENT. The executive power is vested in a Governor, appointed by the crown, and in the administration he is assisted by a responsible ministry. The legislative functions are exercised by a Parliament of two branches, known as the legislative council and the legislative assembly. In the former are 56 members, appointed for life by the Governor, and in the latter are 90 members, chosen for terms of three years by universal suffrage without regard of sex. The State is represented by six senators and by 26 representatives in the Parliament of the Commonwealth of Australia.

Attendance upon public schools is obligatory between the ages of six and fourteen years, and the schools are maintained under a system of public taxation. The University of Sydney, founded in 1852, is at the head of the educational system and is maintained by the State. Charitable, reformatory, and correctional institutions are organized under the laws of the State. Ample provisions have been made for special education in law, medicine, mining, agriculture, dairying, and military science.

INHABITANTS. New South Wales has grown rapidly in population since 1860 and at present is the most populous State in the Commonwealth. Nearly half of the people are Anglicans, about one-fourth are Catholics, and the remainder are largely Presbyterians, Methodists, and Lutherans. Sydney, on the Pacific coast, is the capital and largest city. It takes rank as the tenth commercial port of the world. Other cities of importance include Newcastle, Broken Hill, Fitzroy, Paddington, Parramatta, Goulburn, Bathurst, Albury, Maitland, and Wickham. In

1906 the population was 1,526,697. This included 7,434 natives and 10,974 Chinese.

HISTORY. New South Wales is the oldest colony in Australia. The region was visited by Cook in 1770 and a penal settlement was established at Botany Bay in 1788. Convict immigration led to some degree of development, many persons being sent from England on the slightest pretext, and a large number of them became highly prosperous. The colonial charter was granted in 1839, when the lands were thrown open for settlement under favorable conditions, and several educational institutions were founded by the government in 1843. Victoria was made a separate colony in 1850 and in 1851 gold was discovered, which caused an immense immigration from many parts of Europe and Asia. A railway line was opened for traffic between Sydney and Parramatta in 1855, and this was soon followed by the construction of many interior and branch lines, thus leading to the rapid and prosperous development which it has enjoyed since. Queensland was made a separate colony in 1859. It remained a colony until 1901, when it became an influential State in the Commonwealth of Australia.

NEWSPAPER, a printed publication issued in periodical intervals for general circulation, containing news, editorials, and advertisements. This class of publications is not only of comparatively recent origin, but has undergone vast improvements as a result of improved machinery and the enlarging of the means to communicate among cities and countries. The extension of education and growth in public intelligence is making more popular all classes of publications designed to furnish information relating to current events, as well as magazines devoted to literature and scientific advancement. In fact, the growth in sentiment favorable to more general reading is noticeable in all countries where civilization and society make any pretense of progressive development.

The newspapers and other periodicals published in the United States exceed numerically like publications of any country in the world. It is estimated that the number of newspapers issued in the world in 1909 was 80,500, an increase of about ten per cent. during the previous five years. In most countries of Europe and America there is a noticeable tendency for the press to become less personal and more independent from time to time, although nearly all newspapers may be classed with some political party. However, the discussion of public questions is characterized by a calmness and moderation quite rare a half century ago. The growth of the business of issuing a great paper daily has

been such that the editor in chief does not represent personally as large an influence as was the case formerly. News agencies are maintained in America and Europe, and hundreds of correspondents are employed by the great dailies to cable news from all parts of the earth.

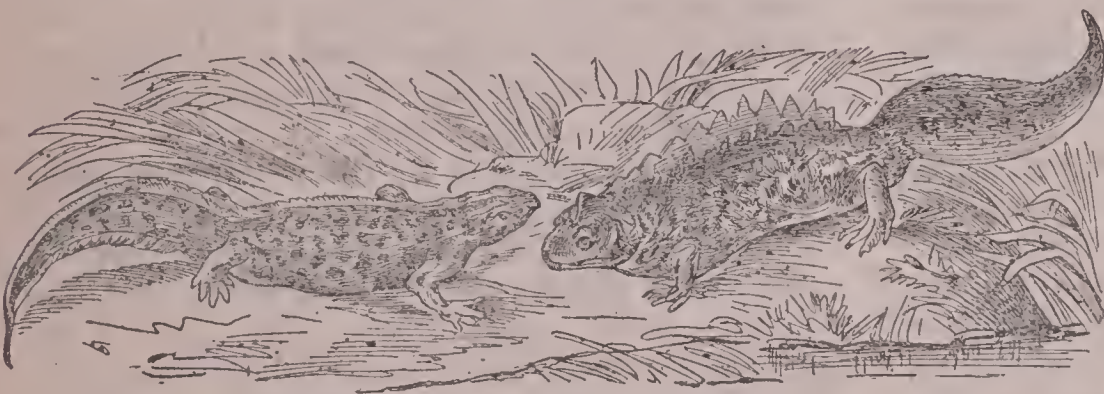
The division of labor affects a great paper as much as any economical enterprise, the work being divided and subdivided. *Reporters* gather news under the direction of a *city editor*, while correspondence and telephone and telegraphic news are edited by a *news editor*, and *copying editors* sift and classify reports from the press association. Other periodicals are read by an *exchange editor*, who gleans for publication what he regards of general interest, and *editorial writers* prepare comments on the news of the day. Most papers have a department for women readers and employ editors for commerce, finance, sport, and market news. Critics to review current literature, music, and the theater are at work constantly. Special editions are issued on Sunday. The editions which are published late in the afternoon and in the evening are revised more or less, and some of the larger dailies employ a *night editor*.

Below is an estimate of the newspapers published in the leading countries of the world: United States, 21,800; Germany, 8,500; France, 6,600; Great Britain and Ireland, 6,500; Austria-Hungary, 5,950; Japan, 3,100; Italy, 2,800; Canada, 1,200; Spain, 855; Russia, 830; Australia, 825; Greece, 610; Switzerland, 480; Holland, 350, and Belgium, 330. New York has a larger number of newspapers than any State, the number being 2,130. Next in order are Illinois, 1,762; Pennsylvania, 1,480; Ohio, 1,250; Iowa, 1,090; and Missouri, 1,060. The largest number of periodicals issued in any Province of Canada is published in Ontario; but all the provinces have representative newspapers and magazines.

It is thought that bulletins were sent from Rome, known as *acta diurna*, several centuries before the Christian era, for the purpose of giving accounts of the progress being made by the imperial army. They constituted the first enterprise similar to newspapers and journals published at present. These journals passed directly to the generals, who caused them to be communicated to the entire army. They not only contained an outline of the government policy, but also conveyed information in relation to punishment, deaths, sacrifices, and other matters of general interest. The *Pekin Gazette*, published in China, was founded about 1350 A. D. and is the oldest daily newspaper now issued regularly. It is certain that the first printed newspaper in the world appeared in Germany

in the latter part of the 15th century, the earliest publication being the *Neue Zeitung* at Augsburg. See **Journalism**.

NEWT (nūt), or **Eft**, the common name applied to various classes of amphibians which closely resemble the salamanders. The form is more slender than that of salamanders, their habits are more active, and they are oviparous. The different species are strictly air breathers. They are aquatic in habits, and, though the larval gills fall off when the animal is about three months old, they retain the larval tail. In all species the skin is soft and has warty lumps. The tail is elongated and flattened while in the water, but becomes somewhat rounded when the animal frequents the land. Newts vary in length from three to seven inches, and the male of most species is distinguished by a fleshy ridge or crest on the back. They are widely distributed and are regarded as the most obnoxious animals in appearance, but they are not in any sense venomous. Their food consists of in-



SMOOTH NEWT.

COMMON NEWT.

sects' larvae, snails, worms, and frog spawn. The limbs are weak, which gives them an awkward appearance when crawling on the land, but in the water they move with considerable ease by paddling with the tail. Various parts, such as the legs and tail, are reproduced when lost by accident, as is the case with many animals allied to them. They are often mistaken for lizards, but differ widely from them in many important characteristics.

NEWTON, a city in Kansas, county seat of Harvey County, on Sandy Creek, 135 miles southwest of Topeka. It is on the Missouri Pacific and the Atchison, Topeka and Santa Fé railroads. The surrounding country is agricultural and contains extensive deposits of stone and coal. It has a public library, the Bethel College, and several school and county buildings. Among the manufactures are flour, carriages, dairy products, soap, candy, machinery, and ironware. It has a growing trade in merchandise. The place was settled in 1871 and incorporated the same year. Population, 1910, 7,862.

NEWTON, a city of Massachusetts, in Middlesex County, on the Charles River, seven miles west of Boston. It is on the Boston and Albany Railroad and has communication by an extensive system of electric railways. The site includes eighteen square miles and is beautified by several hills and many fine streets. About 260 acres are included in the public parks, which include the Metropolitan Park and the Metropolitan parkways along the Charles River. Among the noteworthy buildings are the public library of 65,000, the Lasell Seminary, the Allen School, the First Baptist Church, the Eliot Church, the high school, and the Newton Theological Seminary. It has a memorial which was erected in honor of John Eliot, who preached here to the Indians.

Newton has a large commercial trade and is an industrial center. It has manufactures of ink, hosiery, paper, soap, dyestuffs, machinery, chemicals, cordage, India-rubber goods, and vehicles. The site was first settled in 1630 and the city became incorporated in 1873. It is a favorite residence of many Boston merchants, and is often called "The Garden City" of New England. Fifteen villages are included within its limits. Population, 1905, 36,694; in 1910, 39,806.

NEW ULM, a city in Minnesota, county seat of Brown County, on the Minnesota River, 28 miles northwest of Mankato. It is on the Minneapolis and Saint Louis and the Chicago and Northwestern railroads and is surrounded by a fine agricultural and dairying country. The noteworthy buildings include the county courthouse, the Saint Alexander Hospital, the Turverein Library, the Martin Luther College, the public library, and the high school. Among the manufactures are flour and grist, brick and tile, pottery, butter and cheese, cigars, lumber products, and machinery. It was settled by Germans in 1857 and incorporated in 1870. The Indians made a raid upon it in 1862 and a cyclone damaged it greatly in 1881. Population, 1905, 5,720; in 1910, 5,648.

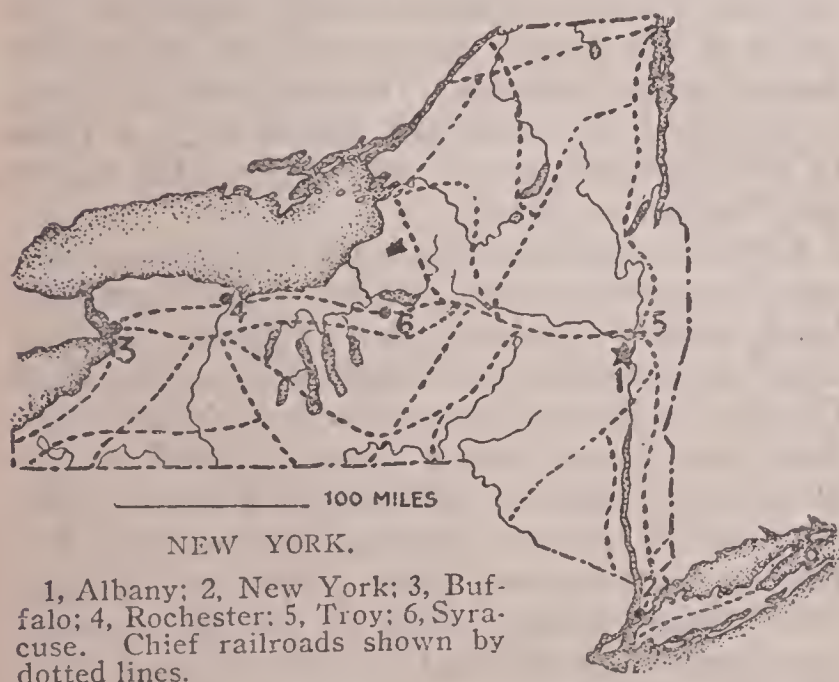
NEW WESTMINSTER (wěst'mĭn-stēr), a city of Canada, in British Columbia, 75 miles northeast of Victoria. It is on the Fraser River, 15 miles from the Strait of Georgia, on the Canadian Pacific and other railways. The surrounding country is fertile and in its vicinity are extensive fisheries and canneries. Among the manufactures are machinery, canned fruits and fish, lumber products, and hardware. It has

a public library, an asylum for the insane, a Dominion prison, and several schools and colleges. Electric lighting, sewerage, waterworks, and an electric street railway are among the public improvements. Population, 1901, 6,499.

NEW WHATCOM (hwöt'kü'm). See **Bellingham**.

NEW YEAR'S DAY, the first day of January and of the year. It has been observed as a religious holiday from the time of the Julian reformation of the calendar. Since it occurs on the eighth day after Christmas, it is the festival of Christ's circumcision, and as such is celebrated by various religious denominations, though in many countries it is observed more particularly with festive rejoicing and for interchanging presents. Although the Egyptians, Jews, Mohammedans, Chinese, and Romans differed from us and from each other as to the day on which the year begins, they all made the first day of the year one of special interest. It is observed more closely in religious services in European countries than in America, and in many it has been superseded by Christmas for the bestowal of gifts.

NEW YORK, one of the original thirteen states of the United States, popularly called the *Empire State*. It is bounded on the north by Lake Ontario and the Province of Quebec, east by Vermont, Massachusetts, and Connecticut, south by the Atlantic Ocean, New Jersey, and Pennsylvania, and west by lakes Erie and



Ontario and the Niagara River, which separates it from Ontario. The northwestern boundary is formed by the Saint Lawrence River and it is separated in part from Vermont by Lake Champlain. It includes all of Long Island, which is separated from the mainland by the East River. The extent from north to south is 312 miles and from east to west, 326 miles. It is the

largest of the Eastern States, having an area of 49,170 square miles, which includes 1,550 square miles of water surface.

DESCRIPTION. The surface is diversified, many portions being level or undulating plains, while others are hilly, and in the eastern part are a number of mountain groups and chains. In the northeastern part are the Adirondack Mountains, which rise abruptly from the shore of Lake Champlain, culminating in Mount Marcy, 5,344 feet high, the highest peak. These highlands are heavily timbered with spruce, pine, and the hard woods, and large tracts are still covered with primeval forests. In the southeastern part of the State, extending northward along the Hudson, are ranges of the Appalachian Mountains, which cross the border from New Jersey and Pennsylvania. Along the frontier of Massachusetts is the Hoosac Range. South of the Mohawk Valley and west of the Hoosac Range are the Catskill Mountains, which have a general elevation of 3,500 feet, but Slide Mountain, the highest peak, has an altitude of 4,205 feet. The region lying west of the mountainous section may be described as a plateau, having a broken surface along the border of Pennsylvania and sinking gradually toward the northwest. Through the central part of the State, from Albany to Buffalo, extends the Erie Canal. A small portion of the mainland and all of Long Island belong to the low and level Atlantic coast plain.

The State forms a notable watershed for five drainage systems, including those of the Delaware, the Hudson, the Mississippi, the Saint Lawrence, and the Susquehanna. Both the Delaware and Susquehanna rivers rise in the State and they drain a large part of the south central section. In the eastern part is the Hudson, which receives the inflow from the Mohawk and discharges into New York Bay. The northeastern part is drained through Lake Champlain into the Saint Lawrence River, which, in its upper course, receives the inflow from the Genesee, Oswego, Black, and Oswegatchie rivers. In the southwestern part the drainage is through the Allegheny River, a tributary of the Ohio, hence by the Mississippi system. In many places the streams pass through deep gorges and are characterized by waterfalls, including the Falls of the Mohawk, near Cohoes; the Taughannock Falls, near Cayuga Lake; the Niagara Falls, in the Niagara River; and the falls of the Genesee River, at Rochester. These and other falls and rapids furnish an abundance of water power.

The State has many lakes of much beauty and value in commerce. On the eastern border

is Lake Champlain and directly south of it is Lake George, the latter being entirely within the State. Many fine sheets of water are distributed in the Adirondack Mountains, such as Saranac, Placid, and Tupper lakes. In the western part are lakes Cayuga, Seneca, Oneida, Owasco, and Keuka. Chautauqua Lake, in the southwestern corner, is celebrated as a summer resort.

The climate is marked by extremes of heat and cold, the thermometer varying from a few degrees below zero to 100° above, and the average for the State is about 48°. In the southeastern part the temperature is quite equable, being influenced by the breezes from the Atlantic. All sections of the State have an abundance of rainfall, which is heaviest in the Adirondacks and lightest in the northwest, ranging from 35 inches in the latter to about 60 inches in the former. Heavy snows fall in winter, mostly in January and February.

MINING. The State has vast deposits of minerals, but the coal measures are not found in large sections, although the fields of Pennsylvania are of easy access. In 1909 the total coal products had a value of \$7,845,500. It holds first rank in the output of salt, the quantity produced annually having the value of \$2,600,000. In the output of mineral waters it is exceeded only by Wisconsin and it holds a high place in the production of pig iron. Large deposits of limestone are worked, and the quality is well suited for building purposes and the manufacture of Portland cement. Many clays of value are found and much of the output is used in the manufacture of tile, brick, and pottery. Several counties in the western part of the State have extensive deposits of natural gas and petroleum. Slate is quarried profitably and marble and granite are obtained for building purposes and monuments. Other minerals include gypsum, zinc, copper, lead, and graphite.

AGRICULTURE. Originally the State was covered by vast forests of pine, hickory, maple, oak, chestnut, walnut, sycamore, and other trees. Considerable forests still exist, but much of the surface has been cleared for pasturage and cultivation. It long ranked as the leading State in agriculture, but Illinois exceeded it in 1890, and since then it has been surpassed by other west central states. The land area included in farms is given as 75 per cent. and the average size of the farms is 99 acres. Hay is grown on a larger area than all other crops combined, owing to extensive interests in the live-stock industry. Oats holds rank as second in acreage, but is closely followed by corn and wheat. Other crops include buckwheat, potatoes, rye,

beans, and tobacco. Some of the central counties grow large quantities of hops. The Hudson valley and the lake regions are noted for the superior quality of grapes. Floriculture is a source of much income. Gardening and small farming are conducted with much care in the vicinity of the larger cities.

New York has an important place in dairy farming and in the number of dairy cows it holds first rank. The value of butter and milk produced per annum is greater than that of any other State in the Union. While the larger investments are in dairy cows, considerable interests are attached to raising cattle for meat. Sheep are grown extensively and the wool clip averages about 4,800,000 pounds per annum. Horses of a fine grade for draft and driving purposes are raised, and considerable attention is given to the industry of growing swine and mules. The interests in growing poultry for meat and eggs are considerable.

MANUFACTURES. The State has ranked first in the output of manufactured products since 1825, and manufacturing has been the principal industry for about a century. This enterprise is favored by its location near the vast coal fields of Pennsylvania and its valuable forests, which continue to yield large quantities of spruce, hemlock, and hard-wood timber. Other resources for manufacturing come from the mines, quarries, dairies, and farms. Fisheries of importance are located in the lakes and off the shore of Long Island. Among the catches are oysters, clams, menhaden, and bluefish, and much of the output is prepared for the market by curing and canning. The total manufactured products of the State per annum have a value of \$2,250,000,000, nearly one-sixth of the output for the United States.

Clothing stands at the head of the list in the value of manufactures, but it is followed closely by the output of printing and publishing, textiles, sugar and molasses, and machinery. New York City is the greatest manufacturing center in the State and in the United States, but a large variety of products are obtained in Buffalo, Rochester, and Syracuse. Many of the streams furnish an abundance of water power, but Niagara Falls stands at the head of the list, whence the power is conducted to Buffalo and other manufacturing centers. Cohoes and Utica produce large quantities of rugs and carpets, Yonkers is a center of the knitting industry, Rochester produces many optical instruments and cameras, and Troy is a center for the manufacture of cuffs, collars, and shirts. Rochester was for many years the leading manufacturing city of flour, but it has given way to Minneapolis

in this respect. Grist milling, cheese making, fruit canning, and slaughtering and meat packing are represented in a number of the larger cities. In the brewing industry the State has first rank, which is true likewise of the manufacture of butter and condensed milk. Other products include soap, confectionery, boots and shoes, lace goods, furniture, gloves and mittens, cigars, and chemicals.

TRANSPORTATION AND COMMERCE. The State outranks any other State in the Union in maritime commerce, though New York City is the only port on the Atlantic. About one-third of the exports and more than half of the imports of the nation pass through this port. A large commerce is carried on the lakes, both with Canada and other states of the Union, and the larger portion of this trade is through the port of Buffalo. Other navigable waters include the Saint Lawrence and Hudson rivers, Lake Champlain, and the Erie Canal, the latter extending across the State from east to west, connecting the Hudson River at Albany with Lake Erie at Buffalo. Other artificial waterways constructed by the State include the Oswego Canal and the Champlain Canal. These avenues for cheap transportation, together with the large population of the State, have operated to maintain the high position in commerce.

The Mohawk and Hudson Railway was opened between Albany and Schenectady, a distance of seventeen miles, in 1831. Soon after a line was completed between Albany and Buffalo, which parallels the Erie Canal. Lines now extend to all parts of the State, the total aggregating 8,675 miles. The New York Central and Hudson River Railway has a trunk line from New York City by way of Albany to Buffalo, where it is connected with affiliated lines extending to Chicago and Saint Louis. A large portion of this railway is double track and part of the system has four parallel tracks. Other railways within the State include the New York, Ontario and Western, the Erie, the Lehigh Valley, the West Shore, the Lackawanna, and the New York, Chicago and Saint Louis railways. All of the larger cities have electric railways, providing extensive communication to urban, suburban, and interurban points.

EDUCATION. The per cent. of illiteracy for the total population over ten years of age is 5.5, but among native whites it is only 1.2. School attendance is compulsory between the ages of 8 and 16 years. The educational affairs are under the direction of a State board of regents and a State superintendent of public instruction, who are assisted by county school commissioners and principals and superintendents in the

towns, boroughs, and cities. Teachers' institutes are held annually in different sections of the State, at which the attendance is large, usually about 25,000. Normal education is provided by 16 public normal schools, at which about 6,000 students attend, and additional instruction is given in a number of high schools and academies. State aid has been extended to the district library system since 1838, giving all the pupils in school the advantage of good reading matter.

Although the State does not maintain a university, higher education is amply provided for in a large number of well-organized and heavily endowed institutions. Columbia University, in New York City, is one of the oldest and best known centers of learning in the country. Other institutions of a high character include Vassar College, Poughkeepsie; New York University, New York City; Colgate University, Hamilton; College of the City of New York, New York City; Cornell University, Cornell; Syracuse University, Syracuse; Union Theological Seminary, New York City; Union College, Schenectady; University of Rochester, Rochester; and Wells College, Aurora. West Point, on the Hudson, has the United States Military Academy. Many parochial schools and private institutions of learning are maintained.

The charitable and penal institutions are under the direction and management of boards of lunacy, corrections, and charities, each being appointed by the Governor and the senate. More than 500 institutions of this kind, having nearly 70,000 inmates, are supported by the State. Buffalo, Utica, Willard, Poughkeepsie, Middletown, Binghamton, Rochester, Ogdensburg, Flatbush, Ward's Island, Gowanda, and several other places have hospitals for the insane. Six penitentiaries are maintained, located respectively in the counties of Albany, Clinton, Erie, Kings, Monroe, and New York. Auburn, Clinton, and Ossining (Sing Sing) have prisons. Reformatories are located at Bedford (for women), Elmira, and Napanock. The larger cities, especially New York, have many workhouses for the confinement and employment of minor offenders. Ample provisions have been made for epileptics and other subjects of charity and benevolence.

GOVERNMENT. The State is governed under a constitution that was revised in 1894 and, after ratification by the vote of the people, it went into effect Jan. 1, 1895. It vests the executive authority in the governor, lieutenant governor, comptroller, secretary of State, treasurer, attorney-general, and State engineer and surveyor, all elected for two years. The other State offi-

cers, including those that have charge of educational and charitable institutions, are appointed by the Governor and confirmed by the senate. The Legislature consists of a senate and a house of representatives, known as the assembly. At present the senate consists of 50 members chosen for two years and the assembly has 150 members chosen annually.

The court of appeals is the highest judicial authority in the State. It is composed of a chief justice and six associate justices, all elected for fourteen years. Seventy-six judges constitute the supreme court, each elected for fourteen years, and they act in eight judicial districts. Other courts include those known as county courts, surrogate courts, and city courts. Local government is administered by villages, towns, and cities. Three classes of cities have been established by the Legislature and they are governed under general plans established by law. All cities having less than 50,000 inhabitants belong to the *third class*, those having between 50,000 and 250,000 are cities of the *second class*, and those having 250,000 or more inhabitants belong to the *first class*. The right to vote is restricted to those who have been citizens of the United States 90 days and residents of the State one year, of the county four months, and of the town or precinct thirty days.

INHABITANTS. The State of New York ranks first in population, in wealth, and in the number of educational institutions. Being the gateway at which a large foreign immigration is admitted, a considerable number of its inhabitants are foreign born. Nearly two million of its inhabitants are of foreign birth, including principally Germans, Irish, Jews, and Italians. Albany, on the Hudson, is the capital. The principal cities include New York, Buffalo, Rochester, Syracuse, Albany, Troy, Utica, Yonkers, Binghamton, Schenectady, Auburn, Elmira, Newburgh, Cohoes, Poughkeepsie, Oswego, Kingston, Amsterdam, Jamestown, Lockport, Rome, Gloversville, Watertown, Middletown, Ogdensburg, Ithaca, Hornellsville, Hudson, Dunkirk, and Corning. In 1900 the population was 7,268,012, or 153 persons to the square mile. This included 4,627 Indians, 7,170 Chinese, and 99,232 Negroes. In 1905 the population was 8,066,672; in 1910, 9,113,614.

HISTORY. It is thought that Giovanni Verrazano was the first European to reach the region included in New York, since he discovered New York Bay in 1524. Henry Hudson, sailing in the *Half Moon* under the flag of Holland, discovered the river that bears his name, in 1609. In the same year Samuel Champlain, the founder of Quebec, made important explorations and

discovered Lake Champlain. The Dutch carried a trade in furs with the Indians until 1614 without attempting settlements, but in that year Fort Nassau was established and in 1623 New Amsterdam was founded, the former being the original name of Albany and the latter of New York City.

Four Dutch governors ruled in the region, including Minuit, Van Twiller, Kieft, and Stuyvesant, and in 1664 the colony was captured by the English and granted to the Duke of York. The English were ousted for a short time, in 1673, but all the remainder of the period up to the Revolution they remained in possession. In 1690 the first colonial congress met at Albany to consider Indian troubles and in 1700 Captain Kidd, the pirate, was captured. The people were about evenly divided between the American party and the Tories during the early struggle between the colonies and England, but the former rapidly gained in numbers and soon were in the majority. An independent government was organized, in 1775, and the following year a provincial convention was held at White Plains, at which was drawn up the constitution adopted in 1777.

New York ratified the Articles of Confederation in 1778, and throughout the Revolution gave support to the Americans. On July 26, 1788, a convention ratified the Constitution of the United States by a vote of 30 to 27. Many Tories settled in Canada after the close of the war, but the party lines between the Federalists and Democrats were closely drawn. During the early part of the Civil War a large party favored a peaceable settlement with the Confederate States, though the State did not possess slaves, but 467,000 troops were furnished to the Federal army.

NEW YORK, the largest city of America and the second city of the world, being exceeded in population only by London. It is located in the State of New York, at the mouth of the Hudson River, which flows through New York Bay into the Atlantic Ocean. Lower New York Bay is connected with Upper New York Bay by the Narrows, a strait which separates Staten Island from Long Island. This strait is about a mile wide and on its shores are forts Hamilton and Wadsworth. All large vessels that enter the inner harbor, known as New York Bay, must pass this strait. New York Bay is five miles wide and six miles long from north to south, and is one of the most beautiful and secure harbors in the world. Vessels may also enter the harbor from Long Island Sound through the improved Hell Gate Pass and the East River, and from the western side of Staten

Island through Kill Van Kull, but both these passages are fitted only for ships of light draft.

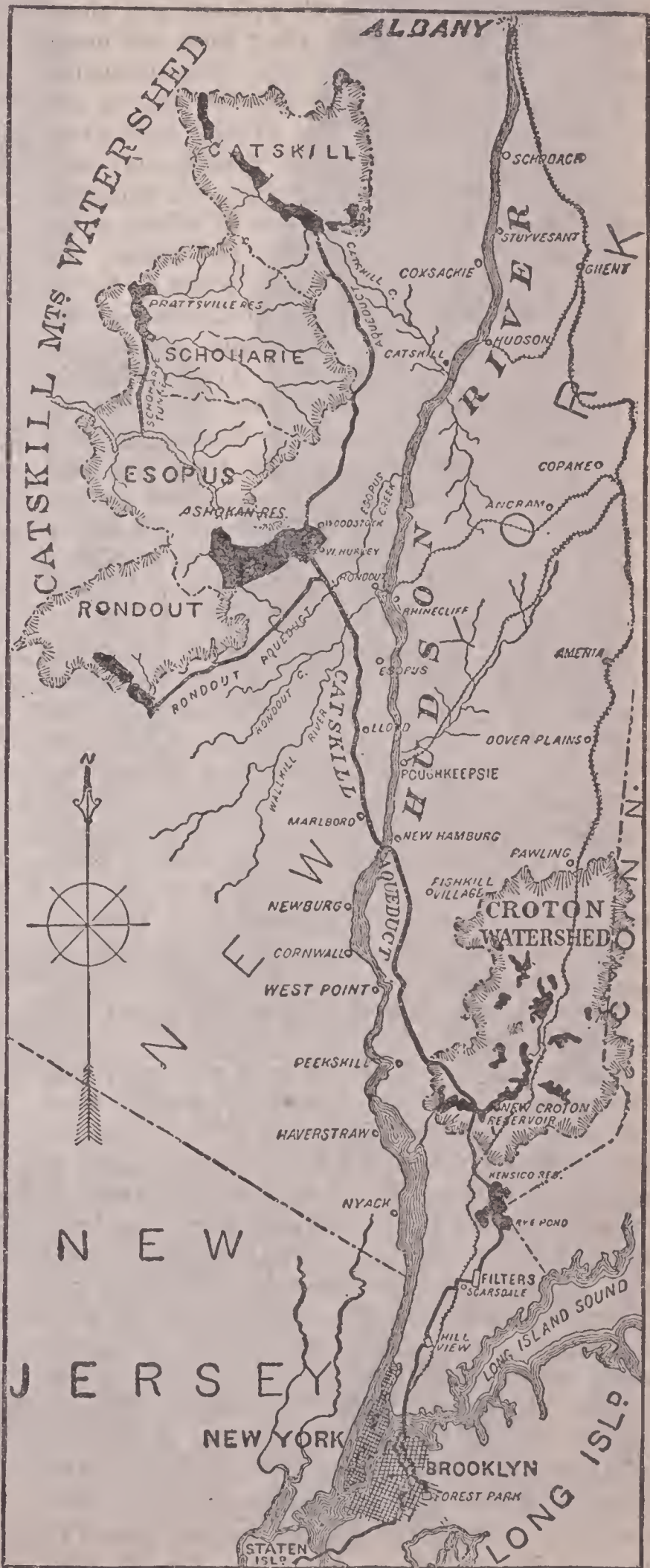
Three small islands are situated in the harbor, these being known as Bedloe's, Governor's and Ellis islands. The celebrated Bartholdi's Statue of Liberty stands on Bedloe's Island and the United States government occupies Governor's Island. Immigrants from foreign countries are now received on Ellis Island, though formerly they landed at Castle Garden. Several islands are situated in the East River, known as Blackwell's, Randall's, and Ward's islands, and these contain a number of charitable institutions under municipal authority.

DESCRIPTION. Originally New York was confined on the Island of Manhattan, a tract of land included between the Hudson and East rivers. It is bounded on the north by Spuyten Duyvil Creek, northeast by the Harlem River, east by the East River, south by New York Bay, and west by the Hudson River. This island was purchased by Peter Minuit, director for the Dutch India Company, from the Indians in 1626 for \$24. At present the city not only covers this tract, but extends far beyond into the State and includes a part of Long Island. Manhattan Island is about one and three-fourths miles wide and thirteen miles long. Eighteen miles south of Manhattan is Sandy Hook, where a bar separates the lower bay from the Atlantic Ocean. Southeast of Manhattan Island is the borough of Brooklyn, now a part of New York City, and west of it, across the Hudson, are Jersey City and Hoboken, both located in the State of New Jersey.

Greater New York consists of five boroughs, all of which were included by the charter of 1897. They include Manhattan, which includes all of Manhattan Island; Richmond, which consists of Staten Island; Brooklyn, which is coextensive with King's County on Long Island; Queens, located north of Brooklyn and east of Manhattan; and the Bronx, situated north of Manhattan and Queens. The area is as follows: Manhattan, 22 square miles; the Bronx, 40 square miles; Richmond, 57 square miles; Brooklyn, 66 square miles; and Queens, 124 square miles, making a total of 309 square miles.

STREETS. The older part of the city, situated below Fourteenth Street, is covered most densely with buildings and has a number of tortuous streets. The remainder of the city is platted largely on a regular plan, has wide and uniform streets and avenues, and some of its thoroughfares rank among the finest and best improved in the world. Broadway is the great artery of business. In the business section it is only eighty feet wide, but its northern half has near-

ly double this width. Fifth Avenue, formerly an exclusive residential street of rich people, is devoted to business as far as Fiftieth Street, and north of that it is lined with fine resi-



Map of New York City, showing the surroundings, the Hudson River to Albany, and the source of the water supply.

dences, churches, and clubhouses. Some of the finest dwellings in the world are located on Fifth Avenue between Sixtieth Street and 100th Street, where no street railways are permitted. Between Seventh and Tenth avenues and along the Hudson, known as the West Side, are many tenements and numerous large manufacturing establishments. Along the East River, on the east side of Manhattan, is a district with great tenement houses. The most conspicuous section is near City Hall Park, where the buildings range from ten to thirty stories in height, some of them having cornices 340 feet above the pavement. This section extends south as far as Battery Park, the former site of Castle Garden, in which is located the Aquarium.

Wall Street, extending from Trinity Church, on Broadway, to the East River, contains the subtreasury and many banking houses. It is a narrow street and is so named from the wall which once defended New Amsterdam at this point, and in its vicinity are many of the larger and most massive buildings of the city. Other streets of note include the Bowery, Maiden Lane, Park Row, and 23d Street. Along the Hudson River is Riverside Drive, a boulevard noted for its private residences and apartment houses. The northern part of Manhattan and much of the Bronx are hilly and are formed largely of solid gneiss and limestone, hence tunneling and the leveling of streets are difficult and expensive, but no outlay of money has been spared in either of these enterprises. Richmond and the Bronx are mainly residence districts, while Brooklyn contains many business houses and manufacturing establishments as well as residences. The wholesale trade is centered chiefly on Broadway between Tenth and Chambers streets.

PARKS AND SQUARES. New York has many fine public parks and beautiful specimens of landscape gardening. Central Park contains 840 acres, of which nearly half is wooded, and is considered one of the most beautiful pleasure grounds in the world. Bronx Park, on both sides of the Bronx River, has an area of 660 acres and contains extensive botanical and zoölogical gardens. North of Kingsbridge is Van Courtlandt Park, containing 1,130 acres, in which are located a museum and many beautiful gardens and lakes. Near Baychester is Pelham Bay Park, the largest in the city, containing 1,750 acres. Morningside Park is located between 110th and 123d streets, Saint Mary's Park is at 149th Street, Crotona and Claremont parks are near the village of Tremont, and Prospect Park is in Brooklyn. Many small squares and parks are located in different parts of the city,

such as Madison Square, Washington Square, and Union Square. Harlem Speedway, extending for two miles along the western bank of the Harlem River, is beautified by finely kept gardens and parkings.

MONUMENTS. Those entering New York Bay are at once impressed with the Statue of Liberty Enlightening the World, presented to the United States by the government of France and located in the harbor on Bedloe's Island. Central Park is noted for its fine statues and monuments, including the obelisk presented to the city by the Khedive of Egypt, Ismail Pasha, and erected in 1880. At the entrance to Central Park is an equestrian statue of Simon Bolivar, the gift of Venezuela. Other statues in Central Park include one of Robert Burns, presented by resident Scotchmen, one of Sir Walter Scott, by John Steele, one of Alexander Hamilton, one of Professor Morse, and those of Schiller, Beethoven, Daniel Webster, Humboldt, and Thomas Moore. The tomb of General Grant is situated at the summit of the Riverside Bluff, a conspicuous point overlooking the Hudson, and Washington Arch is at the north entrance to Washington Square. South of Cooper Union is a figure of Peter Cooper by Saint Gaudens, in Union Square is a bronze statue of Lafayette by Bartholdi, and at the subtreasury in Wall Street is the colossal figure of Washington by Ward. Others of note include the statue of Roscoe Conkling, at Madison Square; the statue of "Sunset" Cox, in Astor Place; the statue of Garibaldi, in Washington Square; the statue of Hancock, near Central Park; the statue of Ericsson, at the Battery; the statue of Greeley, in City Hall Park; and the statue of Thorwaldsen, at the Sixth Avenue entrance to Central Park.

BUILDINGS. When approaching New York by river or bay, an extraordinary view is afforded of the high buildings of Manhattan Island, which constitutes one of the most impressive and interesting features of the city. The Produce Exchange near the Battery is a large structure of brick and terra cotta and has a tower 225 feet high. On Bowling Green, near the Produce Exchange, is the Customhouse, which occupies the former site of Washington's official residence. Both sides of Broadway from Bowling Green to City Hall Park are lined with massive and tall business structures, such as those of the Standard Oil Company, the Union Trust Company, the Manhattan Life Insurance Company, and the Commercial Cable Company. The subtreasury, a fine structure erected by the Federal government, is located on Wall Street and the city post office is in City Hall Park. The



CURB BROKERS ON BROAD STREET, NEW YORK CITY.



Park Row building, on Park Row, is 31 stories high and 390 feet from the street to the top of its towers, and was long the tallest building in the city. It is now exceeded in height by the Singer building, located on Broadway and Liberty streets, which has 42 stories. This structure is 612 feet high and has a total floor space of over nine acres. However, the Metropolitan Life Insurance building is the tallest in the city and in the world. It is on Madison Avenue and 23d Street, has 48 stories, and the top of the tower is 658 feet above the ground. At the 23d Street intersection of Broadway and Fifth Avenue is the Flatiron building, a structure of 20 stories with 456 offices above the fourth floor.

Trinity Church, on Broadway opposite Wall Street, is the most interesting ecclesiastical building. It occupies a site granted by the English government in 1697, but the present Gothic structure of brownstone dates from 1846. It is surrounded by a cemetery that contains the graves and monuments of many persons noted in American history. Near it is Saint Paul's Chapel, located on Broadway between Vesey and Fulton streets, the Episcopal place of worship at which Washington and others of pre-Revolutionary times attended. Grace Church, at Broadway and Tenth streets, is an ornate Gothic structure of white limestone. The Roman Catholic Saint Patrick's Cathedral, on Fifth Avenue, is the finest Gothic edifice in America. At Cathedral Heights is the cathedral of Saint John the Divine (Protestant Episcopal), a beautiful structure with a tower 445 feet high. Saint George's (Protestant Episcopal) Church is located at Rutherford Place. Other churches of note include the Saint James Lutheran Church, 73d Street; the Broadway Tabernacle, Fortieth Street; the Madison Square (Presbyterian), Madison Avenue; the First Church of Christ (Christian Scientist), 96th Street; the Madison Avenue (Reformed), Madison Avenue; and the Plymouth Congregational, Brooklyn.

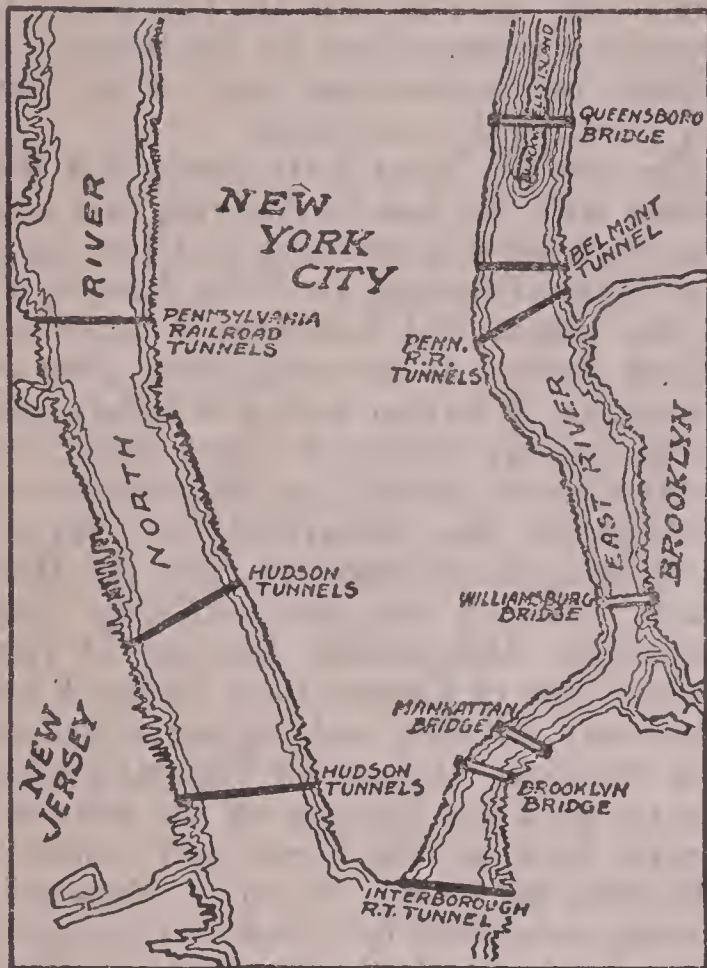
New York City is noted as an educational center. The public schools are well organized and attended and many private and parochial schools are maintained. It is the seat of the College of the City of New York, Columbia University, the New York University, the Barnard College, the Saint John's College, the College of Saint Francis Xavier, the College of Physicians and Surgeons, and many professional and scientific schools and associations. Many circulating libraries are maintained in connection with the public library, and a number of branch libraries have been provided under a gift of Andrew Carnegie amounting to

\$5,200,000. The Mercantile Library has 235,000 volumes. Among those prominent in the library movement were John Jacob Astor, James Lenox, and Samuel J. Tilden, whose gifts were united and from the consolidated trust fund it has been possible to build up a city library with 800,500 volumes. The building in which this great library is housed is located on Fifth Avenue, between 40th and 42d streets, and the structure is 366 feet long and 246 feet wide. Large libraries are maintained by the public schools, colleges, universities, and many of the scientific and educational associations.

The city has about forty hotels that may be classed with the best in America, and in addition there are a great many that rank as good. The Waldorf-Astoria, on Fifth Avenue, is one of the largest and best known hotels in the United States. It has more than 1,000 rooms for guests, is sixteen stories in height, and its equipments are modern in every detail. Other hotels of note include the Holland House, the Buckingham, the Netherland, the Savoy, the Manhattan, the Murray Hill, and the Hoffman House. Among the great buildings may be classed the Metropolitan Museum of Art, on the east side of Central Park, in which are located very valuable and expensive collections. The American Museum of Natural History is situated in a fine building on the west side of Central Park, at 77th Street, and contains vast collections in natural history. Museums are likewise maintained by Columbia University, the Lenox Library, and other institutions. The Metropolitan Opera House, on Broadway, has a seating capacity for 3,200 persons. Other noted theaters include the Criterion, the Casino, the Empire, the Daly's, the Knickerbocker, the Garden Theater, the Victoria, and the Urban Place Theater. As a whole the architecture of New York includes many structures of great value, but these impress with a feeling of awe rather than with a sense of beauty. They are not confined to the original limits of New York, but the former city of Brooklyn, now a part of Greater New York, has many schools, churches, office buildings, and institutions of various kinds that take a high rank in value and architectural completeness.

BRIDGES. Many bridges connect the different parts of the city, facilitating easy passage for pedestrians and for street railway and railroad purposes. A large number of bridges cross the Harlem River, including the famous High Bridge, which is 1,460 feet in length. It is located at West 175th Street and near it is the High Bridge Park. At West 181st Street is Washington Bridge, which is 2,384 feet in

length, and from it a fine view is afforded of Kingsbridge and Washington Heights. A number of great bridges cross the East River, connecting Manhattan Island with Brooklyn. These include the New York and Brooklyn Bridge, which has its Manhattan terminal at the City Hall Park. It is 5,989 feet long, has a river span of 1,600 feet, is 85 feet wide, and was



BRIDGES AND TUNNELS.

erected at a cost of \$15,000,000. The promenade is free, but a fare of five cents is charged to cross on the electric cars. About a mile north of it is the East River Bridge, which has been in use some time, but it was not fully completed until 1908. It extends from Delancey Street, Manhattan, to Broadway, Brooklyn. The Williamsburg Bridge extends from Grand Street, Manhattan, to Williamsburg, Brooklyn. The Queensboro Bridge, which crosses the East River at 59th Street, was opened for traffic in 1909. It is 7,637 feet long and cost \$20,000,000. At present there are five great bridges across the East River and communication is further facilitated by two tunnels between Manhattan and Brooklyn. Three tunnels under the Hudson connect the city with the shore of New Jersey.

COMMUNICATION. Few cities equal New York in its convenient location for communication with other commercial centers of the United States and foreign countries. It has a natural harbor, extensive river and ocean traffic, and is

the converging center of many railways. Among the lines entering the city are the New York Central and Hudson River, the Erie, the Baltimore and Ohio, the West Shore, the Pennsylvania, the Lehigh Valley, the Lackawanna, the New York, New Haven and Hartford, and a number of others. At 42nd Street is the great terminal station of the New York Central and other lines. The Pennsylvania Company constructed a tunnel under the Hudson River, which was completed in 1908, hence the trains now enter the great terminal station on 32d Street, between Seventh and Eighth avenues. Formerly this line and a number of others transferred passengers as well as freight by ferries from Jersey City to various points in Manhattan and Brooklyn, and numerous ferry lines are still maintained for transporting, but the construction of this tunnel has been a means of relieving the formerly congested conditions.

Intercommunication is by electric surface cars, electric elevated lines, and the subways, and in addition there are numerous lines of cabs, hansoms, and conveyances by carriages and automobiles. All the electric lines run both local and express trains, giving those who reside some distance from the central part of the city the benefit of rapid transit. The surface electric lines extend to all parts of the city and branches are operated to many points in the State and on Long Island, including the connections with Jamaica and Coney Island. The elevated lines extend from the Battery toward the north and branches cross the great bridges of the East River into Brooklyn. It may be said that New York has the most complete underground electric railway in the world. The original subway has been in operation since 1904, when it was completed at a cost of \$36,500,000. An extension of this subway was completed to Brooklyn in 1908. The cars are operated and lighted wholly by electricity, and at intervals the tunnel is lighted by skylights in the center of the streets. In some places there are two and in other sections are four tracks, ranging from 25 to 50 feet in width, and the height is thirteen feet throughout. Many shops are located in various places of the subway, particularly between 23d Street and the Battery.

PUBLIC IMPROVEMENTS. The streets are exceptionally well graded and paved. Much of the paving in the business center is of granite, while in the districts lying farther out it is of brick, asphalt, or macadam. Much care is taken to insure cleanliness and safety on the streets during business hours, hence inspectors and patrolmen are met with on all the thoroughfares. An adequate system of sewerage is maintained,

and all the streets are well lighted, either with gas or electricity. Manhattan and the Bronx derive an excellent supply of water from the Bronx and Croton rivers through the Croton Aqueduct. The supply has been enlarged by the extension of branches to the Catskill Mountains, and a large quantity is stored in a number of natural lakes and artificial reservoirs. It is estimated that the daily consumption of water averages about 400,000,000 gallons, making it necessary to keep a supply stored so as to insure adequate service. Brooklyn derives its water supply from streams and wells on Long Island, and several large reservoirs are located in the eastern part of the borough and near Prospect Park. It is estimated that Brooklyn consumes daily about 120,000,000 gallons.

PUBLISHING. New York is the largest book and newspaper publishing center of the United States. About 60 daily and 100 weekly papers are issued regularly. The total number of periodicals is placed at 875, including many in the German, Hebrew, Italian, and French languages. The *Commercial Advertiser*, founded in 1798, is the oldest daily newspaper issued in the city. Among the prominent dailies are the *Journal*, the *American*, the *World*, the *Sun*, the *Telegram*, the *Commercial Advertiser*, the *Herald*, the *Times*, the *Evening Post*, the *Staats-Zeitung*, the *Jewish News*, the *Press*, the *Herold*, and the *Mail and Express*. Nearly all of the great magazines are issued in the city, such as the *Cosmopolitan*, the *Review of Reviews*, the *Everybody's*, and *Munsey's*.

TRADE. With the port of New York are included the municipalities on the Hudson and New York Harbor, hence the trade credited to the city embraces a considerable traffic carried on at Jersey City and Hoboken. Nearly half of the total foreign trade of the United States passes through New York, giving it a commerce fully five times as large as that of any other city in America. While it controls to a large extent the trade between Europe and the region of the Great Lakes, it does not benefit by the commerce of the Gulf of Mexico and the southern coast of the Atlantic, which is carried through other ports with foreign countries. New York is an importer of silk goods, rubber and elastic goods, chemicals, sugar, coffee, tobacco, jewelry, and precious stones. The exports include flour, corn, live stock, cotton, copper, and machinery. Although it has a large foreign trade, the coast trade of New York is relatively much more valuable.

MANUFACTURES. New York is the largest manufacturing center of North America. The output of the industries is more than fifty per

cent. greater than that of any other city in the United States. About 28,500 manufacturing establishments are maintained and fully half a million persons are employed in them. Clothing is the leading product and much of the work is done in tenement houses and small workshops. Sugar and molasses are of next importance, and the output of printing and publishing stands next in the list. Brooklyn is noted for its large sugar and molasses refineries, for its machine shops and foundries, and for its large interests in roasting and grinding spices and coffee. Other products of the city include pipe tobacco and cigars, hardware, machinery, lace goods, fur goods, musical instruments, and electrical apparatus.

GOVERNMENT. The present charter was adopted in 1889, but it was revised by the State Legislature in 1901. It vests the chief executive power in the mayor, who is elected for two years by popular vote, and he is assisted by the heads of the different boroughs. The heads of fourteen administrative departments are appointed by the mayor, who may remove most of them, but certain officials are appointed by the heads of the boroughs. Legislative authority is vested in a board of 73 aldermen, who are elected for two years by districts, but the president of the board is chosen by the voters of the entire city. Any ordinances and resolutions passed by this legislative body may be vetoed by the mayor, but they may be passed over his veto by a two-thirds vote, though any measure requiring the payment of money cannot thus be passed without a three-fourths vote. The civil service rules apply to most departments of the city government, the appointments to office being largely from the lists of eligibles furnished by a commission.

HISTORY. The first European to land in the vicinity of New York was Giovanni Verrazano, a Florentine sailor, who discovered the Bay of New York in 1524. Henry Hudson, sailing under the direction of the Dutch East Indies Company, explored the river that bears his name in 1609, and a number of Dutch immigrants landed on Manhattan Island in 1614. New Amsterdam was founded by these Dutch settlers in 1623, but the British conquered it in 1664 and named it New York, in honor of the Duke of York. It was reconquered in 1673 and named New Orange, but in the following year it was restored to the British. The famous plot of Negro slaves to burn the city was discovered in 1741 and was followed by several executions. When the Revolutionary War began New York was less populous than Boston or Philadelphia. It was occupied by the British

from 1776 to 1783, but in the latter year was evacuated by them. From 1784 to 1797 it was the capital of the State, and from 1785 to 1790 it was the seat of the United States government. Its development after the Revolution was constant, growing not only in commercial importance, but gaining steadily as a center of political influence in the State.

Robert Fulton's steamboat, the *Clermont*, began to sail regularly between New York and Albany in 1807. A steam ferry was opened to Long Island in 1812, and steamers began to run regularly to various points on the Atlantic. In 1819 the *Savannah* crossed the ocean and the Erie Canal was completed about the same time, hence immigration and trade with the interior were greatly facilitated. Several disastrous fires and two cholera epidemics had a harmful influence and the Astor Place Riot occurred in 1849, in which 34 rioters were killed and many soldiers and citizens were wounded. In 1861 the people were greatly divided on the issues of the Civil War, but the city gave loyal support to the Union, furnishing 116,382 soldiers. The "Tweed Ring" perpetrated frauds upon the city for a number of years, but the leaders were convicted and the organization was broken up in 1871. Great distress was caused by the panic of 1873, but the city continued to grow without intermission.

Greater New York was organized under a law which went into effect Jan. 1, 1898, when the counties of Richmond and Kings, Long Island City, the towns of Newton, Flushing, and Jamaica, and a part of Hempstead in Queens County were united into one great city. The following is its population according to reports issued by the government: 1774, 22,861; 1800, 60,489; 1825, 166,166; 1850, 550,394; 1860, 813,669; 1870, 942,292; 1880, 1,206,590; 1890, 1,515,301; 1900, 3,437,202. In 1910 Greater New York had a population of 4,766,883.

NEW YORK, College of the City of, an educational institution of New York City, founded in 1847 and managed under the city board of education. It was first established as the Free Academy, but its prosperous growth caused it to be changed to the College of the City of New York in 1866. Originally it was open only to graduates of the public schools, but in 1882 the privilege of attendance was extended to all who have attained the age of fourteen years. Tuition and the use of apparatus and text-books are free to students, who have the advantage of five courses of study. These lead to the degrees of B. A. or B. S., and two years of additional work entitle them to the M. A. and M. S. degrees. The institution has

a library of 36,800 volumes, 125 professors and instructors, and an attendance of 2,500 students.

NEW YORK UNIVERSITY, an institution of higher learning in New York, organized in 1830, formerly the University of the City of New York. The name was changed to its present form in 1896. The buildings are in three places, on Washington Square, on First Avenue between 26th and 25th streets, and at University Heights. Washington Square has a fine building of ten stories, of which the upper floors are occupied by the schools of law, pedagogy, and commerce, and the others are leased for business purposes. Instruction in medicine is given in the buildings on First Avenue. The site of University Heights, on the Harlem River, covers forty acres and contains a fine group of buildings, including the library, the hall of languages, chemical, physical, and biological laboratories, four dormitories, and buildings for engineering. In 1908 the University Heights Bridge over the Harlem was opened, connecting the 207th Street station of the subway with University Heights.

University College had its origin in 1829, when a number of public-spirited business and professional men met to consider "the establishment of a university in the city of New York on a liberal and extensive scale." University Graduate School, designed to complete the subjects commenced in the colleges, was begun in 1886 by twelve chairs announcing courses for graduate members. The work is carried on mainly at the Washington Square building, but for the scientific courses the laboratories at University Heights are used. All courses of instruction and examination leading to the degrees of master of arts, philosophy, or science, and doctor of philosophy, or science, are in charge of the Graduate School. The School of Applied Science is located at University Heights, which offers four years' courses in civil engineering, mechanical engineering, chemical engineering, and industrial chemistry. The School of Pedagogy was founded in 1888 and is one of the foremost institutions of the kind in the country. The collegiate division is maintained for teachers who have completed a college course in part. Other departments of the university include the University Law School, the University and Bellevue Hospital Medical College, the Summer School, the New York American Veterinary College, and the School of Commerce, Accounts, and Finance.

New York University is one of the foremost institutions of higher learning in North America. The faculty of law was planned by the Hon. B. F. Butler in 1835, then Attorney-Gen-

eral of the United States. John Taylor Johnston founded the law library, which has since been enlarged by David Banks and others. Six noted professors, including Drs. Valentine Mott and John W. Draper, organized the faculty of medicine in 1841. Samuel F. B. Morse, one of the professors, invented the recording telegraph in the old building on Washington Square. The total value of the property is \$6,500,000. It has about 275 instructors and a library of nearly 100,000 volumes. In 1908 the attendance was over 4,000 students. These were distributed as follows: College, 126; Graduate School, 281; School of Applied Science, 215; School of Pedagogy, 589; Washington Square Collegiate Division, 322; School of Commerce, 804; Summer School, 541; Law School, 817; Women's Law Class, 33; Medical College, 502; Veterinary College, 25. See **Hall of Fame**.

NEW ZEALAND (zē'land), a colony of Great Britain in the South Pacific Ocean, located about 1,175 miles southeast of Australia. It consists mainly of three separate islands known respectively as North Island, South Island, and Stewart Island, though the latter is comparatively small. North Island has an area of 44,468 square miles; South Island, 58,525 square miles; and Stewart Island, 615 square miles. Chatham, Cook, Auckland, and a number of other small islets lie near the New Zealand group and are governed with it, the total area being 104,771 square miles. North Island is separated from South Island by Cook Strait, which ranges from 16 to 100 miles in width, and Stewart Island lies 25 miles south of South Island, being separated from it by Foveaux Strait.

DESCRIPTION. North Island has an undulating surface, diversified by low hills and extensive forests. Some of the mountains have volcanic peaks and the highlands have a general altitude of 4,500 feet. The highest peaks are Tongariro, 6,512 feet; Egmont, 8,315 feet; and Ruapehu, 9,200 feet. The shore is indented by a number of bays that furnish excellent harbors. South Island has a more compact form, lying as a parallelogram in a northeast and southwest direction. Much of its surface is highly elevated, including a lofty range of highlands known as the Southern Alps. Mount Cook, the culminating peak, has an elevation of 12,349 feet above sea level. The drainage is by small streams, all of which flow rapidly. Waikato, in North Island, is the largest river. It flows into Lake Taupo, located in the east central part, which has no outlet to the sea. On South Island are the beautiful lakes of Te Anau and Wakatipu, both in the southwestern part. New

Zealand has a coast line of 3,000 miles, the larger part of which is in North Island.

The climate is equable and healthful, though it varies considerably with the location in latitude. There is a difference of about 10° between the north and the south, the latter being the colder section. The east coast has a rainfall of 27 inches, while the west coast has from 80 to 100 inches. Frosts are very uncommon in the north, but Stewart Island, on the south, has a moderately cold winter. The flora resembles that of Australia, though the acacia and eucalyptus are not represented, but the ferns and mosses are abundant. Pine, gum, and palms are the chief varieties of trees. No wild animals of large size are native to the colony, but beautiful birds of song and plumage are very numerous.

MINING. The report of the government places the value of minerals produced per year at \$20,-240,000. Gold is the most valuable and is followed closely by silver and coal. Gold is mined extensively in the districts of Otago, Westland, Auckland, and Nelson, and the output is more than one-half the total of minerals produced in the colony. It is secured to some extent from quartz, but a large share is mined by dredging in the bed of the Clutha River and other streams. Coal is mined largely for exportation. Other minerals include lead, antimony, quicksilver, and manganese. Clays suitable for brick and pottery and stone of a good quality are abundant.

AGRICULTURE. About two-thirds of the surface is adapted to grazing and farming, and the interests vested in agriculture exceed those of any other industry. The soil is easily cultivated and the climatic conditions are more favorable to the growth of crops than in any part of Australia. Green crops, such as rape and turnips, are grown on a large acreage. Oats, wheat, and barley are the principal cereals. Other crops include hay, maize, potatoes, and vegetables. Tropical and semitropical fruits of all kinds are grown in abundance.

In proportion to the size of the colony, it exceeds all other countries in the extent of its sheep-raising interests. The number of sheep is placed at 20,125,000 head and the purpose is to produce meat rather than wool. Formerly the flocks were large and comparatively few in number, but the tendency now is to decrease the size and increase the number of flocks. Much of the mountain region is utilized for pasturage, being favored by a suitable climate and an abundance of rainfall. Large interests are vested in rearing horses and cattle. Dairy farming has shown a steady development in recent years. Swine and poultry are grown profitably.

MANUFACTURES. The native materials for manufacturing have stimulated this enterprise. At present the largest investments are in wool scouring, meat freezing, lumber and grain milling, and butter and cheese making. Clothing and boot factories have attracted large investments and extensive iron and brass works are maintained. The general manufactures include cigars, clothing, earthenware, pottery, furniture, and machinery.

TRANSPORTATION AND COMMERCE. The railways aggregate 2,850 miles and practically all of them are owned and operated by the government. In 1908, the private railways did not exceed 125 miles. Electric railways are operated in the larger cities and some of the rural districts, and about 18,500 miles of telegraph lines are in use. The foreign trade is largely with Great Britain, the United States, and Germany. Among the principal exports are grain, wool, gold, frozen meat, kauri gum, lumber, and butter and cheese. The imports consist chiefly of sugar, tea, clothing, textiles, tobacco, and iron and steel goods. The dammar pine tree, from which kauri gum is obtained, furnishes considerable material for exportation. According to the government reports the annual imports are valued at \$50,000,000 and the exports, at \$65,000,000.

EDUCATION. The government maintains a system of public education, which is presided over by a minister of a department. Attendance upon school is free and compulsory between the ages of seven and thirteen, but a small fee is paid by those who pursue secondary courses. At the head of the educational system is the New Zealand University, with which are affiliated five colleges located respectively at Auckland, Canterbury, Christchurch, Dunedin, and Wellington. A number of private and parochial schools are maintained, but the attendance is almost exclusively upon the public schools. About 325 public libraries are located in the colony, and a number of educational and scientific associations are well represented. The Anglican, Presbyterian, and Wesleyan churches have efficient organizations and a considerable number are classed as Roman Catholic. Effective missionary and educational work has been done among the natives for many years.

GOVERNMENT. The Governor is the chief executive officer. He is appointed by the British crown and is aided by a ministry of eight members. The legislative functions are exercised by the General Assembly, consisting of a legislative council and a house of representatives. Some members of the former were appointed for life prior to September, 1891, but since then the membership has been elected and the number is

fixed at 44. In the house of representatives are 80 members, who are elected for three years, including four representatives of the native Maoris. The right to vote is universal, without distinction of sex. Local government is administered in town and road districts, in boroughs, and in counties.

New Zealand is noted particularly for its development of state and municipal ownership of public utilities. Many of the industries are organized on a basis of coöperation, and arbitration is compulsory in the adjustment of questions between capital and labor. The government has a fixed policy in encouraging the development of industrial arts, building railways and canals, and constructing interior and harbor improvements.

INHABITANTS. The density of population is about nine persons to the square mile. A large per cent. of the inhabitants are immigrants from England, Ireland, and Scotland, but quite a number of Germans and Scandinavians are included. The influx of Chinese and other colored races is restricted by the government. Wellington, on North Island, is the capital. Other important cities include Auckland, Christchurch, Dunedin, Invercargill, Oamaru, and Wanganui. In 1906 the total population was 936,107. This included 47,731 Maoris and 2,792 Chinese.

HISTORY. New Zealand was discovered in 1642 by Tasman, and in 1769 it was claimed for George III. by Captain Cook. Settlements were effected by Europeans in 1814, but material advancement in colonization was not made until 1833, when it was annexed for governmental purposes to New South Wales. In 1841 it was established as a separate colony, with a governor independent of the Australian colonies, and a constitution was adopted in 1852. The natives of New Zealand are a Polynesian people known as Maoris. Severe wars for the possession of the land occurred at various times, particularly in 1843. These natives were organized as tribes and formerly were numerous. Many have intermarried with the whites. Auckland was the capital up to 1865, but in that year the seat of government was removed to Wellington, which is the present capital.

The New Zealand University was established by an act of the General Assembly in 1870, and about the same time the government began to participate in the construction of railways. A compulsory school attendance law was enacted in 1876, general manhood suffrage was established in 1890, and the franchise was extended to women in 1893. As a means of encouraging agriculture, the government began to make loans to farmers on mortgages in 1894, and the following year a law was passed to prohibit home-

steads from being mortgaged and sold for debt. A graduated tax on incomes was enacted about the same time. The laws now in force provide for an old age pension, accident insurance for workingmen, and the protection of children from working in mines and factories. New Zealand furnished men and supplies to support Great Britain in the Anglo-Boer War.

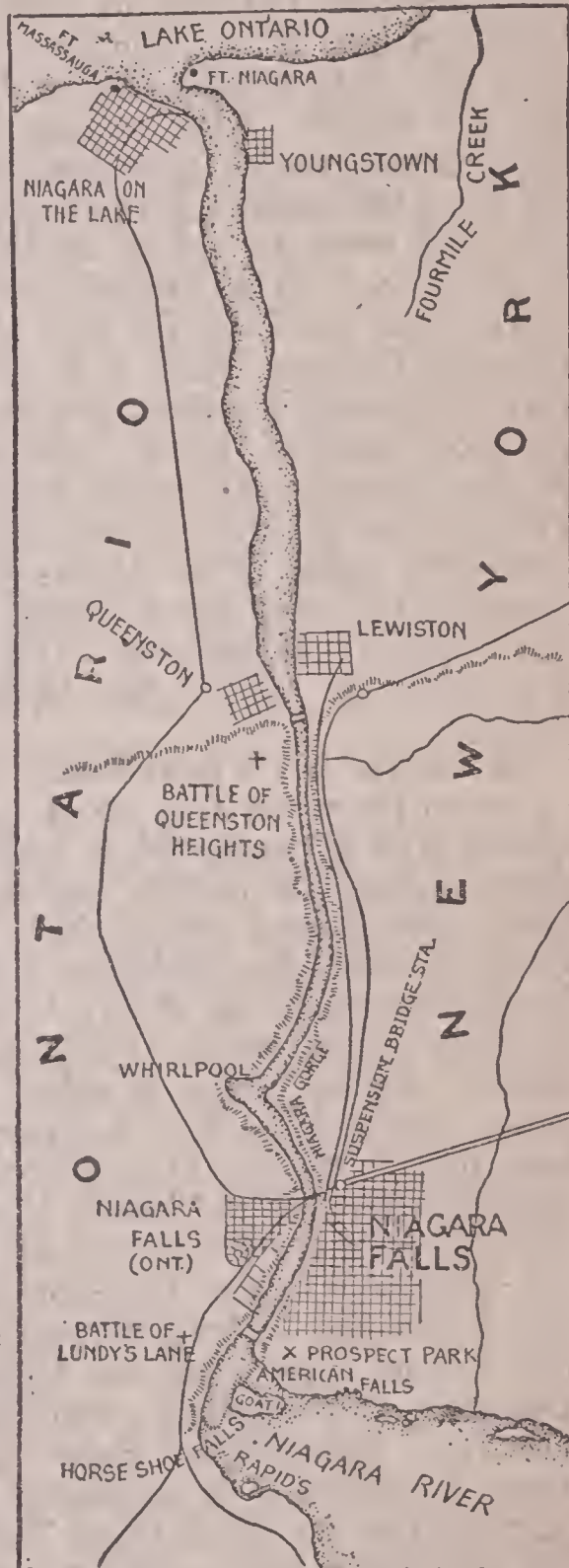
NEZ PERCÉS (nā pēr'sāz), or **Shahaptians**, an Indian tribe of North America, resident in Idaho at the time that region was first explored. They were generally friendly to the whites and in 1854 disposed of a part of their land, but in 1877 difficulties arose about a reduction of their reservations. Soon after a number of them were transferred to Indian Territory, now Oklahoma, while others remained in Idaho or settled in Washington.

NGAMI (n'gā'mē), a lake situated in South Africa, at the northern extremity of the Kalahari Desert, east of German Southwest Africa. It is sixteen miles wide, sixty miles long, and 2,650 feet above sea level. The rainy season causes it to rise materially, when its water is fresh, but it becomes brackish in the dry season. It receives the water of the Kubanga and the outflow is carried into the Makarikari Salt Basin. The existence of lakes in this region of Africa was known in the time of Herodotus, but explorations of note were not made until 1849, when Livingstone supplied authentic information regarding the natural aspect of that section of Africa.

NIAGARA FALLS, a city of New York, in Niagara County, on the Niagara River, 22 miles west of north of Buffalo. It is on the Wabash, the Erie, the New York Central, the Grand Trunk, and other railroads. Communication by electric railways is maintained with Buffalo, Kingston, Queenston, and other points of interest. It is connected with Canada by a cantilever and two arch bridges and by a stone bridge with Goat Island. The noteworthy buildings include the De Veaux College, the Carnegie public library, the Niagara University, and many public schools and churches. Prospect Park is a fine public resort. Among the manufactures are flour, paper, gas, machinery, lumber products, earthenware, cooperage, spirituous liquors, edged tools, wearing apparel, and utensils. Pavements, waterworks, electric lights, and street railways are among the improvements. Extraordinary water power is derived from the Niagara Falls and River. The city is a favorite center for sight-seers, who visit the Falls on the Niagara River. It was chartered as a city in 1892, when the former villages of Suspension Bridge and Niagara Falls were united. Population, 1910, 30,445.

NIAGARA FALLS AND RIVER, a falls and river of North America, situated between Ontario and New York. The Niagara River flows from Lake Erie into Lake Ontario, being the outlet of lakes Erie, Saint Clair, Michigan, Huron, and Superior. It is 34 miles long and at its beginning is 326 feet higher than the level of Lake Ontario, into which it discharges. Several

islands are in the upper course of the river, including Grand Island, which is about nine miles long. The distance from Lake Erie to the city of Niagara Falls is 16 miles. Grand Island divides the water into two nearly equal channels, which reunite and form a channel about two and a half miles wide. Here the water flows quietly for a short distance, but it narrows immediately above Niagara Falls and causes the Rapids, which is soon divided by Goat Island, on each side of which the water falls



by two cataracts, known respectively as the American Falls and the Horseshoe, or Canadian, Falls. In the course of the Rapids the river descends 52 feet, forming a prelude to the majestic cataracts, where the water descends with great force over the nearly perpendicular rocks.

The American Falls, on the east side, has a width of 1,120 feet and a descent of 167 feet, while the Canadian Falls, on the west side, has a width of 2,125 feet and a descent of 153 feet.

Massive rocks have prevented the water from excavating at the foot of the American Falls, but a great basin has been cut immediately below the Canadian Falls. This basin has the effect of causing the waters to flow smoothly, permitting the *Maid of the Mist*, a small steamer, to approach close to the cataract. At the upper part of the Falls the water has an average depth of about four feet, but in some places at the apex it is fully 20 feet, and the volume sweeping over the crest is estimated at 15,000,000 cubic feet per minute. After leaving the basin below the precipice, the water rushes with great rapidity down the channel, here known as the *Gorge*, the sides being formed of nearly perpendicular walls of rock. Three massive bridges span the Gorge near the Falls, the first of which, nearly opposite Prospect Park, is a steel arch structure for carriages, pedestrians, and electric cars. A short distance below, between Suspension Bridge Station and Niagara Falls, Ontario, are two railroad bridges, the first of these being a cantilever bridge of the Michigan Central Railway and the other being a steel arch bridge of the Grand Trunk Railway. The latter of these was built to replace the former suspension bridge.

The Gorge has a total length of seven miles, in which the water falls about 100 feet. It descends with a velocity of 30 miles an hour and pours through the narrow confine with a terrific roar. The channel widens about midway in the Gorge, forming the celebrated Whirlpool, a circular basin worn in the rocks by a constant whirling of the water. Here the stream rests awhile, circling around in sullen whirl. Sometimes huge floating logs are seen tossing their ends high in the air, to be sucked down only a moment later into the vortex of the maelstrom. The waters find their exit at the lower side of the Whirlpool, where they spring into motion afresh, but the velocity decreases gradually as the stream approaches the Ontario plain, at Lewiston, which is about seven miles from Lake Ontario. Immediately above Queenston the river is spanned by a suspension bridge, which is crossed by the Great Gorge Railway, an electric line that stretches along the heights in Ontario, but extends the entire distance from Lewiston to Niagara Falls, N. Y., on the American side, at the foot of the walls of the Gorge.

Goat Island is well wooded and beautifully improved with walks and drives. It is reached from Prospect Park by two stone bridges, each crossing a subchannel from the American side. A constant wear of the rocks by the action of the water, which has gone on for ages, causes the Falls to recede slowly toward Lake Erie.

The United States government controls the land immediately adjoining the Falls on the New York side, while the Canadian side is a reservation of the Dominion government, the purpose being to preserve the immediate vicinity in its natural state. Many points of interest may be seen along the course of the Niagara River, including, besides the Falls, the grounds of the Battle of Lundy's Lane, the Gorge, the Whirlpool Rapids, the Whirlpool, the vicinity of the Battle of Queenston Heights, and Fort Niagara. A tunnel has been excavated from Table Rock, on the Canadian side, to a point immediately below the margin of the Horseshoe Falls, enabling tourists to view the great descent of water at close contact. Father Hennepin discovered Niagara Falls in 1678, and a Swedish naturalist named Kalm published the first account of it in 1751. It is so named from an Iroquois word, meaning the *Thunder of Water*. An immense volume of power is utilized for industrial purposes, many sluiceways and tunnels having been constructed for that purpose on both sides of the cataract.

NIAGARA SERIES, a geological formation represented largely in North America, forming the lowest division of the Silurian system of rocks. It is so named from its typical development along the Niagara River, whence the deposits extend northward into Canada and southward as far as Alabama. Rocks of this series are found in New York, Virginia, and in many places of the central part of the Mississippi valley, especially in Kentucky, Missouri, and Illinois. In the vicinity of Birmingham, Ala., one of the formation bears red hematite iron ore, hence has given rise to a large industry in steel. In New Brunswick and New Foundland it is thicker than in New York, ranging several hundred feet. The limestone obtained from these deposits is used extensively for building purposes. In many places the deposits abound in fossils, such as shells, ferns, and the trunks of trees.

NIBELUNGENLIED (ně'be-löong-en-lēt), a noted German epic poem, dating from the Middle Ages and constituting one of the most celebrated productions in the world's literature. It was written in the High German dialect, but its authorship is unknown, though it is generally assigned to the early part of the 13th century. It is reasonably certain that some of the material constituting the poem originated in the 12th century. This literary product reached its greatest popularity among the Germans in the 16th century. According to a critical analysis made by Wilhelm Karl Grimm (q. v.), it is a compilation of rhapsodies and songs that ex-

isted for many generations, all of which have been presented with a remarkable simplicity, though some of them are not connected closely in all of their parts. The story of the Nibelungenlied is to the effect that Siegfried, heir of the King of the Netherlands, came into possession of the fabled treasure of the Nibelungs, and that this constantly bore evil to its owner. He became the husband of Kriemheld, sister of the King of Worms, the celebrated Günther. The latter was desirous of winning Brunehilde of Iceland, and Siegfried came to his assistance by substituting himself for Günther. A dispute now arose as to whether Günther or Siegfried was the greater, by which the jealousy of Brunehilde became aroused, and she accordingly induced Hogan, a vassal of Günther, to murder Siegfried.

The death of Siegfried was long mourned by Kriemheld, but after some years she was married to Attila, King of the Huns. She had come into possession of the treasure of the Nibelungs after the death of Siegfried, but this was secured from her by Hogan, who succeeded in casting it into the Rhine. Kriemheld still mourned the death of Siegfried and could not be reconciled. To secure revenge she invited her brother and his court to pay her a visit, which he did with 11,000 Burgundians. The poem is devoted after this to an account of a long contest that followed, in which many of the Burgundians lost their lives. However, Kriemheld finally slew her brother with the sword of Siegfried, but she was herself slain by the aged warrior Hildebrand. The exact location of the Nibelungs' treasure has not been revealed, since Hogan took an oath not to give any information regarding the place, but it is still supposed to lie secure at the bottom of the Rhine. Many valuable manuscripts which are associated with this poem are extant, some dating from the 13th century, and numerous translations have been made into other languages.

NICAEA (nī-sē'ā), or **Nice**, anciently an important city of Asia Minor, situated in Bithynia, on Lake Ascania. It was founded in 316 B. C. by Antigonus, who named it Antigonía, but later its name was changed to Nicaea by Lysimachus in remembrance of his wife. This interesting city was the seat of an ecumenical council under Emperor Constantine, in 325 A. D., and another under Empress Irene in 786. It was made the capital of the Greek possessions by Emperor Theodorus Lascaris in 1204, remaining the seat of Greek emperors until 1261, when they recovered Constantinople from the Latins. Nicaea fell into the possession of the Turks in 1330 and has since remained a part of

the Ottoman Empire. The population at present is about 1,200, but the place is known as Isnik. See **Nice, Councils of.**

NICARAGUA (nē-kā-rā'gwā), a republic of Central America, lying south of Honduras, west of the Caribbean Sea, north of Costa Rica, and east of the Pacific Ocean. It comprises thirteen provinces and has an area of 49,200 square miles. The interior has a chain of mountains trending from the southeast to the northwest, and along the Pacific coast are ranges of mountains that contain many volcanic cones, some of them rising 7,000 feet above sea level. The central chain of mountains forms a great watershed and east of it is an extensive plain. Among the principal rivers are the Bluefields, the Maiz, the San Juan, and the Grande. The coasts are indented by a number of bays and furnish good harbors, including that of Corinto, one of the best on the Pacific. It has several fine lakes, the principal ones being Nicaragua, Managua, and Pearl Lagoon. The climate is varied according to differences in elevation above sea level and proximity to the sea, though in the main it is tropical. As a whole the country has an abundance of rainfall, but the precipitation is scant during the summer season in the mountain districts.

The climate is generally favorable to the growth of cereals and in most parts to man, but in the swampy regions of the Caribbean coast it is unhealthy and malarial. A large part of the surface is fertile, with a reddish clay soil on the Caribbean coast and a deep black soil in the west. The country has an abundance of excellent timber, including logwood, cedar, Brazil wood, and mahogany. Large quantities of hardwood lumber are obtained in the mountains and along the streams. The pastures are excellent. Large herds of cattle and sheep are reared and considerable interests are vested in the rearing of horses, ponies, mules, and swine. The principal crops consist of coffee, cotton, corn, sugar cane, rice, tobacco, vegetables, and many varieties of fruits. Indigo, gum arabic, ginger, India rubber, aloes, sarsaparilla, and copal are produced in abundance. The minerals embrace iron, gold, silver, copper, lead, granite, and limestone. Interior trade is carried chiefly by wagons and pack mules and only 250 miles of railroads are in operation. Many of the natural resources are still undeveloped and the country affords vast opportunities for energy and capital, the varied climate and different localities offering favorable openings for both.

The government of Nicaragua is administered under a constitution proclaimed in 1894. It is modeled after the Constitution of the United

States. Both the president and vice president are elected for terms of four years by manhood suffrage. The legislative functions are vested in a congress of one department, which is constituted of forty representatives, who are elected for terms of two years by popular vote. A supreme court is the highest judicial tribunal, but each of the thirteen departments has courts of second instance and other minor courts. The country has a national militia of 5,000 men, with a reserve force of 10,000 men. Nicaragua took an active interest in advocating the organization of the Republic of Central America, a union of the Central American countries, although this wholesome scheme did not meet with a generally favorable reception. Schools are maintained under government grants and taxation, but the educational affairs are still in a very backward condition. About 1,500 elementary schools are maintained. A number of high schools flourish in some of the towns and cities, but much of the instruction is given in Catholic parochial schools. Several institutions of higher learning have been endowed by the government. Roman Catholic is the prevailing religion and the language is Spanish.

The region included in Nicaragua was occupied by the Aztecs at the time Columbus sailed along its coast in 1502. These natives were advanced materially in agriculture and other arts. In 1522 the country was conquered by Pedro Arias de Avila, the governor of Panama, and the city of Granada was founded by Spaniards in 1524. It belonged as a dependency to Guatemala from 1560 to 1821, securing its independence from Spain in the latter year. Since then it has had a number of revolutions. A dispute concerning the Mosquito Coast arose with Great Britain in 1841, but it was settled by a treaty in 1850, when the British ceded all rights of a protectorate to Nicaragua. Corinto is the principal seaport on the Pacific. Greytown, on the Caribbean Sea, has a large foreign trade. The foreign trade is chiefly with the United States, Germany, Great Britain, and France. Many of the coffee estates are under the ownership of German syndicates. Managua, on the southern shore of Lake Managua, is the capital. The principal cities include Leon, Granada, Managua, Masaya, Corinto, Chinandega, and Bluefields. Population, 1908, 492,650.

NICARAGUA, Lake of, a body of fresh water near the western coast of Nicaragua, Central America. It is from 28 to 45 miles wide, 108 miles long, and 108 feet above the Pacific, from which it is separated by a low range of hills, which is only eleven miles wide at its narrowest point. The San Juan forms its outlet into the Caribbean Sea. It is united with Lake Managua by the Tipitapa River. The lake contains a number of islands and is the seat of considerable steamboat commerce, being on the route of the principal traffic across the isthmus. A good highway extends from the western shore to the Pacific, passing through the town of Rivas. Lake Nicaragua is on the route proposed for the Nicaragua Canal.

NICARAGUA CANAL, a projected canal across Central America, which is designed to



ROUTE OF PROPOSED NICARAGUA CANAL.

begin at Greytown, thence run southwest to Ochoa, on the San Juan River, and thence pass up that river into Lake Nicaragua. A passage from the lake to the Pacific Ocean is to be effected by a canal running from La Virgen to Brito, thus providing a route with a total length of 170 miles from Greytown on the Caribbean Sea to Brito on the Pacific. This plan necessitates making excavations about 29 miles of the distance and utilizing for 121 miles the San Juan River and Lake Nicaragua, 65 miles in the former and 56 in the latter. Six locks are planned between the Caribbean Sea and Lake Nicaragua and two between the latter and the Pacific. In 1902 the United States purchased the French holdings in the Panama Canal, on which active work was commenced soon after, and it is not probable that the Nicaragua Canal will ever be built.

NICE (nēs), a city of France, in the department of Alpes-Maritimes, of which it is the capital. It has a good harbor and convenient railroad connections. The favorable climate makes it a popular winter resort for persons in search of health. Among the manufactures are

silk and cotton goods, machinery, oil, confectionery, flour, paper, chemicals, and utensils. The cathedral, known as the Church of Notre Dame, is one of its principal buildings. Other important buildings include the public library with 100,000 volumes, the Museum of Natural History, an astronomical observatory, the lyceum, and many schools and churches. It has a number of statues, including those of Garibaldi and President Carnot. The public utilities include waterworks, a system of sanitary sewerage, stone and macadam pavements, and electric street railways. It has a considerable export and import trade. Nice was founded at an early date by a colony from Massalia, and in the 2d century B. C. became a Roman possession. Subsequently it was conquered by the Visigoths. It passed to the dukes of Savoy in 1388 and remained a possession of their descendants until 1860, when it became French territory. Population, 1906, 134,232.

NICE, or **Nicaea**, **Councils of**, the name of two ecclesiastical councils held at Nicaea, in Asia Minor. The first was convened in 325 by Emperor Constantine, at which 318 bishops attended. It was called to settle the Aryan controversy, which had arisen in regard to the doctrines of the Trinity. This council condemned Arius, a parish priest of Alexandria, formulated the Nicene Creed, and determined when Easter should be observed. The second council convened in 786 and is counted the seventh ecumenical council. Empress Irene and her son Constantine called the council to determine the question of using pictures in worship. About 375 bishops attended, chiefly from Greece, Thrace, Sicily, and Italy, and after much discussion the council sanctioned such use of pictures in worship. See **Iconoclasts**.

NICENE CREED (nī'sēn), the formula of the Christian faith adopted at Nicaea, in Asia Minor, by the Council of Nice in 325. This confession of faith was reaffirmed at Constantinople in 381 and is the second of the ancient creeds, having been preceded by that of the Apostles. It is acknowledged at the present time by the Roman and Greek Catholic and most Protestant churches. This creed defines the doctrine of the Trinity and asserts that the Son is of the same essence or substance as the Father. The Eastern Church, in the article on the Holy Spirit, uses the form which reads "And I believe in the Holy Ghost, who proceedeth from the Father," while the Western Church says, "Who proceedeth from the Father and the Son."

NICKEL, a metallic element discovered in 1751 by Axel Frederick Cronstedt (1722-1765). It is usually found associated with cobalt.

Nickel is hard, ductile, malleable, and magnetic, and has a grayish-white color. It may be alloyed with tin, copper, arsenic, and gold. In 1879 Fleitmann, a German chemist, discovered that nickel may be easily drawn and rolled when mixed with a small per cent. of magnesium. Previous to that time it had been used almost exclusively in preparing German silver, which is still its most important alloy, but it is now employed in the arts as an ingredient of many alloys, including coins, and for coating the soft metals by electrolysis. Nickel was formerly produced most extensively in Germany, France, Norway, and Hungary, and is still secured there in considerable quantities, but within recent years the largest output has been in Canada, where the annual production has a value of \$1,850,000. The Canadian mines are situated mostly in Ontario, at Sudbury and Cobalt, and yield fully half of the world's supply. Productive deposits are worked in Missouri and elsewhere in the Ozark Mountains. The addition of about three per cent. of nickel to steel has been found to greatly strengthen it. Nickel steel is now used extensively in the manufacture of high grade bicycle tubing, crank shafts, engine forging, and for armor.

NICOBAR ISLANDS (nik-ō-bär'), a group of small islands in the Indian Ocean, located 125 miles northwest of the northern part of Sumatra. They extend from southeast toward the northwest and appear to be the summits of mountains that extend above the surface of the sea. The area is 635 square miles. Great Nicobar, the largest island, has a surface of 337 square miles. About twenty islands are included in the group, of which twelve are inhabited by people who are low in the state of civilization, consisting mostly of Malaysians. The products include sugar, rice, bamboo, oranges, coconuts, and copra. Denmark acquired these islands in 1756, but the colony was unsuccessful and was abandoned. Great Britain annexed the group in 1869. Population, 1906, 6,412.

NICOTINE (nik'ō-tin), a poisonous, colorless, oily liquid alkaloid obtained from the leaves of certain plants, especially tobacco. It forms acrid and pungent salts when combined with acids. The amount contained in tobacco varies from two to eight per cent.

NIELLO (nī-ēl'lō), a substance used to fill up lines and patterns in executing ornamental work. It has a black color, melts at a moderate heat, and may be ground into a fine powder. Niello has been used in doing ornamental work from an early date. The best products made with niellos are Byzantine. Later the art was introduced into Russia, where it is still prac-

ticed to a considerable extent. Although used in Europe and America, it is less popular than enamel. Niello work is executed by cutting a design in metal and filling with the colored composition. After the object has been decorated, it is cleaned and polished, so a black pattern is shown on the smooth metal surface.

NIEMEN (nē'men), or **Memel**, a river of Europe, having its source near the city of Minsk, Russia. After a course of 550 miles, it flows into the Baltic Sea, entering that body through Kurisches Haff. It divides near Tilsit and forms a large delta. The Niemen is navigable to Grodno, a distance of 400 miles from its mouth. It is connected with the Dnieper and Black Sea by the Oginski Canal. After entering Germany, it takes the name of Memel.

NIFLHEIM (nēfl'him), in northern mythology, the kingdom of cold and darkness, separated by a great chasm from Muspelheim, the kingdom of light and heat. It was one of the nine homes or abodes which the Scandinavians anciently thought were provided in the beginning of time. The region was ruled over by Hel. It was looked upon as the final abode of those who die of old age or in the state of wickedness.

NIGER (nī'jēr), or **Joliba**, a great river of Western Africa, having its source north of the Kong Mountains. After a general course to the northeast as far as Timbuktu, it makes a bold curve and assumes a tortuous course toward the southeast, flowing into the Gulf of Guinea by an extensive delta. The natives apply various names to it in different regions, such as Mayo, Joliba, and Quorra. Its exact extent is not known definitely, the most careful estimates placing its length at 2,800 miles and its basin at 800,000 square miles. The region where it rises is mountainous, its source being fully 3,000 feet above sea level. After flowing about 325 miles, it reaches a region of great fertility. In many places near Timbuktu several channels are formed that surround extensive islands, and in some places the river spreads over a large flat region. It has few tributaries of importance, except the Benue, which rises in the upper part of French Congo, flows toward the southwest, and joins the Niger at Lokodza.

The delta of the Niger begins about one hundred miles from the sea, at Abo, and consists of three principal mouths known as the Nun, Mari, and Bonny. It extends fully 150 miles along the coast and includes a vast region of mangrove forests. The existence of the Niger was known to Herodotus, who supposed it to be a tributary of the Nile, and Pliny also spoke of it in that connection. The first definite knowledge of the river was secured in 1796,

when Mungo Park explored its banks for a distance of 160 miles. A railroad line is projected from the head of navigation on the Senegal, at Kayes, to Timbuktu for the purpose of uniting the traffic of that river with the navigation of the Niger.

NIGERIA (nī-jě'rī-à), or **Niger Territories**; a vast region of West Africa, belonging to Great Britain. It is situated between the British Lagos and the German Cameroon, and stretches north from the Gulf of Guinea for about 1,000 miles. This region includes Southern Nigeria and the territory formerly occupied by the Royal Niger Company, known as Northern Nigeria. Southern Nigeria became a British protectorate in 1884, and the Niger Territories passed from the Royal Niger Company to the British in 1899. The entire region embraces about 450,000 square miles. It includes a number of large interior towns and trade centers, among them Wari, Bonny, Akassa, and Kano. The trade is carried on largely by navigation on the Niger River, on which steamers may penetrate into the heart of the continent. Among the products are India rubber, hides, ivory, gum, vegetable butter, live stock, coffee, cocoa, and fruits. The imports embrace cotton, silk, and woolen goods, beads, hardware, earthenware, salt, and utensils. The Fulahs are the dominant race, though there are many different classes governed under a number of chiefs and native kings. Old Calabar is the seat of government in Southern Nigeria and Zungru is the capital of Northern Nigeria. Christian missionary societies are operating among the natives. A number of government schools receive public support. The population is estimated at 25,000,000.

NIGHT HAWK, a bird found widely distributed in North America, belonging to the family of goatsuckers. It is of value for its destruction of large insects and beetles, upon which it feeds. The common night hawk is about nine inches long, measures 22 inches in expanse of wings, and has a slightly forked tail. The color is brown with small spots of white on the throat and sides. This bird pursues its prey in the air, principally near sunset. It often flies to a great height at twilight and suddenly rushes downward, when a sharp, rasping cry is heard. The *whip-poor-will* and *chuck-will's-widow* are species of the night hawk. These birds are migratory, leaving the northern zones in September and returning in May. In most species the flight is rapid.

NIGHT HERON, the name of a class of birds intermediate in form between the herons and the bitterns, but distinguished from both

by having a shorter and thicker bill. The legs are shorter than those of the herons. The *common night heron* of America ranges from the southern part of Canada to Mexico. It is timid, has a black bill and yellow feet, and builds a coarse nest in brush or on the limbs of trees. In some places it is called the *qua-bird* from the noise which it makes. It moves northward in the spring to nest in the woods near ponds and streams and returns southward in autumn. At night these birds are harassed by raccoons and other animals and by day they are pursued by crows, hawks, and vultures. Several species of the night heron are widely distributed in Africa, Asia, and Europe. The *yellow-crowned night heron* is native to South America.

NIGHTINGALE (nīt'in-gāl), a bird of song, belonging to the thrush family. The plumage of both sexes is alike, being reddish-brown above and grayish-white beneath. In most species the tail is rufous and the breast



NIGHTINGALE.

is dark hued. It is so named because it chants its beautiful song at night, but only the male is the singer, and its song ceases at the time the female has hatched its young. The nightingale is distributed extensively in Eurasia and Africa. It is particularly abundant in the western part of Europe and the countries bordering on the Mediterranean. Its nest is built on or near the ground and from four to six olive-colored eggs are laid. It gathers food by searching for caterpillars, worms, ants' eggs, insects, and beetles. Among the best known species are

the *true nightingale*, the *thrush nightingale*, and the *Indian nightingale*. The *redwing* is often mentioned as the Swedish nightingale and the *Virginia nightingale* is a species of grosbeak. In some countries the nightingales are prized as cage birds. They have entered extensively into the literature of many civilized nations. In captivity they are short lived.

NIGHTMARE, or **Incubus**, a state of oppression which is sometimes experienced during sleep, in which there is a sense of great pressure upon the breast accompanied by inability to move. It manifests itself in the form of uneasy or painful sensations, but they are insufficient to wake the patient, hence disagreeable or frightful dreams are apt to occur. Sometimes the persons afflicted suffer from illusions, appearing to be attacked by wild animals or armed men, or they seem to be falling down precipices. The more common form of nightmare usually takes place during the first sleep and is caused by a constrained position or by a distended stomach, which may act to somewhat impede respiration. The nightmare is caused by the feeling of oppression produced in this way and is dispelled at once when the patient awakes and draws a full breath. Those subject to a variety of chronic affections, such as dyspepsia or heart disease, are frequently affected by nightmare.

NIGHTSHADE (nīt'shād), a class of plants belonging to the natural order *Solanaceae*, commonly reputed poisonous and used extensively in medicines. They are weedlike plants with white flowers and black berries, and are widely distributed in all the continents and many islands. The common species include the *black nightshade*; the *deadly nightshade*, or *belladonna*; the *woody nightshade*, or *bittersweet*; and the *enchanter's nightshade*, or *circaea*. Several species of nightshade common to Europe are extremely poisonous, but those found in North America are not regarded as possessed of poisonous qualities, though the leaves and berries have properties that induce sleep. The *common nightshade* grows to a height of about two feet. It is much branched and has white flowers and ovate leaves.

NIHILIST (nī'hil-ist), a term applied to the advocates of *Nihilism* in Russia, which is a socialistic movement that began to form as early as 1860. It was first applied by Ivan Turgenieff (1818-1883) to the hero of his novel, "Fathers and Sons," who was made to personify a movement in Russia for the spread of greater religious and political independence. When a movement was inaugurated to free the serfs, in 1860, though this was prevented by serf owners in-

fluencing the Czar, the Nihilists began to conduct active educational movements. In harmony with the general plan, many young men and young women of the upper classes visited the fields and factories for the purpose of distributing socialistic literature and organizing societies. The object was to establish a party with vast influence in civic affairs through agitation. The rapidity with which the movement spread so alarmed the authorities that repressive measures were resorted to and several hundred of the advocates were tried and sentenced to exile in Siberia. By 1878 the movement began to grow with renewed strength as a direct resentment of the severity of punishment, and the acquisition of political freedom was declared the first necessity. Assassinations rapidly followed and incendiary movements became widespread.

In the month of June, 1879, 3,500 fires occurred in Saint Petersburg, most of them being attributed to Nihilists. The assassinations included those of Generals Drenteln and Mezentzoff, Commander Heyking, and Prince Krapotkin. In the meantime, on March 13, 1881, Alexander II. was assassinated near his palace by a bomb. When Alexander III. became Czar of Russia, it was hoped that great political rights would be extended to the people, including the formation of the legislative body, liberty to agitate reforms, and the adoption of a constitutional policy of government. Later the movement lost much of its vigor by the Czar encouraging industrial development, but recently Nihilism has again taken on new forms of life. Many Russians of wealth and high standing are favorable to the organization as a political party. Nihilism as now advocated favors greater political rights and agrarian socialism.

NIIGATA (nĕ-ĕ-gă'tà), a city of Japan, on the west coast of Hondo, at the mouth of the Shinano River. It has an open harbor and is connected with interior cities by railways. The site consists of a narrow strip of land between the river and the ocean, but it is well improved by paving and sewerage. Canals run through several parts of the city and the river is crossed by a number of bridges. Among the chief buildings are the post office, the central railway station, and many Buddhist temples. Muslin, clothing, and machinery are manufactured. The surrounding country produces coal, petroleum, tea, rice, and raw silk. In 1869 the port was opened to foreign trade, but the foreign commerce is not large. Population, 1907, 60,756.

NIJNI NOVGOROD (nij'nĕ-nôv'gô-rôt), or **Nizhni-Novgorod**, a city of east central Russia, capital of a government of the same name, on the Volga River, about 270 miles east of Mos-

cow. It is well fortified, having a Kremlin with substantial walls. A large part of the city extends along the Oka River, which enters the Volga at this place. The chief buildings include the arsenal, the governor's palace, the city hall, the public library, and two fine cathedrals. It is the center of a large trade in cereals and lumber. Among the manufactures are machinery, leather, boots and shoes, cotton and woolen goods, spirituous liquors, tobacco, candles, and earthenware. The railroad commerce is extensive. Steamboat lines connect it by the Volga with the Caspian Sea and by canal with the Baltic. It is the seat of annual fairs, when many thousands attend. Population, 1908, 92,035.

NIKKO, a noted center of religious worship in Japan, situated about ninety miles northwest of Tokio, where it has a fine site on the Nikko Zan, meaning mountains of the sun's brightness. A Buddhist temple was established there in 767 and subsequently many temples and other institutions were founded, though the place lost much of its splendor by a destructive fire in 1861. It is now celebrated more particularly because of the many splendid sepulchers in which lie the remains of noted personages, including several shoguns of Japan. Large caravans of pilgrims wend their way to Nikko annually to worship in the shrines of ancient splendor, or to look with feelings of satisfaction upon the statues of heroes whose achievements enter largely into the traditions and history of the Japanese.

NILE, the largest river of Africa, formed at Khartum by the junction of the Blue Nile and the White Nile. The latter, which is called the Bahr-el-Abiad by the natives, is regarded the main stream and has its source in Lake Victoria Nyanza. The length is 4,100 miles and the basin drained by it includes 1,425,000 square miles. It is the longest river, next to the combined Mississippi-Missouri, and its basin is one of the largest in the world. A considerable portion of the northern part of German East Africa is included in the basin, this region draining into Lake Victoria Nyanza. The White Nile issues from Lake Victoria Nyanza and forms the Ripon Falls, thence passes through Lake Ibrahim Pasha, and enters Lake Albert Nyanza. The Falls of Karuma and the Murchison Falls are situated in its course before reaching Lake Albert Nyanza, the latter being about 230 miles from Victoria Nyanza. From the latter lake it flows in a northerly direction to about 9° north latitude, where it receives the Bahr-el-Ghazel, and flows nearly east until it receives the Sobat River. There it again makes a bold curve and continues in a northerly course

until it reaches Khartum. After receiving the Blue Nile, a river flowing from the southeast and having a length of 950 miles, it has a northeasterly course to Ad Damer, where it receives the Atbara from the southeast, its last tributary, and thence has a northerly but tortuous course until it reaches the Mediterranean Sea.

Numerous cataracts and obstructions to navigation characterize various portions of the Nile and below Khartum are six great rapids. Several of the cataracts have been overcome for navigation purposes by the construction of canals and by several deepening of the channel. The delta of the Nile begins near Cairo, where two branches known as Rosetta and Damietta are formed, though there are a large number of smaller channels, the most easterly entering near the Suez Canal and the most westerly near the city of Alexandria. The Nile owes its vast water supply to the rains which fall in the tropical regions and form the extensive equatorial lakes. There is scarcely any rainfall in the greater part of the lower valley, and at certain seasons of the year evaporation reduces the water supply near its mouth to a smaller quantity than flows through its channel in the Nubian Desert. In June the water supply increases and its greatest volume is reached in September. The rise and subsidence are equally gradual, and during the height of the flood much of the valley of Lower Egypt and a great part of the delta are inundated, the rise at Cairo being about forty feet. These floods are of immeasurable value in stimulating plant growth in the Nile valley, since they bring great productiveness to the soil by watering and fertilizing it. Much of the valley would otherwise be barren.

Some writers divide the Nile into four sections, from the fact that it passes through regions having that number of distinctive aspects, the divisions being known as the Delta and the Lower, Middle, and Upper Nile. The Delta is a network of canals and streams. From the Delta to Assuan stretches the Lower Nile, which is navigable the entire distance by large vessels. The Middle Nile extends from Assuan to Khartum, a distance of 1,125 miles, and is characterized by the region of cataracts. At Assuan the First Cataract is 3 miles long with a drop of 16 feet. A distance of 214 miles up the river, near the town of Wadi-Halfa, is the Second Cataract, which is 124 miles long and falls 216 feet. The Third Cataract is 73 miles farther up the river, has a fall of 36 feet, and is 45 miles long. Between the Third and Fourth cataracts is the productive region of Dongola; the latter is 68 miles long and drops 160 feet.

Twenty-eight miles north of Berber is the Fifth Cataract, with a descent of 200 feet in 100 miles, and the Sixth Cataract is about 50 miles below Khartum and drops 20 feet in one mile.

Attention has been attracted to the Nile in recent years particularly on account of the great reservoir at Assuan, work on which was commenced in 1899 and the reservoir was formally opened Dec. 10, 1902. Its construction consists principally of a dam of masonry across the first rapids north of the island of Philae. The dam averages 60 feet in height, with a maximum height of 130 feet, is 23 feet wide at the top, and the difference of water level below and above is 67 feet. There are 180 openings for sluices, which serve to direct the flow of the water as it is needed for irrigation. It is estimated that about 800,000 acres can be irrigated in an average year, which area includes 52,000 acres in the Fayum, 70,000 acres in Upper Egypt, 106,000 acres in the province of Ghizeh, 120,000 acres of cotton land in Lower Egypt, and 456,000 acres in Middle Egypt between Cairo and Assiut. The enterprise of building the Assuan dam is the greatest achievement of the kind on record and the network of irrigating canals constitutes the largest system ever constructed for irrigating purposes.

The Nile has long been held sacred by the Egyptians, presumably because of its value in maintaining fertility, the god Nilus being one of their divinities. It was thought by many of the ancients that the Nile had its source in Morocco and passed underneath the ground as a subterranean stream until it reached a point in Nubia, but in the time of Nero explorations were made that indicated its source to be located far toward the south. The source of the Blue Nile was discovered in 1770 by Bruce, but much information gathered regarding the true Nile dates from 1858 and 1868, when Speke and Schweinfurth made their respective exploration tours. Livingstone operated from the south and in 1871 reached Lake Tanganyika, which was found to drain into the Zambezi. In 1875 Stanley published authentic information that the source of the Nile is in Victoria Nyanza, but that a considerable region south of that lake drains into it. The Nile abounds with fish, including the salmon, white trout, and several species of eels. Among the wild animals common to the region of the Upper Nile are the ibis, crocodile, and hippopotamus.

NILE, Battle of the, a celebrated engagement at the mouth of the Nile, in the Bay of Aboukir, about thirteen miles northeast of Alexandria, which was fought on Aug. 1, 1798. The English fleet was commanded by Nelson and the

French by Admiral De Brueys, and the result was a decided victory to the former. Napoleon landed at the bay on July 25, 1799, and defeated the Turks under Mustapha. Sir Ralph Abercrombie effected a landing there in 1801.

NILES, a city of Ohio, in Trumbull County, on the Mahoning River, 58 miles southeast of Cleveland. It is on the Erie, the Baltimore and Ohio, and the Pennsylvania railroads. The chief buildings include the high school, the public library, and several churches. The surrounding country is farming and dairying, producing large quantities of cereals, live stock, and dairy products. Among the industries are boiler shops, rolling mills, and machine shops. Waterworks, electric lights, and sanitary sewerage are among the utilities. Niles was incorporated in 1864. Population, 1900, 7,468; in 1910, 8,361.

NIMBUS (nīm'būs), in art, the name of the disk or halo used to designate the divine or sacred personages. It is used extensively in sacred art among the Christians, in which the nimbus surrounds the head of Christ, the Virgin Mary, and other persons to which important functions attach. Though the use of the nimbus originated among the Christians in the 5th century, it is employed to some extent in the classic art and among the Hindus. At first it was used only to designate Christ, especially when He was represented in a group of persons. Later the head of Christ was enriched by a circular nimbus, while the Father was designated by a triangular shape, and the Holy Ghost came to be represented by a dove with a circular nimbus. The Virgin Mary was in many cases crowned by a circlet of small stars and the angels and saints were designated by a circle of small rays. Many frescoes, illuminated manuscripts, and mosaic paintings show a wide use of the nimbus in sacred art.

NIMEGUEN (nīm'ē-gēn), a city of the Netherlands, in the province of Gelderland, four miles from the border of Germany. It is located on the Waal River, has a somewhat hilly and elevated site, and is surrounded by a fertile farming and fruit-growing country. The streets are steep and narrow, but many are paved with brick and stone. Steam and electric railways furnish communication with the leading cities of Western Europe. It has the church of Saint Stephen, a fine Gothic structure, and contains a museum, a townhall, and several parks. The manufactures include flour, leather, furniture, cigars, wine, perfumery, and Weissbier. It has a large trade in merchandise, cattle, and agricultural products. The Treaty of Nimeguen was concluded here in 1678, which terminated the war between France

and Holland. A second treaty was concluded in 1679, between France and the German Empire. Formerly it was one of the best garrisoned and fortified of Europe and it still has strong fortifications. Population, 1906, 52,147.

NÎMES (nēm), or **Nismes**, a city in the southern part of France, capital of the department of Gard. It is situated conveniently in a fertile region and on several railroads. The streets are largely tortuous in the older part, but the newer portion is finely improved and has many imposing buildings. Among the manufactures are cotton textiles, silk and woolen goods, carpets, upholstery, boots and shoes, leather, clothing, and machinery. Productive coal fields are worked in its vicinity. It is noted as a market for cocoons, silks, brandy, wine, and cereals. The city was founded by the Greeks, but later became a possession of the Romans, who built a number of great institutions that are still evidenced by many remains, among them baths, a mausoleum, and an amphitheater with a capacity for 20,000 persons. The Gauls expelled the Romans and made it one of their most important commercial centers. It belonged to various sovereigns until 1252, when it became a part of France. Nîmes was a stronghold of Calvinism in the 6th century, but after the revocation of the Edict of Nantes it began to decline rapidly. After the Revolution its industries were reestablished and it has since grown rapidly. Population, 1906, 80,184.

NIMROD, the founder of Babylonia. He is described in Gen. x., 8-12, as a son of Cush and the grandson of Ham, and as "a mighty hunter before the Lord." The name is not found in the cuneiform writings, but it is thought that he is identical with the hero described in the epic known as the "Izdubar."

NIMRUD, or **Nimroud**, the name applied to a mound on the east side of the Tigris, seven miles above the mouth of the Great Zab and twenty miles southeast of Mosul. It is on the site of the ancient city of Calah, built by Shalmaneser I. about 1320 B. C. This city was located about twenty miles south of Nineveh and was the third capital of Assyria, succeeding in this respect Asshur and Nineveh. The ruins are thought to be the remains of structures built by the kings, probably their palaces and several great temples.

NINEVEH (nīn'ē-ve), an ancient city of Asia, celebrated as the capital of the Assyrian Empire. It was situated on the east side of the Tigris River, opposite the present town of Mosul. Nimrod, a descendant of Ham, is mentioned in the Scriptures as the founder of Nineveh. On many of its monuments it is

called Nina, being so named from Ninus, a name sometimes applied to Nimrod. Most of our knowledge of this city comes from classical writers, some of whom have described it as occupying an extensive site along the river and as having a circumference of 60 miles. It was inclosed by walls 100 feet high. Among its structures were 1,500 towers 200 feet high. The wall surrounding it was finished in such a manner that three chariots abreast could be driven upon it with convenience. The Book of Jonah mentions it as an "exceeding great city of three days' journey." It remained the capital of Assyria until the fall of that empire, about 625 B. C., when it was destroyed by the allied armies of the Babylonians under Nabopolassar and the Medes under Cyaxares.

The Grecian historian, Herodotus, visited the vicinity of Nineveh about 430 B. C. He found the great Assyrian city desolate and in ruins, but from his writings we learn much of its extent, location, and former greatness. In 1841 explorations and excavations were begun by Bernhard Cotta (1808-1879), who brought to light a number of monuments and libraries, and in 1845 Sir Henry Layard made a careful investigation of its site and many of its ruins. About that time the palaces of Sennacherib, Esarhaddon, and Assurbanipal were uncovered, and its history was unfolded at least partly by the discovery of additional libraries and many cuneiform inscriptions. Vast explorations have since been carried on under the auspices of European and American archaeological societies, and many relics of great historical value are now deposited in the museums of New York, London, Berlin, Paris, and other cities. It is reasonably certain that Nineveh was not only the center of Assyrian art and culture, but that it was one of many great cities. Its monuments and remains still traceable give conclusive evidence that the city had not only strong military structures, but fine educational institutions, palaces, temples, and gardens. It appears to have been a center of manufacturing and an extensive trade.

NINGPO (nĭng-pō'), a city of eastern China, in the province of Che-Kiang, on the Ningpo River, about fifteen miles from the Eastern Sea. A wall 25 feet high and 15 feet wide surrounds the city, through which entrance is effected by six gates. It was thrown open to foreign commerce in 1842, since which time it has developed a large trade. The manufactures include furniture, cotton and silk goods, straw hats, white-wood carvings, carpets, and toys. It contains a number of substantial government buildings, has well-paved streets, and gives evidence of great wealth and luxury. Its temples are among

the most excellent in China and it contains the celebrated Ningpo Pagoda, a seven-storied hexagonal tower 160 feet high. Population, 1906, 257,500.

NIPIGON (nĭp'ĭ-gōn), or **Nepigon**, a lake of Canada, in Ontario, 28 miles north of Lake Superior, with which it is connected by the Nipigon River. The length is 62 miles and the breadth from 15 to 40 miles. It has a number of bays and islands. In several places are rocky headlands. The region has fine forests. Valuable fisheries are found in the lake.

NIPISSING (nĭp'is-sĭng), a lake of Canada, in the northern part of Ontario, so named from a tribe of Algonquin Indians. It is about 30 miles northeast of Georgian Bay, into which the overflow is drained by the French River. The lake is about 54 miles long and 25 miles wide, and with it are connected a chain of smaller lakes. Into it flows the Sturgeon River. A number of small islands are located in the lake, which is a popular resort for angling and shooting.

NIPPON (nĭp-pōn'), or **Nippon**. See **Japan**.

NIPPUR (nĭp-pōr'), a city of ancient Babylonia, located between the Tigris and the Euphrates, about fifty miles southeast of Babylon. It was famous as the seat of worship of the god Bel. Many ruins of antiquity have been found on its site. In 1888 the University of Pennsylvania began to make explorations at this place, by which means a large number of tablets were found. More recently a considerable portion of the site of several temples has been laid bare. It is thought that Calneh, mentioned in the Talmud, is identified with Nippur. Nuffar, a small village, occupies the site at present.

NIRVANA (nĕr-vā'nà). See **Buddhism**.

NISAN (nĭ'sān), the first month of the sacred year in the Jewish calendar, and the seventh month of the civil year. It corresponds nearly to the month of March in the Gregorian calendar. Originally it was called Abib, but after the Babylonian captivity the name was changed to Nisan.

NISH (nĕsh), or **Nissa**, a city of Servia, on the Nishava River, about thirty miles southeast of Belgrade. It is strongly fortified, has railway facilities, and is important as a strategic and commercial center. The streets are broad and improved with paving, and the city is divided into Turkish and European quarters. It has a gymnasium, waterworks, and several schools. Population, 1908, 23,600.

NITER. See **Saltpeter**.

NITRATE (nĭ'trāt), a salt formed by combining nitric acid with bases. Some of the ni-

trates are natural products, as the nitrates of lime, soda, potash, and magnesia, while others are formed artificially, as the nitrates of the oxides of metals. Small quantities of the natural products are widely distributed in nearly all the soils, but in some places are vast deposits, as the so-called Chile saltpeter beds of Chile and Peru. These deposits occur near the coast and are due to the remains of bird and marine animals. They are worked extensively to obtain fertilizer for the soil cultivated in farming and gardening, the value to the crops being due to the fact that plants require considerable nitrogen. A fertilizer serves its purpose best in a heavy soil, in which it is held until coming in contact with the roots, while rains incline to wash the fertilizer too deep into porous or sandy soils. Many of the nitrates are useful in medicine and the trades, such as those of lead and iron, used in medicine, and those of barium and strontium, useful in the manufacture of fireworks.

NITRIC ACID (nī'trik), a compound formed by oxygen with nitrogen, the most important of the five formed from these two elements. Nitric acid is a colorless liquid. It is partially decomposed by the prolonged action of light and is very volatile. The vapor of nitric acid condenses the moisture in the air, producing white fumes. It is very corrosive, staining the skin yellow, is disagreeable to the smell, and attacks many of the metals with great energy. It freezes at 40° below zero and boils at 184°, and while boiling is partially decomposed so that the boiling point rises about one-third higher. When the hydrogen of nitric acid is replaced by metal, nitrates are formed. The nitric acid and the nitrates of commerce are manufactured from nitrates which are found in some soils, particularly in Chile, Egypt, and India, the deposits of Chile embracing an abundance of sodium nitrate. Gun cotton is manufactured by adding nitric acid to cotton. It is used extensively as a powerful oxidizer of metals, such as silver, copper, tin, and many others, the oxidization taking place at the expense of the acid. It is employed in medicine in various forms as a tonic, for the removal of ulcers and warts, as a vapor to destroy contagion, and for affection of the liver. In the arts it is used for etching on copper or steel, in assaying and metallurgy, and in the preparation of dyes by forming a mordant of it and tin.

NITROBENZOL (nī-trō-běn'zōl), or **Nitrobenzene**, a heavy yellow liquid obtained by treating benzene with strong nitric acid. When the two liquids are mixed, they become warm and soon emit red fumes. At first the mixture assumes a brown color, but finally turns to an

orange yellow. The flavor resembles that of bitter almonds, hence it is employed to a considerable extent instead of almond oil in the manufacture of soap and confectionery. However, its chief importance in commerce is due to the fact that it is converted into aniline by reducing agents.

NITROGEN (nī'trō-jěn), a chemical element forming by volume 79 per cent. and by weight 77 per cent. of our atmosphere. It is a tasteless, odorless, and colorless elementary gas. Nitrogen is a common constituent of plant tissue and enters into the various tissues of the body of animals, although pure nitrogen is incapable of sustaining combustion or animal existence, but it possesses no positively poisonous properties. The characteristic properties are negative, serving mainly to dilute and moderate the activity of the oxygen, with which it is associated in atmospheric air. The existence of nitrogen in the atmosphere was discovered by Rutherford in 1772. It was long regarded permanent or incondensable, but Cailletet liquefied it in 1877 by reducing it to a very low temperature and applying a vast pressure. Nitrogen is considerably lighter than oxygen, hence a given bulk of nitrogen is lighter than an equal bulk of atmospheric air. However, air is not a compound, but a mixture, and hundreds of analyses have demonstrated that the proportions of the constituents are nearly constant, the proportion of nitrogen in one hundred volumes of unconfined air varying only from 79 to 79.14 per cent. While four-fifths of the volume of the atmosphere consists of nitrogen, niter contains only 13 per cent., nitric acid about 22 per cent. by weight, and water at ordinary temperature only 1½ per cent.

The exact economic value of nitrogen in the atmosphere is still largely unknown, since it is not susceptible of being taken up directly by plants and utilized in their synthesis of nitrogenous compounds, and it takes no active part in the processes of combustion and of animal respiration. It is thought that atmospheric nitrogen contributes indirectly to the formation of nitrogenous organic matter and that it promotes further utility by diluting the oxygen, it being impossible for animal life to subsist for any considerable length of time in pure oxygen, and no substitute for nitrogen to supply this necessary function is known. Animals secure the necessary supply of nitrogen by breathing atmospheric air. Plants are thought to obtain a portion of their supply from compounds existing in the soil and a part by aërial absorption through the leaves. The important compounds of nitrogen are five in number, including

ammonia, nitrates, cyanides, nitro-compounds, and organic nitrogen compounds.

NITROGLYCERIN (nī-trō-glīs'ēr-ĭn), a light yellow, oily liquid used as an explosive, formed by combining concentrated nitric acid and sulphuric acid with glycerin at a low temperature. It was discovered by A. Sobrero, an Italian chemist, in 1847, and was at first used by itself, but the danger of its explosion by percussion led to the introduction of that class of dynamite compounds in which nitroglycerin is combined with a dope or infusorial earth. If poured in the liquid form into water equaling about fifteen times its bulk, the heavy nitroglycerin sinks to the bottom. When struck violently, it explodes with great force. The energy of the explosion is due to the energy of motion of the atoms in a molecule of nitroglycerin, the explosion resulting directly from the nitroglycerin being resolved into carbon dioxide, water, and nitrogen. An explosion may be effected by heating the nitroglycerin to about 500° Fahr., when in a liquid state, but the most convenient way is to apply a red-hot iron or an electric spark.

The explosive force of nitroglycerin varies according to the degree of purity, but in a pure form it is about thirteen times more powerful than an equal volume of gunpowder, and the gases produced equal about 10,000 times the bulk of the nitroglycerin used. When mixed with dope, it is made into cartridges, which are exploded by a fuse and detonating cap. In the latter form it is known by various names, according to the constituency of the compound, the common forms being fulminating oil, nitroglycerol, glonoin, glyceryl nitrate, nitroleum, blasting compound, trinitrin, and trinitro-glycerin. Nitroglycerin is used in various compounds for medicine, particularly in treating diseases of the digestive organs and the heart.

NIX, or **Nixie**, in mythology, the common name for the water spirits, both male and female, among the German races. They are represented as capable of assuming the human form, although able to take any other shape at will. Like the Greek sirens and muses, they loved music and the dance and had the gift of playing on stringed instruments. Young people often consulted the nixies to determine their future, inducing them to be good to mortals by promising gifts of different kinds. Though mild in appearance, they were frequently cruel and dangerous.

NIZHNI-NOVGOROD. See **Nijni Novgorod**.

NOBILITY (nō-bīl'ī-tĭ), a class of persons elevated by hereditary rank in the state of so-

ciety above the mass of the citizens. This institution originated at an early period in history, but the origin differs somewhat among the nations. The earliest nobility seems to have been religious in character, such as the Brahmins of India and the priestly class in Rome. Among the ancient Germans, Normans, and Swedes the nobility consisted of members of the royal family, who were supposed to be descended from Odin and other deities. The present nobility of Germany and Scandinavia dates from the Middle Ages and was founded chiefly through military supremacy. This is true to a large extent of the nobility in all European countries, but the possession of property played a prominent part in establishing and maintaining titles. This is attested by the prefixes *de* and *von* in Germany and their equivalent in other countries. The nobles are still looked upon as the criterion of gentility or nobility, but many exceptions are found in England, where a number of aristocratic families rose to prominence from other consideration rather than from the possession of territory or wealth. The Spanish term *hidalgo*, meaning the son of somebody, implies nobility. This term entitles a gentleman to be called *don*, which is used with the Christian name like *sir* in addressing the British baronets and knights.

In Great Britain the nobility consists of the five ranks of duke, marquis, earl, viscount, and baron. Baronets, knights, and the younger sons of peers are classed among the gentry, but on the continent they are looked upon as nobles. In general all members of families in Europe entitled to bear coats of arms are classed with the nobility. The British nobility consists of the five ranks mentioned, but in a still more restricted sense it is confined to the members of the upper house of Parliament.

NODE, a term used in mathematics to designate a point where a curve cuts itself, through which more than one tangent to the curve can be drawn. The term is used in astronomy to indicate either of the two points at which the intersection of the planes of two orbits pierce the celestial sphere, especially those of a satellite and its primary. The node encountered by a heavenly body in its northward passage is called its *ascending node* and in its southward passage it is termed the *descending node*. A straight line joining the nodes is termed the *line of the nodes*. The sun is in its ascending node at the vernal equinox and in its descending node at the autumnal equinox. The points at which the orbit of the moon cuts the ecliptic are known as the *lunar nodes*.

NOME, a city of Alaska, on the shore of

Bering Sea, near Cape Nome. It is situated about 150 miles southeast of Cape Prince of Wales and eighty miles from Golofnin Bay. The shore is bordered by low tundra and marshland, and between it and the sea is a low sandy beach. In 1900 gold was discovered near the city of Nome, causing many gold seekers to locate there for the summer, and before the end of the year \$18,000,000 worth of gold was found. The region has since been productive of the precious metal, causing a rapid increase in the population of the northern district of Alaska. However, the climate is very severe and the ground is frozen nearly the entire year. Among the noteworthy buildings are the courthouse, the post office, the city hall, and several public schools. It has waterworks, sanitary sewerage, electric lighting, and a police department. Population, 1900, 12,486; in 1910, 2,600.

NONCONFORMISTS (nŏn-kŏn-fŏrm'ists), or **Dissenters**, the name applied to the British subjects who dissented from the Anglican Church. This class had its beginning at the time of the Restoration, when a large number of clergymen refused to assent to the Act of Uniformity, in consequence of which they were rejected from their livings. In 1689 the Toleration Act was passed to relax the penal statutes, after which the Nonconformists acquired protection of their funds and capital, but the policy of the government was not liberal toward them. The civil disabilities to which the Nonconformists were subject for more than two centuries were removed by repealing the Corporation and Test acts in 1828. In 1836 the Dissenters were permitted to be married by their own ministers and were granted other relief. Other disabilities were removed in 1871, when the great universities were opened to their young men, and in 1880 the passage of the Burials Act permitted their ministers access to churchyards for funerals. The Nonconformists constitute an aggressive class in public affairs and, when acting in harmony, may exercise a wide influence in government.

NONES, the ninth day before the ides in the Roman calendar, both the particular day and the ide being included. The ides occur on the fifth day of all the months, except March, May, July, and October, in which they occur on the seventh day.

NORFOLK (nŏr'fak), a city of Virginia, in Norfolk County, ninety miles southeast of Richmond, on the Elizabeth River, an inlet from Chesapeake Bay, opposite Portsmouth. It is the converging center of several railways, including the Norfolk and Western, the Southern, the Seaboard Air Line, the Atlantic Coast Line,

and the Norfolk and Southern. Inland water communication is provided by the Albemarle and Chesapeake and the Dismal Swamp canals. Transcontinental and coastwise steamboat lines visit it regularly. The harbor is safe and commodious, connecting with the James River and Hampton Roads. It is the principal port city of Virginia, the second largest city in the State, and is the leading peanut market of the world. The site is quite level, but sufficiently elevated to be healthful, and the area is four square miles. Many of the streets are paved with brick and stone and all are well drained and graded. An efficient system of street railways supplies communication with Portsmouth, Cape Henry, Virginia Beach, Ocean View, and other points of interest. The city has waterworks, gas and electric lighting, and extensive telephone facilities.

The principal buildings include the customhouse, the post office, and the city hall. Saint Paul's Church dates from 1737 and is one of the oldest buildings in the city. It is the seat of the Norfolk Academy and the Norfolk Mission College for colored students. The public schools are well systematized and attended. The Atlantic Hotel, the Citizens' Bank, the Monticello Hotel, and the Saint Vincent's Hospital are modern architectural structures. At Portsmouth, across the Elizabeth River, is the Norfolk Navy Yard. Across Hampton Roads, a short distance northwest, are Newport News and Fortress Monroe, with which it is connected by lines of ferries. The public library has about 15,500 volumes.

Norfolk has a large domestic and foreign trade in lumber, cotton, coal, peanuts, grain, oysters, and fruits. In its vicinity are many large gardens and dairy farms, the products of which are transported to the larger cities. It ranks as one of the principal coaling stations in the world. Among the manufactures are lumber, fertilizers, cotton and silk goods, machinery, tobacco and cigars, boots and shoes, and sailing vessels. The town of Norfolk was organized in 1682, was incorporated as a borough in 1736, and became a city in 1845. The British bombarded it in 1776, when most of the buildings were destroyed. It was the chief naval station of the Confederate States until 1862, when it was captured by the Federal forces. The battle between the *Monitor* and the *Virginia* was fought near the city. In 1907 it was the seat of the Jamestown Ter-Centennial Exposition. Population, 1910, 67,452.

NORFOLK ISLAND, an island in the South Pacific, about half way between New Caledonia and New Zealand and 1,200 miles northeast of

Sydney. It has an area of sixteen square miles. The coasts are steep and high, but the soil is fertile and the climate is healthful. Mount Pitt, the highest elevation, has a height of 1,040 feet above sea level. Wheat, maize, sweet potatoes, cabbage, and tropical fruits are the principal products. Formerly it yielded large quantities of pine, but the supply is almost exhausted. The government is administered by the state of New South Wales. Captain Cook discovered the island in 1774. It was used as a penal station until 1851. Population, 1906, 878.

NORFOLK ISLAND PINE, a tree of the pine family, native to Norfolk Island, where it was formerly the principal forest tree. It belongs to the genus *Araucaria*. The wood is white and tough and is valuable for furniture and construction purposes. The tree attains a height of about 200 feet. Many of the larger specimens have a diameter of ten or twelve feet.

NORMAL SCHOOL, an institution designed for training students to become teachers, in which the theory and practice of the teachers' profession is taught. The first normal schools were established in Germany, from which other European nations patterned, and institutions of this kind are now supported in every civilized country. The normal schools of the United States are modeled largely after those established in Massachusetts under the direction of Horace Mann. All the states now maintain one or more normal schools. In Canada and the United States, as a further means of instructing those who wish to teach, normal training has been provided in many of the high schools and in teachers' institutes (q. v.), though the latter are designed more particularly for inspirational purposes. The normal school system is so efficiently organized that teachers with normal training are given preference in many localities when positions are to be filled. The preparatory work is graded from the kindergarten branches to the courses of high schools and normal colleges. At present the attendance upon the normal schools of the United States is about 36,500, of which about one-fourth are male students. The age of those in attendance is generally between seventeen and twenty years. Besides public normal schools, there are a large number of private schools and academies in which normal training is given.

NORMANDY (nôr'man-dī), the name of a former province of France, bordering on the English Channel, comprising an area of 10,534 square miles. It is now divided into the five departments of Calvados, Eure, La Manche, Orne, and Seine-Inférieure. This territory

formed a part of the Roman Empire, but it was seized by the Franks and united to Neustria. In the time of Charles the Simple, in 911, it became known as Normandy. William II. conquered England in 1066, when the two countries became united, and they continued a formal union until 1204, when Philip Augustus took possession of the province and made it a part of France. The English came into possession of it a second time after the Battle of Agincourt, in 1415, but it was reunited with France by Charles VIII. in 1449. Formerly the Channel Islands were a part of Normandy, but they have remained an English possession.

NORMAN FRENCH, a dialect spoken by the people of Normandy, after that region was occupied by the Normans or Northmen. When the Normans conquered England, in 1066, this dialect was made the language of England, where it is known as the Old French. It was the official speech until the time of Edward III., when it was replaced by the English, but in several formal proceedings of state it is still used.

NORMANS, the name applied to the descendants of the Northmen. The Normans came from Scandinavia and founded colonies in Gaul at an early date in the history of Western Europe. They settled chiefly in northern France, where they gave name to the ancient province of Normandy, which is now formed into the departments of Calvados, Eure, La Manche, Orne, and Seine-Inférieure. This region passed from the Romans to the Franks. In the 10th century it was conquered by the Normans, and their chief, Rollo, assumed the title of Duke of Normandy. Later they conquered England, which they annexed to Normandy in 1066, and, after becoming separated, Normandy was conquered by the French in 1203. Other settlements made by the Normans were in Italy and Sicily, where Norman princes ruled in the 11th and 12th centuries.

NORRISTOWN (nôr'ris-toun), a city of Pennsylvania, county seat of Montgomery County, on the Schuylkill River, sixteen miles northwest of Philadelphia. It is on the Pennsylvania and the Philadelphia and Reading railroads. In its vicinity are productive iron mines and quarries of marble, sandstone, and limestone. Among the noteworthy buildings are the county courthouse, the Norristown Hospital, the high school, the McCann Library, the Masonic Temple, the city hall, and the Agnes Stinson Home for Old Ladies. Other features include the Montgomery Cemetery and the Schuylkill Bridge. It has manufactures of glass, cotton and woolen goods, ironware, oil, flour, hard-

ware, and machinery. Intercommunication is by a system of electric railways. The place was settled in 1688 and incorporated in 1812. Six miles northwest is Valley Forge. Population, 1900, 22,265; in 1910, 27,875.

NORTH ADAMS, a city of Massachusetts, in Berkshire County, on the Hoosac River, 21 miles north of Pittsfield. It is on the Boston and Maine and the Boston and Albany railroads. The site is in a beautiful locality of the Berkshire Hills, near Mount Greylock, the highest summit in the State. Among the chief buildings are the public library, the State normal school, the city hall, and the North Adams Hospital. Hudson Park, the natural bridge across Hudson Brook, and the Hoosac Tunnel are other features. The manufactures include boots and shoes, cotton and woolen goods, ironware, machinery, and earthenware. It has extensive street railways, waterworks, pavements, sewerage, and fine public schools. The place was settled in 1765 and incorporated in 1878. Population, 1905, 22,125; in 1910, 22,019.

NORTH AMERICA, one of the six grand divisions of the earth, the larger and more northerly continent of the Western Hemisphere. The northern boundary is formed partly by the Arctic Ocean and partly by vast sheets of ice, the land masses probably extending within a few hundred miles of the North Pole. It is bounded on the east by the Atlantic and on the south and west by the Pacific. The maximum breadth is about 3,300 miles and the length from north to south is 4,500 miles. Recent estimates place the area at 8,350,000 square miles.

DESCRIPTION. The coast line is extremely irregular, especially in the north, where many peninsulas and the Arctic Archipelago form a counterpart of the southeastern section of Asia. Point Barrow and the Melville Peninsula form the principal projections on the north; Labrador, on the northeast; Nova Scotia, Florida, and Yucatan, on the east; and Lower California and Alaska, on the west. The Isthmus of Panama joins the continent with South America. Among the principal coast indentations are Hudson Bay, on the north; the Gulf of Saint Lawrence, the Bay of Funda, Penobscot Bay, Chesapeake Bay, the Gulf of Mexico, and the Gulf of Honduras, on the east; and the Gulf of Tehautepec, the Gulf of California, the Strait of Juan de Fuca, and Bristol Bay, on the west. Many islands of considerable size are included with the continent, but they are situated chiefly off the northern and eastern coasts. They include Iceland, Greenland, Baffin Land, Victoria Land, Newfoundland, the Bahamas, Cuba, Hayti, Porto Rico, and Jamaica. Among the principal islands off the western

shore are Vancouver, the Queen Charlotte Islands, and the Aleutian Islands.

SURFACE. Two great mountain systems characterize the surface, the Appalachian Mountains in the eastern part, parallel to the Atlantic Coast, and the Cordilleras, parallel to the Pacific. Between the two sections of highlands is the Mississippi valley, which is separated from the central plain of Canada by a height of land, a low watershed stretching almost due west from Lake Superior to the Rocky Mountains. The Appalachian highlands stretch from the Gulf of Saint Lawrence almost to the Gulf of Mexico, forming a low plateau, which is known locally under different names, such as the Laurentian Hills, the White Mountains, the Catskills, the Allegheny Mountains, and the Blue Ridge Mountains. Mount Mitchell, near the southern extremity of these highlands, has an elevation of about 6,700 feet and is the culminating peak, but is closely approximated by Mount Washington, in the White Mountains. Between these highlands and the Atlantic are two distinct surfaces, the Atlantic coast plain, near the ocean, and the Piedmont plain, forming the country farther inland. Westward the Appalachians slope gradually inland and finally merge into a region of rolling prairies.

The Cordilleras are a continuation of the Andes of South America, trending almost without interruption from the Isthmus of Panama to Bering Strait. The eastern chain is known as the Rocky Mountains, which forms the predominating system of North America. It consists of a vast plateau with an altitude varying from 2,800 to 10,000 feet above the sea, but reaching its highest point in Alaska, where Mount McKinley attains a height of 20,464 feet. In the same vicinity are other lofty peaks, such as Mount Saint Elias, Mount Fairweather, Mount Logan, and a number of others, all exceeding an altitude of 18,000 feet. The system gradually widens in the southwestern part of Canada, but reaches its greatest width in the United States, and two distinct chains, the Cascade Range and the Sierra Nevada Mountains, trend along the coast. Here many of the peaks exceed a height of 14,000 feet, such as Mount Shasta, Mount Whitney, Long's Peak, and Pike's Peak. Greater heights than these are reached in Mexico, where Popocatepetl and Orizaba tower above the snow line, the former being 17,520 feet and the latter, 18,250 feet high. The Great Basin, an elevated and arid section in the west central part of the United States, has many salt lakes that find no outlet to the sea, such as Utah Lake and Great Salt Lake.

DRAINAGE. The greater part of North



MAP OF NORTH AMERICA.

1553

America is drained into the Atlantic, but large sections are tributary to the Pacific and the Arctic oceans. However, nearly all the great rivers belong to the central part of the continent. The McKenzie and its head streams, including the Peace and the Athabasca, carry the drainage from the north central part of Canada into the Arctic, while the northwestern portion is drained by the Yukon into the Pacific. Farther south are the head streams of the Nelson, including principally the Saskatchewan and the Assiniboine, which discharge into Hudson Bay. Still farther south, but somewhat east, is the basin of the Great Lakes and the Saint Lawrence, which is tributary to the Atlantic through the Gulf of Saint Lawrence. The central portion is drained almost entirely by the Mississippi system, which discharges into the Gulf of Mexico. The Fraser, Columbia, and Colorado discharge into the Pacific. Among the principal streams of the Atlantic coast are the Susquehanna, the Hudson, the Delaware, the Potomac, and the Savannah. Mexico has few large streams, aside from the Rio Grande, which separates that country from the United States. The continent has many lakes, but they are most numerous in the central and northern sections. Among the larger lakes may be named Ontario, Erie, Huron, Michigan, Superior, Great Salt Lake, Winnipeg, Winnipegosis, Athabasca, Great Slave, and Great Bear lakes.

FLORA AND FAUNA. The flora is varied greatly, ranging from the plants that thrive in the tropics to those peculiar in the Arctic regions. In Alaska and the northern part of Canada vegetation is very scant, since the ground is frozen the entire year. In this region only the surface thaws out in the summer, forming the tundra, where dwarf willows and reindeer moss constitute the prevailing plant life. Birch and Spruce forests are found as far north as the Arctic Circle, whence southward the size and variety of trees increase rapidly. Here are found fine forests of fir, pine, hemlock, and spruce. These woods merge into the great firs, pines, and redwoods found from British Columbia southward to California. Extensive forests prevail in Eastern Canada and the eastern and northern sections of the United States, but a large prairie region stretches through the greater portion of the central part of the continent, where the surface is well supplied with nutritious grasses. Although many of the streams are bordered by belts of deciduous timber, a large treeless section extends from Saskatchewan southward into Mexico, comprising the Great Plains, between the Rocky Mountains on the one hand and the Great Lakes and the Mis-

issippi on the other. An arid section characterizes the country on both sides of the Rocky Mountains, where cacti, yucca, sage brush, and thorny desert shrubs are numerous.

The animals of North America are very similar to those found in the northern zones of the Old World, but they differ materially from those common to South and even to Central America. Among the animals that are peculiar to the continent are the skunk, the puma, the musk ox, the pronghorn, and several species of pouched rats. No traces of camels, horses, swine, and rhinoceroses are found in the recent strata. The more important animals include the bison, bear, otter, deer, wolf, antelope, moose, reindeer, beaver, bighorn fox, raccoon, opossum, and many species of birds. Among the larger birds are the wild turkey, heron, crane, falcon, vulture, owl, flamingo, goose, duck, pelican, swan, crow, and turkey buzzard. The smaller birds are likewise numerous, such as the swallow, robin, parrot, oriole, lark, thrush, blackbird, snipe, and humming bird.

Two families of monkeys are found in the southern part, but they are peculiarly different from those of the Old World. The reptiles include the lizard, the rattlesnake, the adder, the alligator, and many species of turtles. Insect life is abundant in the central and southern parts, but diminishes or is entirely absent in the extreme north. They include butterflies, beetles, moths, flies, and bees. Fish are abundant in the Great Lakes and rivers, as well as in the coastal waters. Chesapeake Bay has the most valuable oyster fisheries, but oyster beds are found abundantly on both the Atlantic and the Pacific coasts. Salmon fisheries are especially productive near the mouths of the Columbia, the Fraser, and the Simpson rivers. Other fishes include the cod, pike, pickerel, halibut, sturgeon, and herring. The domestic animals correspond to those of Europe rather than those of Asia, but much has been done to improve the breeds by skillful propagation.

INHABITANTS. North America was inhabited by a race of copper-colored people at the time it was discovered by the Europeans. They were named *Indians* from the circumstance that it was presumed by some writers that the new continent comprised a part of India. At the time of discovery, in 1492, the natural aspect was wild and grand. The northern portion was occupied largely by the Eskimos and the southern section was inhabited by the Aztecs, while the central part comprised the hunting ground of the race generally known as Indians. These races have become nearly extinct, partly by a natural decline under the progress of civiliza-



NORTH AMERICA

Scale of Miles
0 200 400 600 800 1000

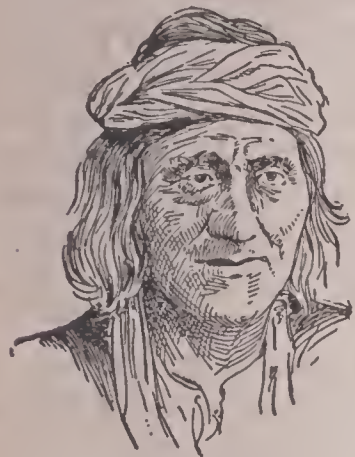
Important towns are shown
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EQUATOR

A 120° B 110 Longitude C West, 100° from D Greenwich 90° E 80° F



tion and partly because of intermarriages and a natural assimilation by the Europeans. At present the population consists principally of descendants from Europeans, but practically all nationalities are represented, although the Germans, Irish, English, Spaniards, Scotch, and French predominate, in the order named. In addition to the Europeans and their descendants



PUEBLO INDIAN.



SIOUX INDIAN.

must be reckoned a large element of African descent and a considerable number of Jews, Japanese, and Chinese. Canada is inhabited largely by people of English, French, and Irish descent. The larger number of Negroes are found in the United States, principally in the southern section. Mexico and Central America are inhabited principally by people of Spanish descent, but many creoles, Negroes, and Indians are in that portion of the continent. The total population, including the adjacent islands, in 1909, was estimated at 121,128,346.

POLITICAL DIVISIONS. The countries of North America are principally republics. The governments have been organized on territory which was formerly included within the sphere of influence of some European country, but in some instances the independent governments made claims to sections that were not so regarded, as in the case of the claim made upon Oregon by the United States. Great Britain has possession of the northern part of the continent, including Newfoundland and the Dominion of Canada, and also has Belize, or British Honduras, and a number of islands in the West Indies. Iceland and Greenland constitute Danish America. France has the islands of Miquelon and Saint Pierre. Several islands in the West Indies belong to Denmark. The independent governments include the United States, Mexico, Cuba, Honduras, Guatemala, Costa Rica, Nicaragua, San Salvador, Haiti, Panama, and San Domingo.

HISTORY. The Northmen settled in Greenland and Iceland at an early date and visited the northeastern part of the continent about 1001, when Lief Eric explored a part of the coast. However, permanent settlements were

not developed until more than a century after the discovery by Columbus, in 1492. John Cabot was the first European to set foot upon the continent, in 1497. It was named America from Amerigo Vespucci, a Florentine traveler, who wrote the first extensive description of the New World. Vasco da Gama made a tour in the 15th century and established the Portuguese claim to the West Indies and the northeastern coast of South America. Magellan and other Spaniards made claims for Spain in the early part of the 16th century. They were soon followed by Cortez, Pizarro, Ponce de Leon, and other Spaniards. Efforts were made by the French to establish settlements on the northeastern coast of North America, but the first permanent European settlement was made by the English, at Jamestown, Va., in 1607. The following year a permanent settlement was made by the French at Quebec, which developed slowly as a base of influence. The English made a second settlement at Plymouth, Mass., in 1620, when the Pilgrim Fathers landed with the *Mayflower*. In the meantime the Dutch established a foothold under Hudson in New York and the Swedes developed a settlement in Delaware, in 1638, but the latter was absorbed by the Dutch in 1655. Still later the Russians came across Bering Strait and made settlements in Alaska.

The early settlements by different nations of Europe soon caused conflicting claims to territory. These claims were the occasion of several wars, which eventually resulted in Great Britain coming into possession of the northern part of the continent, except Alaska, which remained in possession of Russia, while Spain occupied the southern part. In 1776 the thirteen British colonies located south of Canada declared their independence and established the republic of the United States. Ultimately that country acquired Florida and the Territory of Louisiana by purchase, annexed Texas, and acquired the southwestern part of its present possessions through a war with Mexico. Great Britain retained a permanent foothold in Newfoundland and Canada, but Spain lost all of Mexico and Central America by revolutions. The last vestige of Spanish rule disappeared in 1898, when Cuba and Porto Rico were severed from that country. History contains no other example of growth and development so wonderful as that witnessed in North America. The English settlement at Jamestown and the French settlement at Quebec may be said to comprise the two great events which laid a foundation for the development of a new civilization and a larger progress, which are vying with the historical systems of Europe in the upbuilding of institutions.

NORTHAMPTON (nôth-ămp'tün), a city in Massachusetts, county seat of Hampshire County, seventeen miles north of Springfield, on the Connecticut River. It is on the Boston and Maine and the New York, New Haven and Hartford railroads. The place is connected with Hadley by a bridge 1,230 feet long. Among the principal buildings are the county courthouse, the Academy of Music, the Burnham Classical School for Girls, the public high school, and several hospitals. It is the seat of Smith College, the State lunatic asylum, and the Clarke Institute for Deaf Mutes. Mount Tom and Mount Holyoke are near the city. It has manufactures of hair brushes, cotton textiles, silk and woolen goods, stoves, wire, paper, sewing machines, baskets, and machinery. It was settled in 1654 and soon after was named after Northampton, England. Jonathan Edwards resided here from 1727 until 1750. Population, 1905, 19,942; in 1910, 19,431.

NORTHAMPTON, a city of England, in Northamptonshire, sixty miles northwest of London. It is surrounded by a productive agricultural and stock-raising country. Among the noteworthy buildings are the townhall, the public library, the Church of Saint Peter, the Church of Saint Sepulchre, and the Commercial Exchange. The manufactures include boots and shoes, spirituous liquors, flour, paper, leather, metal goods, and machinery. It has systems of waterworks, sanitary sewerage, and electric street railways. The place was founded by the Saxons. Population, 1907, 95,070.

NORTH ATTLEBORO (ăt't'l-bür-ô), a town of Massachusetts, in Bristol County, thirty miles southwest of Boston. It is on the New York, New Haven and Hartford Railroad and has communication by several electric railways. The chief buildings include the public library, the townhall, and the high school. It has manufactures of jewelry, machinery, and utensils. The surrounding country is fertile. It was incorporated as a town in 1887. Population, 1910, 9,562.

NORTH BRADDOCK (brăd'dük), a borough of Pennsylvania, in Allegheny County, ten miles east from Pittsburg. It is on the Pennsylvania Railroad, and is a residential and manufacturing center. The principal products are steel rails, cigars, machinery, and clothing. It has waterworks and well-improved streets. It was incorporated in 1897. Population, 1910, 11,824.

NORTHBRIDGE, a town of Massachusetts, in Worcester County, at the confluence of the Blackstone and the Munford rivers. It is located twelve miles southeast of Worcester, with which it is connected by the New York, New Haven and Hartford Railway. The pub-

lic improvements include a library, waterworks, sanitary sewerage, and street paving. It is a manufacturing center of machinery, cigars, furniture, and cotton and woolen goods. The first settlement on its site was made in 1662, but it remained a part of Mendon until 1772, when it was incorporated as a separate town. Population, 1905, 7,400; in 1910, 8,807.

NORTH CAPE, the most northern point of Europe, forming a rocky promontory on the island of Magero, which is separated from Norway by a narrow channel. The point forming the extreme northern projection of the continent of Europe is a few miles south and .45 miles east of North Cape, and is called Cape Nordkyn.

NORTH CAROLINA (kăr-ô-lí'nà), one of the original thirteen states of the United States, popularly called the *Old North State*. It is bounded on the north by Virginia, east by the Atlantic Ocean, south by Georgia and South Carolina, and west by Tennessee. The length from east to west is 502 miles, the width is from 20 to 188 miles, and the average breadth is about 100 miles. The area is 52,250 square miles, being exactly the same as the area of Alabama. It includes a number of coast lagoons, hence the land surface covers only 48,580 square miles.

DESCRIPTION. The western part of the State is crossed by the Appalachian Mountains, which form the natural boundary between it and Tennessee. These highlands are elevated from 2,000 to 5,000 feet above sea level and include the Great Smoky and Blue Ridge mountains. The former trend along the border of Tennessee, while the latter are located a short distance toward the east. Mount Mitchell, one of the peaks of the Black Mountains, has an elevation of 6,711 feet and is the highest summit in the State. East of the Blue Ridge is the Piedmont plain, which has a general elevation of 200 to 1,200 feet, and its surface is quite rugged and hilly in the western and generally level in the eastern parts. Between the Piedmont plain and the Atlantic is the coastal plain, which is a level and sandy region about 140 miles wide. It is characterized by swamps and shallow coast lagoons, of which Pamlico and Albemarle sounds are the largest. Forests of pine and cedar abound in the coastal plain. Farther inland are stretches of timber made up largely of walnut, magnolia, birch, sycamore, cherry, ash, oak, maple, holly, and hickory.

The drainage is chiefly to the southeast, the general surface sloping in that direction, but the region east of the Blue Ridge belongs to the Mississippi basin. Here the drainage is by the

headstreams of the Tennessee River, which include the French Broad and Little Tennessee. Albemarle and Pamlico sounds receive the inflow from the Tar, Roanoke, and Neuse rivers, all of which belong to the northern half of the State. The Cape Fear River drains the southeastern part. It receives the South River and several other streams and flows into the Atlantic near Cape Fear. The Yadkin, or Great Pedee, and the Catawba drain the southern part and cross the border into South Carolina. Many of the rivers have extensive estuaries and furnish facilities for communication, and the streams flowing through the Piedmont plain are a source of great water power. The lakes are shallow and confined chiefly to the coastal plain.

The State has a variety of climates, owing to differences in altitude, being subtropical along the coast and temperate in the western part. Near the coast the mean temperature is 60° and in the mountains it is 56° , while the extremes range from 10° to 100° . In the coast region the annual rainfall is 60 inches and in the interior about 45 inches, while the average for the State is 53 inches. Considerable snow falls in the mountains, where the winters are quite cold and severe. Navigation is sometimes endangered along the coast by the subtropical storms. As a whole the climate is healthful and agreeable.

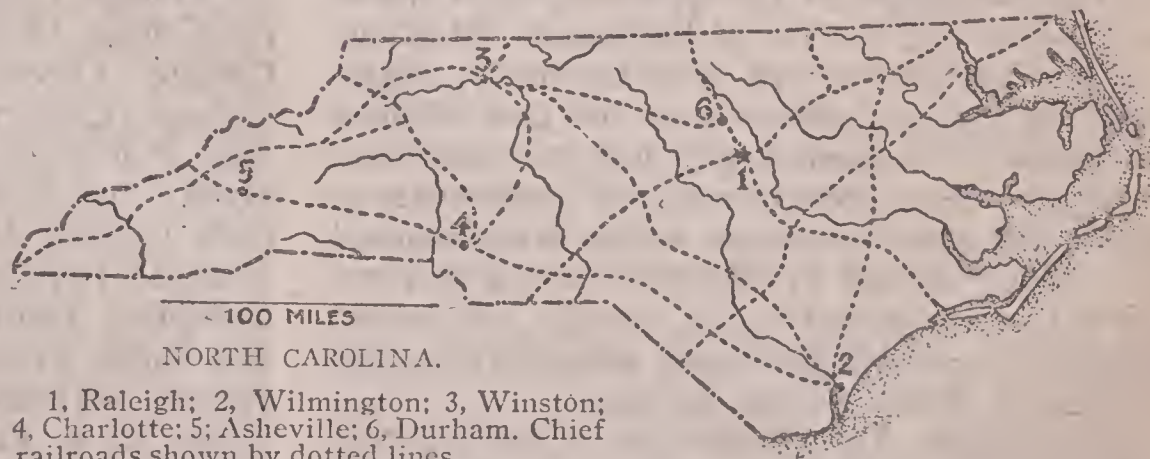
MINING. The State has a large variety of minerals, but the annual output is not large compared to the resources. Mica and corundum are obtained in the region west of the Blue Ridge, where the deposits are extensive and valuable. Iron ore is an important product, but the output is much smaller than that obtained in the vicinity of the Great Lakes. The central part of the State has extensive coal fields, and these are worked in Chatham and in several other counties. Clays suitable for pottery and brick are abundant and the output takes rank among the leading mineral products. Granite and limestone are quarried for monuments and building purposes. Other minerals include talc and soapstone, gold, silver, copper, mineral waters, and phosphate rock.

AGRICULTURE. Agriculture continues to be the leading industry. In the western section the land is broken and mountainous and the coast region is swampy, hence only 74 per cent. of the land is included in farms, which average 101 acres. The area farmed is greater at present than in any period of its history, which is

accounted for by the fact that about one-fourth of the farms are operated or owned by colored farmers, many of whom formerly were slaves, and the size of these farms is less than one-half that of farms operated by white men. Corn is grown on a larger area than any other crop and it is followed in area by cotton. Wheat of a fine quality is grown on a large acreage. Other crops include oats, hay, tobacco, peanuts, sweet potatoes, and rye. A large area along the tide-water rivers is utilized in cultivating rice, dykes being maintained for flooding and draining the surface. In Hyde and several other counties rice is cultivated on lands flooded by pumping. Sugar cane, peas, grapes, and other fruits are grown profitably.

Stock raising is a growing industry, both in the number of head of animals and in improving the grades. Swine are raised very extensively and large quantities are shipped to points outside the State. Dairying was long neglected, but has more recently grown into an important industry. Large interests are vested in growing cattle both for meat and dairy products. Other live stock includes horses, mules, and poultry.

MANUFACTURES. A large increase is shown in the value of manufactures within the last decade. Cotton goods stand at the head of the list and greatly exceed in value the output of any other product. Cigars and tobacco products hold second place in the list, and these are followed closely by the output of lumber and timber products. Large interests are vested in the manufacture of flour, furniture, cotton-seed oil and cake, fertilizers, and tanned and finished



leather. In the output of chewing and smoking tobacco the State is exceeded only by Missouri, and in the manufacture of cotton goods it is surpassed only by Massachusetts and South Carolina. The consumption of cotton in the mills exceeds the production, hence considerable quantities are imported. Winston, Charlotte, and Wilmington are the leading manufacturing centers.

Considerable material for manufacturing is furnished by the fisheries off the coast and the estuaries of several streams. Extensive beds of

oysters abound along the coast and herring, shad, and turtles are taken in large numbers. Although considerable of the output is shipped in a fresh state, the canning of fish and oysters as well as fruits is showing constant development. Dare and Carteret counties are the leading centers of the fish canning industry.

COMMERCE AND TRANSPORTATION. Wilmington and Pamlico are customs districts and through these pass the foreign exports. Cotton goods, lumber, tar, turpentine, fish, flour, and live stock are the principal exports, while the imports include raw cotton, coffee and tea, and machinery. Transportation is favored by an extensive seaboard on the Atlantic and a number of navigable streams. The railway lines in operation include a total of 3,850 miles, and considerable communication facilities are provided by electric railways in different parts of the State. Among the trunk lines passing through the State are the Southern, the Seaboard Air Line, and the Atlantic Coast Line, all of which have numerous branches.

GOVERNMENT. The constitution now in force was adopted in 1868. It vests the executive authority in the governor, lieutenant governor, secretary of State, auditor, treasurer, attorney general, and superintendent of public instruction, each elected for four years by manhood suffrage. The governor, auditor, treasurer, secretary of State, and superintendent of public instruction constitute the council of State. Legislative authority is vested in the Legislature, which consists of a senate of 50 and a house of representatives of 120 members, all of whom are elected for a term of two years. Meetings of the Legislature are held biennially, beginning on the Wednesday after the first Monday in January. A chief justice and four associates constitute the supreme court, and subordinate to it are the superior courts, which are composed of judges elected in districts. Local government is administered by the counties and municipalities, in which the usual administrative officers are elected by the people.

EDUCATION. The organization of the State department of education consists of the State board of education, the State superintendent of public instruction, the State board of examiners, the superintendent of the colored normal schools, and the public high school inspector. Supervision by the State department is effected principally through the superintendents of the several counties, who are the administrative officers of the county boards of education. The county superintendents have personal charge of the examination of teachers, visit the schools when in session, and have general su-

pervision of the public educational work of their counties. To these superintendents the State department of education, through its superintendent, furnishes the necessary office blanks, including plans and specifications for school-houses, which are required to be followed in the construction of school architecture. Bulletins, reports and addresses, and teachers' manuals are published by the State department to further and systematize public instruction. Recent years show a remarkable uplift in the extension of educational work, the founding of libraries, and the improvement of school architecture. About 160 public high schools are maintained, and these are under the general direction of the high school inspector.

The University of North Carolina, at Chapel Hill, is the head of the public school system. Other State institutions include the Agricultural and Mechanical College, Raleigh; the Normal and Industrial College, for girls, Greensboro; the East Carolina Teachers' Training School, Greenville; the Appalachian Training School, Boone; the Cullowhee Normal School, Cullowhee; the School for the Blind, Raleigh; and the School for the Deaf and Dumb, Morgantown. The institutions maintained for Negroes include the Agricultural and Mechanical College, Greensboro; the Slater State Normal School, Winston; the State Normal School, Fayetteville; the State Normal School, Elizabeth City; and the School for the Deaf, Dumb and Blind, Raleigh. Many private and denominational colleges are maintained, including Trinity College (Methodist), Durham; Wake Forest College (Baptist), Wake Forest; Davidson College (Presbyterian), Davidson; Guilford College (Quaker), Guilford College; Elon College (Christian), Elon College; Baptist University for Women, Raleigh; Greensboro Female College (Methodist), Greensboro; Peace Institute (Presbyterian), Raleigh; Normal and Collegiate Institute (Presbyterian), Asheville; and Salem Female Academy and College (Moravian), Winston-Salem. Hospitals for white insane are at Raleigh and Morgantown and one for colored patients is at Goldsboro. Raleigh is the seat of the State penitentiary and of the Confederate soldiers' home.

INHABITANTS. North Carolina has the smallest foreign-born population of any State in the Union, only 4,492. Nearly one-half of the people are Baptists. Other denominations represented largely include the Methodists, Presbyterians, Lutherans, Disciples of Christ, and Episcopalians. Raleigh, in the central part of the State, is the capital. Other cities include Wilmington, Charlotte, Asheville, Winston,

Newbern, Durham, and Concord. In 1900 the State had a population of 1,893,810. This included a total colored population of 630,207, of which 5,748 were Indians and 624,469 Negroes. Population, 1910, 2,206,287.

HISTORY. North Carolina was first settled in 1584, when Walter Raleigh landed an expedition on Roanoke Island, but this colony did not prove successful. In 1653 the first permanent settlement was founded at Albemarle by Roger Greene, who came there with a colony of Virginian dissenters. Another settlement was made on the Cape Fear River by New Englanders in 1660, but these left soon after. Other settlements rapidly followed and proved more successful. The Tuscarora Indians opened a war upon the whites in 1711, when several hundred settlers were massacred, but troops from Virginia and South Carolina broke the power of the natives. In 1729 North Carolina became a royal province. The settlers were among the first to protest against arbitrary legislation on the part of England and on May 20, 1775, the inhabitants of Mecklenburg County met at Charlotte and there adopted the Mecklenburg Declaration of Independence. It was likewise foremost in supporting independence, being the first to instruct its delegates in Congress to support that measure, which it did on April 12, 1776. This date is commemorated in the State as a public holiday.

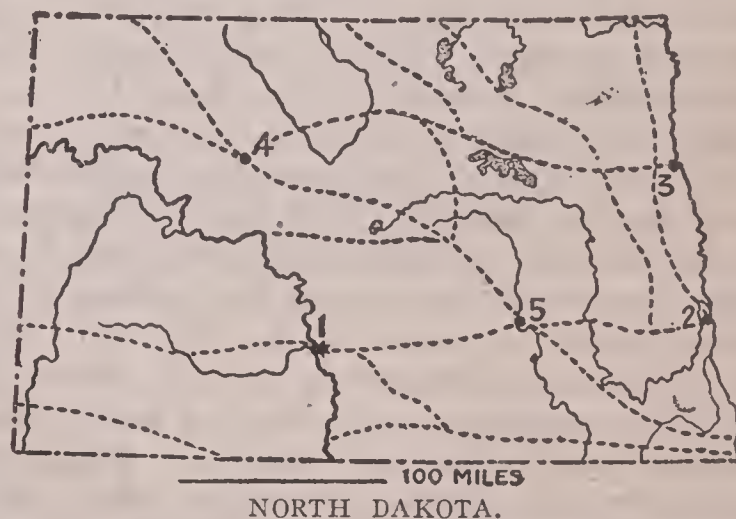
The first State constitution was made in 1776 and the Federal Constitution was ratified on Nov. 21, 1789, being the last State to ratify that document. During the Revolution North Carolina furnished troops for many of the important battles and was invaded by the British in 1780. It did not take part in the first presidential election, not having ratified the Federal Constitution at the time. Raleigh was made the capital in 1791 and the State University was opened for students in 1795. The State passed articles of secession in 1861 and at various times in the Civil War was the seat of engagements, the principal one being the Battle of Fort Fisher in 1865. It furnished 120,000 soldiers to support the Confederacy and took an important part in the contest. Since the Civil War it has developed rapidly. In 1900 it adopted the policy of requiring a property and an educational test for voting. The State has made material progress the last two decades, but the natural resources are open to a still further enhancement of value.

NORTH CAROLINA, University of, a co-educational State institution at Chapel Hill, N. C., established in 1789 and opened in 1795. It comprises a collegiate department, schools of

medicine, law, pharmacy, and mining, and a summer school for teachers. The library has 48,500 volumes, the campus covers 48 acres, and the property has a value of \$750,000. It has a faculty of 70 professors and instructors and is attended by about 750 students.

NORTH DAKOTA (dā-kō'tā), a north central state of the United States, popularly called the *Flickertail State*. It is bounded on the north by Saskatchewan and Manitoba, east by Minnesota, south by South Dakota, and west by Montana. The length from east to west is 360 miles; breadth, 212 miles; and area, 70,795 square miles. In shape it is a rectangle with straight boundary lines, except on the east, where the Red River of the North separates it from Minnesota.

The surface consists almost entirely of an undulating prairie. In the eastern part is the level bed of the ancient Lake Agassiz, which has an elevation of 800 to 1,000 feet above sea level. The Turtle Mountains, which extend into the State from Manitoba and whose summits are about 2,300 feet above sea level, are situated in the north central part. Through the southwestern part flows the Missouri River, parallel to



1, Bismarck; 2, Fargo; 3, Grand Forks; 4, Minot; 5, Jamestown. Chief railroads indicated by dotted lines.

which extends the grassy Plateau du Coteau du Missouri, which ranges from 2,000 to 3,000 feet above the sea, being highest in the southwestern corner of the State. In the west central part, especially along the Little Missouri, the surface is very broken and hilly. This region is characterized by isolated conical buttes, and a portion of it belongs to the Bad Lands that extend across the border into South Dakota.

The drainage belongs principally to the Missouri River, which enters the State from Montana, flows toward the east and south, and passes at the middle point of the south boundary into South Dakota. It receives the Cannon Ball, Heart, Knife, and Little Missouri from the southwest and the Livingston from the north-

west. The James or Dakota River drains much of the central part, crossing the border into South Dakota, where it joins the Missouri. A large part of the north central region is drained by the Souris or Mouse River, which flows into the State from Canada, but reënters that country after forming a long and narrow loop. All of the drainage in the eastern portion is by the Red River of the North, which receives the inflow from the Sheyenne and the Pembina. The only body of water of large extent is Devils Lake, situated in the northeastern part of the State, which has no outlet to the sea. Small lakes and lagoons are distributed in many parts of the Plateau du Coteau du Missouri.

The winters are cold, but, owing to the dry atmosphere, they are sunny and pleasant, while the summers are warm. All seasons of the year are remarkably healthful. In January the mean temperature is 3° and in July it is 70°, and the extremes range from 40° below zero to 98° and even 108° above. Rainfall is scant in the western part of the State, where it ranges from twelve to twenty inches, but in the eastern part it reaches 28 inches. The precipitation is largely in the growing season from April to July, and the soil is peculiarly fitted to withstand considerable drought. Storms and blizzards occur in winter, but the fall of snow is light.

MINING. Though mining has not been developed to the extent of its possibility, considerable quantities of mineral products are obtained. Extensive fields of lignite coal are found in the central and western sections, and mining is developed most extensively in the vicinity of Wilton and Minot. The output is used chiefly for domestic purposes and local manufactures. Building stone of a fine quality is distributed throughout the Turtle Mountains and along many of the streams. Fire and brick clays are abundant and natural cement is found in many places. Mineral waters, salt, iron ore, and sand suitable for making glass are available. In 1908 the mineral products had a value of \$1,125,000, of which lignite coal constituted the largest share.

MANUFACTURES. The State has developed extensive manufacturing enterprises within the last decade, though the products are limited quite largely to the resources obtained from the farms. Flour and grist make up fully half the output. Milling is not confined to a few large establishments, but is distributed in small enterprises throughout the agricultural region. Printing and publishing hold second rank as manufacturing enterprises, but they are followed closely by the dairy products, including both canned milk and cheese. Many repair and machine shops

are maintained. Other manufactures include earthenware, brick and tile, clothing, cigars, machinery, and packed meats.

AGRICULTURE. The land in most sections of the State is easily tilled and much of it is unusually fertile. This is true particularly of the valley of the Red River and nearly all of the level surface. Large tracts in the central part were originally covered with glacial boulders, but the land in this region is a fertile black or brown loam, and much of it has been cleared of stones for cultivation. About 65 per cent. of the farm area is improved. Some of the farms are large, but the average size is 342 acres. Wheat is the leading crop and is grown on about half of the cultivated acreage. Oats and flax rank next to wheat. Other crops include barley, rye, hay, potatoes, and small fruits. North Dakota has usually taken first rank in the production of flaxseed, third in spring wheat, and fourth in barley. Wheat grown in North Dakota is celebrated for its fine flour-making quality.

The live-stock industry was formerly confined largely to extensive ranches, but these have been reduced in size and increased in number. Cattle are grown both for meat and dairy purposes. A fine grade and a large number of horses are raised. Sheep rearing is an extensive enterprise in the grazing regions of the central and western parts. Other live stock includes swine, mules, and poultry.

TRANSPORTATION AND COMMERCE. The Great Northern and the Northern Pacific trunk lines cross the State from east to west, while the Saint Paul, Minneapolis and Sault Ste. Marie crosses from the southeastern to the northwestern part, and the transcontinental line of the Chicago, Milwaukee and Saint Paul passes through the southwestern part. All these great railways as well as the Chicago and Northwestern Railroad have branches in many parts of the State. The railways have a total of 3,800 miles. Both the Missouri and the Red River are navigable part of the year, but they are not used extensively. The commercial interests are extensive. Large quantities of wheat, flaxseed, oats, flour, and live stock are exported. The imports consist mainly of clothing, merchandise, chemicals, and machinery.

GOVERNMENT. The constitution was adopted in 1889, when the State was admitted. It vests the executive authority in the governor, lieutenant governor, secretary of State, auditor, treasurer, attorney-general, superintendent of public instruction, commissioner of agriculture, commissioner of insurance, and three railroad commissioners. Each of these officers is elected for two years. The Legislature is constituted of

two branches, a senate of not less than 30 and not more than 50 members and a house of representatives of not less than 60 nor more than 140 members. The senators are elected for four and the representatives for two years. Biennial sessions of the Legislature are held, beginning on the Tuesday after the first Monday in January. Three judges elected for six years constitute the supreme court, which is the highest judicial authority. Subordinate to it are the district courts, the judges of which are elected for four years. Local government is administered by the townships, municipalities, and counties.

EDUCATION. Liberal support is given by the people to further public education. The Federal government donated about 3,000,000 acres of land to the State, the proceeds of the sale of which constitute a permanent fund which can never be diminished. This fund amounts to about \$14,000,000, practically all of which is invested in bonds of the State, county, school district, township, and city and in first mortgages on farm real estate. Fully 2,000,000 acres of State school lands remain unsold, but the annual income from the permanent funds already amounts to over \$500,000. A two-mill tax is levied for school purposes upon all taxable property within the State and is apportioned in the counties where collected, this tax yielding each year over \$400,000. Additional support of the schools is derived from local taxation. The length of the school term is 156 days. At present the rate of illiteracy among native whites is only .9 per cent.

The State University, located at Grand Forks, is at the head of the public school system. Fargo is the seat of the State agricultural college, which is rapidly becoming one of the strongest institutions of the kind in the United States. Two normal schools for the training of teachers are maintained, located at Mayville and Valley City. Ellendale is the seat of the State normal and industrial school; Wahpeton, of the school of science; Devils Lake, of the school for the deaf; and Bathgate, of the school for the blind. The reform school is at Mandan; the school of forestry, at Bottineau; and the school for the feeble-minded, at Grafton. The State penitentiary is at Bismarck; the asylum for the insane, at Jamestown; and a soldiers' home, at Lisbon. A number of private and denominational schools and educational institutions are well patronized.

INHABITANTS. The State has a larger per cent. of foreign-born inhabitants than any other State in the Union and many native whites are of foreign parentage. The foreign nationalities represented chiefly include Canadians, Swedes,

Germans, and Irish in the order mentioned. Lutheran is the principal Protestant denomination, including about one-third of all the church members. Other denominations well represented are the Methodists, Roman Catholics, Presbyterians, and Baptists. Bismarck, located in the central part of the State, is the capital. Other cities include Fargo, Grand Forks, Jamestown, Minot, Valley City, Dickinson, and Wahpeton. In 1900 the State had a population of 319,146. This included 7,434 colored inhabitants, of whom 148 were Japanese, 286 Negroes, and 6,968 Indians. In 1910 the population was 577,056.

HISTORY. The region included in North Dakota was acquired by the United States in 1803 by the Louisiana Purchase. The first permanent settlement was made by French-Canadians near Pembina in 1807. Lord Selkirk built a fort at that place in 1812, supposing, however, that the region belonged to the English. It was at different times a part of the territories of Missouri, Michigan, Wisconsin, Iowa, and Minnesota, and in 1861 it was organized with South Dakota as the Territory of Dakota, the name being derived from a tribe of Indians. It was admitted as a State on Nov. 2, 1889, after being separated from the region organized as South Dakota. The capital was at Yankton until 1883, when it was removed to Bismarck. It has been highly prosperous since the construction of railroads began, developing with remarkable rapidity in wealth and educational affairs.

NORTH DAKOTA, University of, a co-educational State institution at Grand Forks, N. D., established in 1883. Later the government granted 86,080 acres of land to this institution and 40,000 acres to the school of mines. It offers courses in arts, sciences, mining, literature, philosophy, didactics, law, medicine, civil and mechanical engineering, commercial branches, domestic science, and the different trades. The library contains 15,000 volumes and the university property is valued at \$2,750,000. It has a faculty of 80 professors and instructors, an income of \$95,500, and about 950 students.

NORTHER (nôth'êr), or **Cold Wave**, the name applied to a cold wind from the north, blowing from Canada southward over the United States. The winds of this class are most common in the great plains of North America. They appear to originate in the northwestern part of Canada, whence they move southward across the western part of the Mississippi valley, extending across the Gulf of Mexico and Yucatan. It is possible to predict them in advance from 24 to 36 hours, and in the United States they are forecast by hoisting the cold-wave flag. They move near the surface, rarely rising more than 5,000 feet

above the level. In winter they frequently cause the thermometer to fall below the freezing point, but during the warmer season and in the southern sections they appear merely as cool waves.

NORTHMEN, or **Norsemen**, a name applied to the inhabitants of the coast regions of Scandinavia and north Germany, who were noted in the Middle Ages for their skill in navigating the sea. Their object in sailing was principally to secure profit from ravaging the coasts of other lands and to capture the vessels of other nations while at sea, for which purpose they fitted out many substantial fleets and manned them with the most efficient of their young men. They became known as the *Sea-kings*, or *Vikings*, were warlike, and carried their marauding expeditions to regions far remote. According to the inheritance laws of Scandinavian countries, the fortunes of noblemen passed to the elder sons, hence the younger sons depended



VESSEL OF THE VIKINGS.

upon their success in resorting to a military life, and these continually recruited the Vikings, who were otherwise of the lower rank. These peoples worshiped the gods Thor and Odin and had no regard for the institutions of the people advanced in civilization. They accordingly found it congenial to prey upon monasteries, cathedrals, mosques, capitols, and all the institutions of civilized life.

After the 9th century the Northmen began to dream of conquest, for which purpose they visited the Hebrides and the coasts of France and Spain. The Duke of Rollo secured from the French king, Charles the Simple, a cession of the region known as Normandy in 912, which was afterward organized into a powerful state and was the seat of influence by the Normans, who descended from the Northmen. This colony has an important place in the history of Europe. In 1066 the Normans conquered England and their leader assumed the title of William the Conqueror. Later they adopted the lan-

guage and religion of the French. The Northmen were not only powerful in making themselves felt in Western Europe, but crossed over to Iceland and Greenland, where they formed permanent settlements and maintained a government for centuries before America was discovered. In 986 Bjarne Herjulfson sailed from Europe for Iceland, but a storm caused him to be carried out of his course, and he landed in the region now occupied by Massachusetts, which he named *Vinland*. In the year 1001 Lief Ericsson landed on the shores of Newfoundland and Nova Scotia, which he named *Helluland* and *Markland*, meaning respectively Stoneland and Woodland. Later attempts were made to colonize the northeastern region of North America, for which purpose an Icelandic Northman named Thorfinn Karlsefne sailed from Greenland in 1007 with 160 men for Vinland, but it is thought that the expedition was lost at sea. See **Normans**.

NORTH POLAR EXPLORATION. See **Polar Expeditions**.

NORTH SEA, or **German Ocean**, a great inlet from the Atlantic Ocean, on the northern coast of Europe, extending between Norway, Sweden, and Denmark on the east; Germany, the Netherlands, and Belgium on the south; and Great Britain and the Shetland Islands on the west. The extent from north to south, from the Shetland Islands to the Strait of Dover, is about 650 miles; the general width is about 400 miles; and the area includes a surface of fully 150,000 square miles. The deepest portion of the sea is along the shore of Norway, where it is about 200 fathoms, but most of the sea is quite shallow, having an average depth of about 35 fathoms. The North Sea is the seat of a vast commerce. On its shores are some of the most noted commercial cities of the world, including Hull, London, Hamburg, Bremen, Edinburgh, Amsterdam, The Hague, and others, all of which have a location on its shores or are connected with it through extensive canal improvements. The fisheries yield vast products of cod, herring, haddock, ling, flatfish, and others. It receives the waters from the Scheldt, Rhine, Weser, Forth, Thames, Tweed, Tyne, Humber, Ouse, Tay, and Elbe, this inflow rendering its waters less salty than most of the larger seas. It has many important inlets and is connected with the Atlantic Ocean by the Strait of Dover and the English Channel, and with the Baltic Sea by the Skager Rack, the Cattegat, and The Sound.

NORTH SEA CANAL, or **Holland and Amsterdam Canal**, an important ship canal of Europe, extending from Amsterdam to the

North Sea. It crosses the narrow stretch of land between the Zuider Zee and Ymuiden Haven, on the North Sea. By this route seagoing vessels shorten the distance materially.

NORTH STAR. See Pole Star.

NORTH TONAWANDA (tõn-à-wõn'dá), a city of New York, in Niagara County, on the Niagara River, ten miles north of Buffalo. It is on the Erie, the Lehigh Valley, the Wabash, and the New York Central railroads. The Erie Canal and the Tonawanda Creek penetrate the city. It is surrounded by a fertile country and has a considerable trade in merchandise. The noteworthy buildings include the high school, the public library, the city hall, and many churches. It has manufactures of hardware, roofing material, steam piping, machinery, clothing, and merry-go-rounds. Electric railways, waterworks, pavements, and sewerage are among the improvements. The place was chartered as a city in 1897. Population, 1910, 11,955.

NORTHUMBERLAND (nõr-thũm'bẽr-land), the name formerly applied to a kingdom of Britain, but now to a maritime county in the northern part of England. The kingdom of Northumberland was founded by an Anglican chief named Ida in 547, when it extended from the Forth to the Tyne. On the progress of this political state from the 6th to the middle of the 8th century depended largely the subsequent development of Anglo-Saxon history. The kingdom of Deira, a region between the Tees and the Humber, was added in 560, and under the descendants of Egbert of Wessex the gradual union of England took place, this movement occurring between the close of the 8th century and the Norman conquest.

NORTHWESTER, the name of a warm wind common to the Southern Hemisphere, similar to the Chinook in Canada and the United States. The northwesterners have their source near the Tropic of Capricorn and blow from the northwest, sweeping over New Zealand and the southern part of South America. They are particularly valuable to the southern part of Chile and Argentina, where they have a favorable influence upon the climate.

NORTHWESTERN UNIVERSITY, a co-educational institution of higher learning at Evanston and Chicago, Ill., established in 1851. It is affiliated with the Methodist Episcopal Church, but admission is on an equal basis to all applicants on an examination, or on certificate from accredited schools. With it are connected three schools of preparatory instruction, including the Elgin Academy at Elgin, Ill., the Grand Prairie Seminary at Onarga, Ill., and the academy in Evanston. The university comprises the

schools of law, medicine, dentistry, and pharmacy, in Chicago, and the college of liberal arts and the school of music and oratory, at Evanston. The Norwegian-Danish Theological School, the Swedish Theological Seminary, and the Garrett Biblical Institute, all at Evanston, maintain close relations with the university. It has an endowment of \$4,500,000, property valued at \$7,125,000, and a library of 85,500 volumes and pamphlets. The university has 310 instructors and 4,000 students.

NORTHWEST TERRITORIES, the name applied to a large part of British North America. Formerly it included all the possessions of Great Britain in North America, except the region which was included in Newfoundland and the provinces of the Dominion of Canada. However, the Northwest Territories as at present organized, under the laws of 1905, include only the districts of Keewatin, Franklin, and Mackenzie. The area is estimated at 1,756,000 square miles. Ottawa, the capital of the Dominion, is the seat of government. The population does not exceed 25,000, most of whom are Eskimos.

The climate is cold and severe. In the northern part the soil is frozen almost the entire year, but the country some distance inland has fine forests and considerable mineral wealth. Lichen and mosses are the principal vegetable forms in the Arctic regions, where much of the surface consists of barren lands. Franklin consists entirely of the Arctic Archipelago and the northern headlands of the continent. The southern sections of Mackenzie and Keewatin are rich in vast forests and have a considerable area of fertile lands. Many lakes of large size characterize the surface, including Great Bear, Great Slave, South Indian, and a part of Lake Winnipeg. Lumbering, hunting, fishing, and mining are the principal industries. The government is administered chiefly by the Northwest Mounted Police through a commissioner at Ottawa.

NORTHWEST TERRITORY, the former name of a large region in the United States. It is located west of Pennsylvania, south of the Great Lakes, east of the Mississippi, and north of the Ohio. At present it includes the states of Ohio, Michigan, Wisconsin, Illinois, Indiana, and part of Minnesota. The area is about 265,878 square miles. At the time of the Revolution it was claimed through charters and other grants by Connecticut, Massachusetts, New York, and Virginia. The claims of these states were not recognized at the time the Declaration of Independence was issued and Congress, in 1780, pledged that the lands would be divided so as to form new states, hence the four states making claims ceded their rights. New York

relinquished its claims in 1781; Virginia, in 1784; Massachusetts, in 1785; and Connecticut, in 1786. However, certain lands were reserved by these colonies for special purposes, as the Virginia Military District and the (Connecticut) Western Reserve, both in Ohio.

Thomas Jefferson proposed a plan of government for this region and Congress adopted it in 1784, but it was repealed and superseded by the Ordinance of 1787, when General Arthur Saint Claire was made Governor. The land having been thrown open for sale and settlement, a great influx of immigrants from the states farther east and from Europe founded homes. Ohio was set off and made a State in 1803 and the western part was organized as the District of Indiana in 1800, with William Henry Harrison as Governor. Michigan was made a Territory in 1785; Illinois, in 1809; Wisconsin, in 1836; and Minnesota, 1849, being formed partly from the Northwest Territory and partly from the Louisiana Purchase.

NORWALK (nôr'wāk), a city of Connecticut, in Fairfield County, on the Norwalk River and Long Island Sound, fourteen miles southwest of Bridgeport. It is on the New York, New Haven and Hartford Railroad and is noted as a summer resort. The chief buildings include the Carnegie Library, the State Armory, the high school, the Norwalk Hospital, and a home for children. It has many municipal facilities, including waterworks, pavements, and street railways. The manufactures include straw and felt hats, boots and shoes, cotton and woolen goods, machinery, musical instruments, flour, and paper boxes. It was settled in 1649 and incorporated as a town in 1651. The British burned it in 1779. It was chartered as a city in 1893. Population, 1900, 6,125; in 1910, 6,954.

NORWALK, a city of Ohio, county seat of Huron County, sixteen miles southeast of Sandusky. It is on the Wheeling and Lake Erie and the Lake Shore and Michigan Southern railroads. The surrounding country is farming and dairying. It has a public library, the county courthouse, and many schools and churches. The manufactures include hardware, tobacco, musical instruments, farming implements, flour, umbrellas, sewing machines, and machinery. It is supplied with modern facilities, including electric lights, pavements, waterworks, and sanitary sewerage. Norwalk was settled in 1817 and became a city in 1881. Population, 1910, 7,858.

NORWAY (nôr'wā), an independent kingdom of Europe, occupying the western portion of the Scandinavian peninsula. It is separated from Sweden by the Kiolen Mountains, which continue southward toward the Skager Rack in

the form of a sloping tableland. The western boundary is formed by the North Sea and the Atlantic Ocean; the northern, by the Arctic Ocean; the eastern, by Russia and Sweden; and the southern, by the North Sea and the Skager Rack. It extends north and south for a distance of 1,075 miles and has a width of from 50 to 275 miles. The area is 124,129 square miles.

DESCRIPTION. The coast is indented by numerous bays, or *fiords*, that have rocky and precipitous shores. Hundreds of islands lie near the mainland. Off the northwestern shore are the Lofoden Isles, separated mainly from the continent by West Fiord. The general surface is a rugged plateau, with deep-cut valleys and groups of hills and mountains which rise above the general level. In the southeastern and central parts are forests of pine, fir, birch, and other valuable woods. Vast glaciers and snow fields characterize the northern part. Three mountain ranges diversify the surface, including the Dovrefield in the central part, the Langfield in the south, and the Kiolen on the frontier of Sweden. Most of the mountain regions assume the form of tablelands, called *fields*, and they are characterized by extensive fiords. Among the highest summits are Lodalskaupen, 6,785 feet; Snehaetten, 7,570 feet; and Klittertind, 8,380 feet.

Norway has few large rivers, owing to the narrowness of the country, and the drainage is chiefly toward the south and southeast. The Glommen, in the southeast, has the largest basin and drains into Christiania Fiord, an extension of the Skager Rack. Other rivers of the southern part include the Laugen, Nisser, and Otter, all flowing into the Skager Rack. The central part is drained chiefly by the Orka and the Namsen into the Atlantic. The Tana flows into Tana Fiord, an inlet from the Arctic Ocean, and forms part of the boundary between Norway and Russia. Many beautiful waterfalls and lakes characterize the scenery. Miösen is the largest lake, area 140 square miles, and is about 60 miles long and 1,500 feet deep. The lakes are principally in long and deep valleys and lie about 400 feet above sea level. They include lakes Kröderen, Randsfiord, and Spirilen. Animals common to cold countries are met in large numbers in the northern section, such as the deer, lynx, wolf, bear, and reindeer. Birds of prey and song are quite numerous and many species of waterfowl are found. Among the common birds are the starling, falcon, woodchuck, blackbird, goose, and duck.

The climate varies greatly in different sections, owing chiefly to the extent in latitude. Norway extends about 300 miles into the Arctic Zone and fully one-third is in the region of the

midnight sun. In winter the days are short and dark, but they are unusually bright and long during the summer. In the southern part the shortest day is about six hours and the longest is about eighteen hours. The western coast has a somewhat more favorable climate than the interior, owing to the effect of the sea, and the coldest region is in the central part. In the southern part the mean annual temperature is 45°, the extremes ranging from 10° below zero to 92° above. Rainfall varies greatly, ranging from twelve inches in the highlands of the north to eighty inches along the southwestern coast. At Grimstad, in the southeastern part, it is 47 inches. As a whole the climate is brisk and healthful, favorable to the development of a strong and energetic people.

MINING. Norway is rich in mineral resources and mining is one of the leading industries. At Kongsberg are rich silver mines, which are owned by the government, and these have been worked by the state nearly three centuries. Copper of a high grade is obtained in the vicinity of Røros and iron ores and silver quartz occur in many places. The only coal fields are on the island of Andø. Marble and granite of a fine quality for monuments and building purposes are widely distributed and much of the output is exported. Other minerals include nickel, sulphur, cobalt, slate, soapstone, and feldspar.

FISHERIES. Norway has taken high rank in the fishing industry for many centuries. The value of the annual output of fish, both fresh and cured, approximates \$14,750,000. The coast fisheries yield the larger returns, but sealing, whaling, and deep-sea fishing are carried on to a considerable extent. Cod fisheries are especially productive in the region of the Lofoden Isles, where the annual catch of this class of fishes approximates 35,000,000. Herring are caught in large numbers. Other catches include those of the mackerel, salmon, and lobster.

AGRICULTURE. The country is not rich in soil, about sixty per cent. being mountainous and bare, and only ten per cent. is utilized for cultivation. About one-fifth of the total area is covered with forests. Rye is the staple cereal and is grown farther north than oats or barley, though the latter yields good returns as far north as 70° of latitude. Wheat and oats are not grown north of the Trondhiem Fiord. Potatoes are cultivated to a large extent and take rank with rye as a staple food product. The yield of cereals and root crops compares favorably with that of other countries in Europe, owing to heavy manuring and careful cultivation of the soil. Small fruits of all kinds thrive. The pastures in the southern part are excep-

tionally productive. Grazing is good in the central plateau, where sheep raising receives considerable attention. Cattle are grown both for meat and dairying, and the grades are of a small kind suitable for milking. Dairying is carried on principally by the coöperative plan, the milk being conveyed to central plants from the farms. Two types of horses are grown, a small grade for driving and a larger species for farm and draft purposes. Other domestic animals include goats, swine, reindeer, and poultry. The livestock industry requires warm barns for shelter during the winter, when all animal food is housed, and during the summer young stock is usually driven or shipped north for pasturing.

MANUFACTURES. Many materials for manufacturing are obtained within the country, though the supply of coal is imported to a large extent. Salted and dried fish and cod-liver oil are prepared in large quantities. Lumber products make up nearly one-third of the manufactures, including furniture, barrels, and finishing lumber. Christiania has large shipyards, machine shops, and mills for spinning and weaving. Paper is made extensively from wood pulp obtained at the mills, and tanneries and flour mills are distributed throughout the country. Other manufactures include tobacco and cigars, spirituous liquors, matches, sugar, pottery, hardware, and clothing. In the manufacture of lucifer matches, silk textiles, leather, and cordage the country takes high rank.

TRANSPORTATION AND COMMERCE. Norway has a coast line of about 12,000 miles. This estimate includes the fiords and large islands. From an early date in history the Norwegians have ranked as a race of sailors, and the merchant marine holds fourth rank in the world at present. Though the portable resources of Norway are not large, vessels carrying the Norwegian flag are manifest in all the seas, and are particularly numerous in carrying trade between the United States and South America. Railroad building is confined to the southern part and the lines aggregate a total of 1,650 miles, nearly all of which are owned and operated by the government. Electric railways are operated in the cities and in the more densely populated rural districts. The highways are in a well-improved condition. Coal, oils, linseed, locomotives, and machinery are imported. The exports consist principally of timber, fish, wood pulp, and agricultural products. Great Britain, Germany, Sweden, and Russia have the largest share of the trade.

EDUCATION. An efficient system of public schools is maintained, at which attendance is free and compulsory between the ages of seven and fourteen years. A large number of secon-

dary schools are supported in the towns and cities, in which higher courses of instruction are given. Illiteracy has been almost entirely overcome through the efficient work of private and public schools, and a high class of teaching efficiency is insured through the maintenance of ten normal schools. The educational work culminates in the Royal Frederick University at Christiania, which has an enrollment of 1,500 students.

GOVERNMENT. Norway was united to Sweden in 1815 and until 1905 the government was vested in the same king, but each had a separate legislature and system of courts. It is now an independent constitutional monarchy and the succession is in the male line, but the *Storthing* has the right to choose a successor in case there is no direct male descendant. The legislative branch is known as the *Storthing*, which consists of two chambers, the *Lagthing* and the *Odels-thing*, the former consisting of one-fourth of the whole number and the latter of the remaining three-fourths. All members of the *Storthing*, a total of 123, are elected by popular vote for three years. The right of suffrage is vested in all who have paid their taxes the past year without distinction of sex. Local government is administered by counties, twenty in number, the chief officer of which is called the *amtman*. The militia, or *landvoern*, constitutes the principal portion of the army, and the *landstorm* includes those liable to service in times of war, all of the members being subject to a brief service as a means to develop military efficiency. All men over 22 years of age are included in the compulsory military service in the time of war.

INHABITANTS. Norway is the most thinly populated country in Europe, having only 18 inhabitants to the square mile, and fully two-thirds live in the south. Though all religions are tolerated, nearly the entire population is included in the Lutheran Church. The dissenters number about 52,750, including 10,289 Methodists. Christiania, in the southeastern part, is the capital and largest city. Other important cities include Bergen, Trondhjem, Stavanger, Drammen, and Frederikstad. In 1900 the population was 2,239,880.

LANGUAGE AND LITERATURE. The language of Norway is more closely associated with that of Denmark than that of Sweden, though it has a considerable similarity to the latter. It is very similar to the language spoken in Iceland, with which it constitutes the West Norse branch of the Scandinavian group. The literature is rich in history, poetry, astronomy, botany, geography, and religion, and is closely associated with that of the other Scandinavian countries. Many of the early writings are interwoven with the "Edda," an early production containing legendary

verses of heroes and gods. Among the noted literary products are the "Sagas," in which are included accounts of the conversion of the Scandinavian peoples to Christianity. "The Chronicle of Norwegian Kings" is one of the numerous early literary productions. During the middle period much inspiration was drawn from the literature and language of the Danes. The Norwegian writers of ability belong distinctly to later times and include Wergeland, Monsen, Welhaven, Garborg, Björnson, Absjörson, Ibsen, and others. See **Sweden**.

HISTORY. The history of Norway is closely associated with that of Sweden and Lapland. At the dawn of the historical period of Western Europe the Norwegians were governed by various chiefs and kings. At an early date they were associated with the Northmen. They were noted particularly for great skill in maritime service and acquired a reputation as piratical conquerors of the sea. In the latter part of the 9th century they were governed by Harald Fairhair, who was succeeded by his son, Eric, in 933, but the latter was deposed by his brother, Hako I., in 938. Hako I. became converted to Christianity. He was succeeded by other sovereigns who gave support to the spread of that faith, and in 1042 the ruling sovereign united Denmark to his domain. In 1066 many Norwegians took part with the Northmen of France in conquering England.

In 1319 Norway and Sweden became united under Magnus V., and in 1397 Eric of Pomerania was crowned King of Norway, Denmark, and Sweden. Subsequently many wars preyed upon its people and resources, and, after the defeat of Napoleon in 1814, Norway was united by the Treaty of Vienna with Sweden. Some friction resulted in efforts to unify the governmental institutions of Norway and Sweden for the reason that the constitution of Norway is democratic in character, and in 1821 all titles of nobility were abolished. In June, 1905, the *Storthing* declared Norway an independent state and refused to give further allegiance to the King of Sweden.

The dissolution between Norway and Sweden may be said to date from Aug. 13, 1905, when a referendum vote was taken in Norway to test the sentiment of the people. On the proposition of separation 368,200 voted yes and only 184 voted no. Immediately four commissioners were appointed for each country to negotiate the conditions of the dissolution of the union. The commissioners met at Karlsbad and after protracted negotiations reached an agreement on Sept. 23. This provided that all disputes not involving matters of vital interest be arbitrated before The Hague tribunal, and a neutral zone was fixed between the two countries. The treaty was

ratified by the *Storting* of Norway on Oct. 10 and by the *Rigsdag* of Sweden on Oct. 13. It was proposed to place on the throne of Norway a son of King Oscar, but the King of Sweden refused to allow one of his sons to accept, and Prince Charles of Denmark was elected king by popular vote. He accepted the throne as Haakon VII. (q. v.). Those voting against him favored the establishment of a republic.

NORWICH (nôr'wich), a city of Connecticut, county seat of New London County, on the Thames River, 92 miles southwest of Boston. It is on the Vermont Central and on the New York, New Haven and Hartford railroads. The site occupies hilly ground in the valley of the Yantic and the Shetucket, which here form the Thames. It has communication by steamboats and electric railways. The noteworthy buildings include the county courthouse, the Otis Library, the Y. M. C. A. building, the Backus Hospital, the Free Academy, and the Church of Saint Patrick. It has manufactures of cotton and woolen goods, flour, paper, leather, cutlery, bicycles, hardware, type, cordage, machinery and furniture. The site was purchased from a Mohican Indian chief in 1656 and the town was founded in 1659. It was chartered as a city in 1784. Population, 1900, 17,251; in 1910, 20,367.

NORWICH, county seat of Chenango County, New York, on the Chenango River, 42 miles northeast of Binghamton. It is on the New York, Ontario and Western and the Delaware, Lackawanna and Western railroads. The place is surrounded by a productive farming and dairying country and has many excellent municipal facilities. Among the manufactures are textiles, lumber products, furniture, machinery, carriages, and leather goods. The principal buildings include the county courthouse, the high school, and the public library. It has a fine railway depot and railroad shops. Population, 1900, 5,676; in 1910, 7,422.

NORWICH, a city of England, capital of Norfolk County, 98 miles northeast of London. It is surrounded by a fertile agricultural and dairying country and has several important railway lines. The manufactures include mustard, starch, boots and shoes, clothing, vinegar, machinery, ironware, and farming machinery. Among the noteworthy buildings are the public library, the townhall, the county courthouse, the central railway station, and the free grammar school. It is the seat of a number of fine schools, many churches, and a cathedral of the Norman style founded in 1095, which has a spire 315 feet high. The city was founded about 446, was several times occupied by the Danes, and by the 11th century attained to commercial importance.

It has sent representatives to Parliament since 1296 and was the seat of 66 bishops. The city has been materially improved within recent years and has a large trade. Population, 1907, 119,191.

NORWOOD (nôr'wōd), a town of Massachusetts, in Norfolk County, twelve miles southwest of Boston, with which it is connected by the New York, New Haven and Hartford Railroad. It has waterworks and electric lighting and contains the Morrill Library with 7,850 volumes. The manufactures include leather, glue and ink, ironware, and machinery. It is the residence of many Boston business men. Population, 1905, 6,731; in 1910, 8,014.

NORWOOD, a city of Ohio, in Hamilton County, a short distance from Cincinnati. It is on the line of the Norfolk and Western, the Baltimore and Ohio Southwestern, and other railways. The city owns and operates the waterworks and electric light plant. It is a favorite residence suburb of Cincinnati business men and may be reached by interurban and electric trains. Among the manufactures are pianos, furniture, machinery, electrical apparatus, paper bags, and clothing. The first settlement on its site was established in 1790 and it was incorporated as a city in 1902. Population, 1910, 16,185.

NOSE, that part of the face of man and of the higher animals which contains the nostrils



NOSE.

A, b, c, d, interior of the nose, which is lined by a mucous membrane; *n*, the nose; *e*, the wing of the nose; *q*, the nose bones; *o*, the upper lip; *g*, section of the upper jawbone; *h*, the upper part of the mouth, or hard palate; *m*, frontal bone of the skull; *k*, the ganglion or bulb of the olfactory nerve in the skull, from which are seen the branches of the nerve passing in all directions.

and the organ of smell. In man the nose projects as a triangular pyramid from the center of the face, above the upper lip. It consists of the

external and internal parts, the latter being formed of the nostrils, two cavities divided by an upright wall, called the *nasal septum*. The nose is composed of cartilage covered with muscle and skin and is joined to the skull by two small bones, the vomer and the turbinate bone. The nostrils are lined by a continuation of the mucous membrane of the throat and open at the back into the pharynx. At the roof of the nose is a long, sievelike plate, through which the fibers of the *olfactory nerve* enter, and this nerve, ascending to the brain, gives rise to the sensation of smell. Odorous particles need not enter the nose to produce smell impulses, but must be conveyed to the membrane by the air or by some other gaseous medium. The smell impulses are more intense when the odorous air is drawn up higher into the nasal passages, for the reason that they then affect a greater surface. The nasal passages are concerned in the production of voice and serve in the function of breathing. Small hairs are usually abundant in the nostrils. They serve to prevent dust particles entering in breathing.

NOTARY (nō'tā-rĭ), or **Notary Public**, an officer appointed to draw up and attest deeds, contracts, and other legal documents. The name and office is of Roman origin, but the *notarii* of ancient Rome were private shorthand writers instead of public officers. At present the functions of a notary public vary somewhat in different countries. In Great Britain and the United States they are appointive, both male and female citizens being eligible in most of the states, and in some cases they are required to give bonds as a guarantee of faithful service. In general they have power to take acknowledgments of legal documents, as deeds and mortgages, and in addition take affidavits and protest commercial paper. The official power or authority of a notary cannot be transferred to another, but his official acts must in general be performed personally. In most countries a notary has a seal, which is required to be impressed upon the document, and in most cases it must be stated when the notarial commission expires.

NOTATION AND NUMERATION, two common terms employed in arithmetic. The former designates a system of figures or characters used to represent numbers, and the act of recording them; while the latter is employed to express the art of reading numbers when they are expressed by numerals. The numerical symbols used in notation are known as the *Arabic* and the *Roman*. However, the so-called Arabic system was originated by the Hindus and came to us through the Arabs, hence the name. The

principal characters up to one million are relatively as follows: Arabic 1, Roman I; 2, II; 3, III; 4, IV; 5, V; 6, VI; 7, VII; 8, VIII; 9, IX; 10, X; 11, XI; 12, XII; 13, XIII; 14, XIV; 15, XV; 16, XVI; 17, XVII; 18, XVIII; 19, XIX; 20, XX; 30, XXX; 40, XL; 50, L; 60, LX; 70, LXX; 80, LXXX; 90, XC; 100, C; 500, D; 1,000, M; 1,000,000, \bar{M} . The names applied to the different denominations include the following: unit, ten, hundred, thousand, million, billion, trillion, quadrillion, quintillion, sextillion, septillion, octillion, nonillion, decillion, etc.

NOTRE DAME (nō'tr' dām), **Cathedral of**, a celebrated church in Paris, France, dedicated to the Virgin Mary. It occupies a fine site on the Ile de la Cité, where formerly stood a temple of Jupiter Cernaunus, and was built in the 13th century. The architecture is in the Gothic style and is crowned with two massive towers. The length of the cathedral is 330 feet; width, 170 feet; and height of towers, 223 feet. It was converted into a Temple of Reason at the time of the French Revolution, when the goddess of reason replaced the statue of the Virgin. Victor Hugo directed attention to it by his literary work entitled "Notra Dame de Paris," in 1830, and soon after the edifice was greatly improved.

NOTRE DAME, University of, an educational institution of higher learning at Notre Dame, Ind., established under the auspices of the Roman Catholic Church in 1842. It is one of the largest and most important universities of its class in the United States. The courses embrace law, sciences, mathematics, fine arts, and the classics. Special advantages are provided for the teaching of mechanical engineering, applied electricity, telegraphy, pharmacy, architecture, and typewriting. The library contains 60,000 volumes and the college property is valued at \$2,750,000. It has a faculty of 70 instructors and an attendance of 975 students.

NOTTINGHAM (nō'tīng-əm), a city of England, capital of Nottingham County, on the Trent River, 118 miles northwest of London. It occupies a fine site in a fertile region, has extensive railroad facilities, and is the center of a large commercial and manufacturing trade. The older streets are narrow and irregular, but the newer part of the city is spacious and contains many large business blocks and residences. It has extensive manufactures of cotton and woolen textiles, lace, needles, hosiery, tobacco products, machinery, furniture, chemicals, and hardware. The city has a number of fine educational institutions, including the Mechanics' Institute, the University College, the Congregational Institute, the free grammar school, and

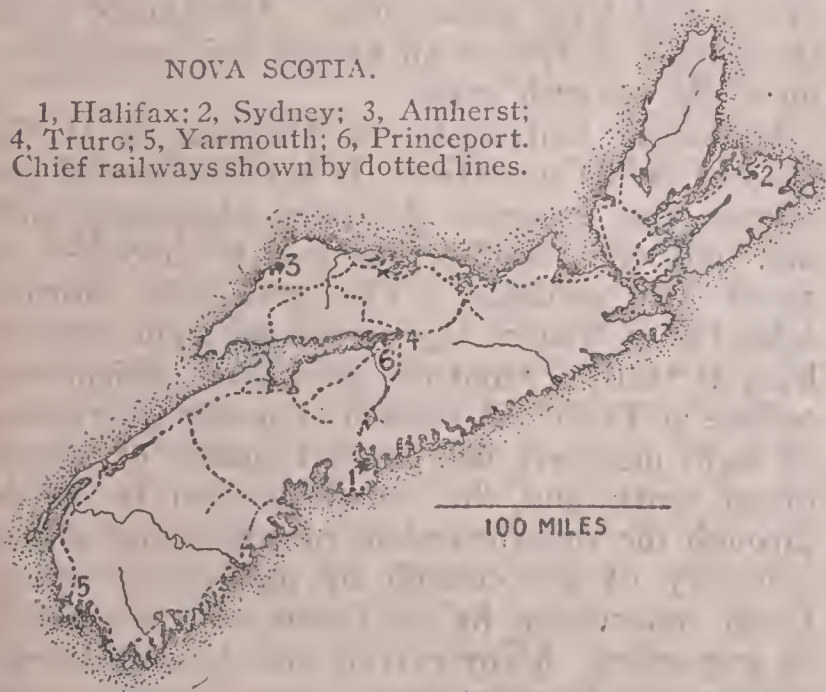
the Nottingham School of Art, a fine structure in the Italian style erected in 1865. It is the seat of several benevolent institutions, many fine churches, and the Roman Catholic Cathedral of Saint Barnabas. It has a free museum of natural history, many hospitals, and a free public library of 100,000 volumes. The city is supplied with electric and gas lighting, street railways, pavements, public parks, waterworks, public markets, and municipally owned baths and cemeteries. It was founded in the early Anglo-Saxon occupation of England and was held by the Danes until 868. In 1643 it was taken from Charles I. by the Parliamentarians. Population, 1901, 257,489.

NOUN, one of the parts of speech, a word used as the name of anything, quality, action, or other entity. A noun is said to be *proper* when it is the name of a particular person or thing and *common* when it refers to any one of a class of objects. *Class nouns* are names that refer to any individual of a class, as horse; *collective nouns* are singular in form but denote more than one, as assembly; and *verbal nouns* denote the name of an action, as singing. A noun that denotes a quality considered apart from the object in which it is found, as brightness, is called an *abstract noun*. The properties of the noun are *gender, person, number* and *case*.

NOVA SCOTIA (nō'vā skō'shī-ā), a Province of the Dominion of Canada, consisting of the island of Cape Breton and the peninsula of Nova Scotia. The two are separated by the

NOVA SCOTIA.

1, Halifax; 2, Sydney; 3, Amherst;
4, Truro; 5, Yarmouth; 6, Princeport.
Chief railways shown by dotted lines.



Gut of Canso, which connects the Gulf of Saint Lawrence with the Atlantic Ocean. The peninsula of Nova Scotia is bounded on the north by New Brunswick, Northumberland Strait, and the Gulf of Saint Lawrence, northeast by the Gut of Canso, south and west by the Atlantic, and northwest by the Bay of Fundy

and New Brunswick. Cape Breton Island lies northeast of Nova Scotia and its boundaries are formed mainly by the Atlantic and the Gulf of Saint Lawrence. Sable Island, located east of Nova Scotia, is a dependency of the Province. The area is 21,248 square miles.

DESCRIPTION. A number of indentations characterize the coast, which in many places is high and rocky. The surface is undulating, sloping gradually toward the southwest, and the highlands form a continuation of the Appalachian system. Along the Atlantic coast are the highlands that form the principal watershed and along the Bay of Fundy trend the North Mountains. North of the Minas Basin, an inlet from the Bay of Fundy, is a range known as the Cobequid Mountains. The highlands range from 600 to 1,000 feet above the sea and within this region are many fertile valleys.

The drainage is chiefly toward the south by numerous short rivers. In the southwestern part is the Annapolis River, which flows mainly between two ranges of hills along the Bay of Fundy and discharges in the Annapolis Basin. Saint Mary's River, in the southeastern part, flows into the Atlantic. All the streams of Cape Breton Island are short and unimportant, but it has many fine lakes, including Bras D'Or Lake, which has connection with Saint Peter's Bay. All of the coasts are indented by numerous inlets, including Saint Mary Bay, Minas Basin, Saint George's Bay, Chedabucto Bay, and Saint Margaret Bay, in Nova Scotia, and Aspy Bay, Saint Ann Bay, and Saint Peter's Bay, in Cape Breton Island.

The location of Nova Scotia gives it a more equable climate than any other Province of Canada, being influenced by breezes and currents from the ocean. Its southern coast is tempered by the Gulf Stream, which produces a modifying effect upon the severity of the winters, but the Province has an unusual amount of cloudy and foggy weather. The summers are mild and the winters are not intensely cold. At Halifax the thermometer seldom falls below zero and the extreme of summer is about 86°. An abundance of rainfall occurs in all parts of the Province, the average being about 45 inches. Extensive and valuable forests abound, including spruce, balsam, tamarack, walnut, elm, and maple.

MINING. The minerals are abundant and valuable. Coal seams of great thickness underlie the northern part, where a superior quality of the bituminous variety is obtained. This product is exported to various parts of Canada and the New England states. The annual output of coal is placed at 3,000,000 tons. Gold is mined

profitably on the Atlantic side of Nova Scotia and Cape Breton Island, and iron ore of excellent quality is found throughout the Province. About half of all the gypsum produced in Canada is obtained in Nova Scotia. Granite and limestone for building purposes are abundant. Other minerals include copper, silver, lead, tin, and petroleum.

AGRICULTURE. About one-half of the entire surface is susceptible to cultivation, and the lowlands along the streams and inner shores are exceptionally fertile. Oats, potatoes, hay, barley, buckwheat, and fruits are the principal crops. Large quantities of fruit, especially apples, are raised for export in the Annapolis and Cornwallis valleys. The hilly country is generally rocky and not well adapted to farming, but it furnishes excellent grazing. Cattle are the principal domestic animals and they are grown both for the butcher and for dairy purposes. Horses, sheep, and poultry are grown extensively for domestic use and exportation.

MANUFACTURES. The Province has an immense store of coal and iron ore, hence is abundantly supplied with material for the production of large quantities of iron and steel. Tanning bark is obtained in the forests and the industry of tanning is well established. Halifax has plants for the manufacture of beet sugar and cotton and woolen fabrics. The forests yield large quantities of valuable lumber, the output being partly exported and partly used in the manufacture of furniture and machinery. Large quantities of fish are cured and canned, especially cod, herring, mackerel, and lobster. These fisheries have been important from the early discovery of America. However, the output of cured and canned cod and lobster surpasses all others in importance.

TRANSPORTATION AND COMMERCE. Nova Scotia is situated favorably for a large maritime commerce, having an extensive coast and many safe harbors. A trunk line of the Intercolonial Railway extends the length of the Province, with terminals at Halifax, North Sidney, Pugwash, and Pictou Landing. Direct connection is provided by a line to Chaleur Bay, in New Brunswick, and to Montreal. The total lines include 1,200 miles. Navigation is secured against dangers by a large number of lighthouses and fog alarms, these being necessary on account of dense fogs that prevail at different seasons of the year. Commercial relations are maintained with the leading countries of the world, although the principal markets are those of Great Britain, the United States, the West Indies, and Brazil. Coal, fish, lumber, and dairy products are the principal exports, while the imports include textiles, tea and coffee, clothing and machinery.

GOVERNMENT. The Lieutenant Governor of Nova Scotia is appointed by the Governor General of the Dominion and is assisted by an executive council of eight members. The Legislature consists of two chambers, the legislative council of 21 appointive members and the house of assembly of 38 elective members. A large part of the public revenues is obtained from leases and royalties in connection with the mines and, in addition, a subsidy is paid by the Dominion. Local government is administered by the county and municipal officers.

EDUCATION. The public schools of Nova Scotia are classified in twelve grades, of which eight are common school and four are high school grades. About 105,000 pupils are in attendance upon these schools, of which number nearly nine per cent. are in the high schools. Over one-third of the public school teachers have had the advantage of efficient normal training. Ample facilities are provided for teaching military tactics and mechanical and domestic sciences. Each county has a high school, located usually in the shire town, and it is open to all in the county who can pass the examination, in consideration of an extra grant called the *County Academy Grant*, and these free high schools are known as the *County Academies*. All the high schools are free to those residing in the school section, which may be a city, town, or rural district, and the area of the last mentioned is normally about four square miles. Support for public instruction is obtained by municipal and provincial grants and local assessment. Attendance upon the schools is free in all grades and compulsory up to the seventh grade.

Dalhousie University, in Halifax, is at the head of public education. It has faculties of art, science, law, medicine, dentistry, pharmacy, mining, and civil engineering and is attended by about 400 students. The provincial normal school is at Truro; the provincial technical college, at Halifax; and the provincial agricultural college at Truro. A council of public instruction of eight members has general charge of educational work and the administration is chiefly through the superintendent of education, who is secretary of the council of public instruction. Local supervision in the towns and counties is by inspectors. Many private and denominational institutions are maintained. These include Kings College (Episcopalian), Windsor; Acadia College (Baptist), Wolfville; Saint Francis Xavier College (Scotch Catholic), Antigonish; Saint Mary's College (Irish Catholic), Halifax; Presbyterian College, Pinehill; and College Ste. Anne (French Catholic), Church Point.

INHABITANTS. The density of population is 22

persons to the square mile. A large majority of the people are of British origin, but the Scotch are most numerous. About one-third of the inhabitants are Roman Catholics, and the remainder are largely Presbyterians, Baptists, Episcopalians, and Methodists. Although the public schools are undenominational, a large number of parochial institutions are maintained. Halifax, in the south part of Nova Scotia Island, is the capital and largest city. Other cities include Sydney, Amherst, Truro, Yarmouth, Pictou, Lunenburg, Spring Hill, and Stellarton. In 1901 the population was 459,574, including 2,125 Indians.

NOVA ZEMBLA (nō'vā zēm'blà), an island which belongs to Russia, situated between the Arctic Ocean and the Kara Sea. It is separated from Vaigatch Island by Kara Strait and is divided into two parts by Matotchkin Strait. The length is 625 miles; breadth, 75 miles; and estimated area, 40,500 square miles. Nova Zembla was known to the hunters of Novgorod in the 11th century, but definite knowledge was not accumulated until in the last century, when surveys were made and published. The climate is colder than that of Spitzbergen, for the reason that the latter is affected by oceanic currents to a much greater extent, and the vegetation consists largely of stunted shrubs, lichens, and various short grasses. Vast flocks of wild fowl frequent the shores in summer and autumn, and there are abundant whale, seal, and dolphin fisheries. It is frequented by the bear, ice fox, lemming, and reindeer, but insect life is very limited. A few scattered settlers live in the southern part. During the milder season of the year large numbers of Russian hunters and fishers frequent the different islands and the shores.

NOVELS, the name applied to fictitious tales, usually written in prose, based on a plot of greater or less intricacy. They portray representations from real life, especially emotional periods in the lives of the persons depicted. A novel differs from an epic in that the latter deals with ordinary characters and actions, and from romance in that it professes to represent things from real life, while romance appeals to the mysterious, supernatural, and heroic. Novels were written for entertainment in an early period. The first known are the "Milesian Tales," none of which are now extant. These writings are attributed to Aristides, a member of an Ionic Grecian colony in Asia Minor, known as Milesia, which was conquered by the Persians in 494 B. C. Later both novels and romances became popular among the Greeks and Romans. Modern novel writing dates from the early part of the

14th century, the first being in the stories of Giovanni Boccaccio, who published the finest in point of style and sentiment in his "Decameron" in 1358. Later appeared many novels. They were inspired largely by this work and partly by "Il Novelino," one of the celebrated productions of Italian masters that appeared rather as a compilation than an original work near the close of the 13th century.

Excellent novels soon after developed in the literature of all leading countries. By the early part of the 17th century each of the principal languages of Europe had incorporated prose fiction as a representative type in the recognized literature. Writers multiplied in the 18th and 19th centuries. The nations which have a literature at all include among their writers a number of celebrated novelists. The leading American novelists include Washington Irving, J. Fenimore Cooper, Oliver Wendell Holmes, Nathaniel Hawthorne, Edgar A. Poe, Harriet Beecher Stowe, Brockden Brown, W. D. Howells, Bret Harte, W. G. Simms, and Henry James. Among the English writers of novels may be mentioned Sir Walter Scott, Bulwer-Lytton, George Eliot, Walter Besant, Charles Dickens, Rider Haggard, Wm. M. Thackeray, and Thomas Hughes; among the German, Wilibald Alexis, Gustaf Freytag, Georg Ebers, Gottfried and Johanna Kinkel, and G. zu Putlitz; among the French, Victor Hugo, George Sand, Alphonse Karr, Prosper Mérimée, Daudet, and Zola.

NOVEMBER (nō-vēm'bēr), the eleventh month of our year, but the ninth in the Julian calendar. It was one of the ten months of the year of Romulus, consisting of thirty days, which number was afterward changed to 29 by the decemvirs. Julius Caesar gave it 31 days, but Augustus restored it to its original 30 days, which is the number at present. See **Months**.

NOVGOROD (nōv'gō-rôt), or **Novgorod-Veliki**, a city of Russia, capital of a government of the same name, on the Volkhov River, 115 miles south of Saint Petersburg. It is conveniently connected by railways, but is of interest mainly because of its importance as a seat of Russian influence in the early history of Europe. Novgorod was the most important city of Northern Europe in the 12th century, when it had a population of 400,000 and maintained a form of government largely republican in character. It may be considered the nucleus around which grew Russian influence, since the history of that country commenced when the Norman prince, Rurik, began his reign, in 862, over the tribes resident in and around Novgorod. In 1862 a great monument was erected here by the Russian government to commemorate the thou-

sandth anniversary of that event. Its decline began in 1471, when Ivan III. destroyed a part of the city, and it was further injured by the opening of the port at Archangel and the founding of Saint Petersburg. The Church of Saint Sofia, founded in the 11th century, is its most noteworthy building, but it has several other fine churches, a number of schools, and manufactures of clothing, machinery, spirituous liquors, and utensils. Waterworks, pavements, and street railways are among the improvements. It is the center of considerable trade in hemp, flax, and cereals. Population, 1908, 28,108.

NOVUM ORGANUM, meaning new instrument, the name of Francis Bacon's great literary work, treating of the proper method of studying nature. In this work the author points out what he deems vain and useless speculations of ancient philosophers and directs the minds of man to the pursuit of the practical and useful. It was instrumental in developing the modern inductive method of proceeding from particular facts to general laws, instead of inferring facts from vague and insufficiently proven laws. No book excelled it in revolutionizing the mode of thinking, in overthrowing many prejudices, and introducing new opinions.

N-RAYS, the name applied to peculiar rays of light discovered at the University of Nance, France, while Professor Blondlot was experimenting with X-rays. These rays penetrate most substances, although others are impenetrable by them, such as water, platinum, and salt rock. Substances through which they penetrate readily, such as thin fabrics, are made opaque to them when saturated with water. These rays exist in sunlight in a dry atmosphere, but do not penetrate the air when it is moistened with fogs or clouds.

NUBIA (nū'bi-à), a region of Africa, situated south of Egypt, west of the Red Sea, and north of Abyssinia. The area is about 445,000 square miles. It extends west into the Sahara Desert and the Sudan. The surface consists largely of desert regions, but there are fertile districts along the Nile and Mareb rivers, and some of the valleys extending inland from the Red Sea. Nubia was known as a part of Ethiopia by the ancients. It formed a part of the possession of the Pharaohs, but later was organized by native rulers, who adopted a form of Christianity and a civilization patterned after the Egyptian. Within the last century it has had a varied existence, being governed in the early part of that period by native chiefs of the Moslem faith, but in 1820 it was conquered for Egypt by Ismail Pasha. It is at present connected in part with the government of upper Egypt and in

part with the Egyptian Sudan. The inhabitants consist largely of Numidians of the Ethiopian and Arabian races, who have a dark-brown complexion and a medium stature. They engage principally in the culture of cereals and in pastoral pursuits. Among the principal exports are timber, ivory, ostrich feathers, honey, musk, and small grain. The manufactures consist of rude pottery, coarse cotton and woolen goods, and household utensils. Slavery existed until within comparatively recent times and polygamy is still practiced. Mohammedanism is the recognized form of religion. The population is about 1,500,000.

NUISANCE (nū'sans), in law, any act which annoys or gives trouble and vexation, and which impairs the use and enjoyment of property or the reasonable exercise of liberty. A *public nuisance* is one that effects a considerable number of people, or an entire community, while a *private nuisance* is injurious only to one person or a very small number of persons. The former class includes such offenses against the public as interfere with the trades or public intercourse. These embrace the maintenance of a slaughterhouse or a soap factory in which the smell is unwholesome, or a boiler factory or gas engines which make constant and disagreeable noises. Among the private nuisances are those injuries which result from emptying sewage or conducting drainage upon the property of a neighbor. Both public and private nuisances are criminal, but those guilty of an offense of this kind may be held liable for the payment of damage in addition to being punished by criminal proceedings. The question of determining what constitutes a nuisance is subject to the investigation of a court of record, but immediate restraint may be obtained by an injunction. A violation of an order of a court to abate a nuisance renders the party guilty of contempt.

NULLIFICATION (nūl-lī-fī-kā'shūn), in government, an act whereby the law is rendered null and void and inoperative. It was first applied in the United States by advocates of state sovereignty, in 1799, when adherents of that political belief urged the passage of resolutions in the Kentucky Legislature for the purpose of rendering illegal certain acts of the Federal Congress. The theory was exemplified in Pennsylvania by the *Olmstead Case*, in 1809, and in Georgia in the matter of the *Cherokees*, in 1825-30, but it was urged particularly in 1830 by John C. Calhoun. He asserted that a State Legislature can declare unconstitutional any Federal law which is objectionable to that State, and thought it could withdraw from the Union in case such a law were enforced. The Legis-

lature of South Carolina passed a law in 1832 to nullify a tariff enactment passed in that year, but President Jackson issued a proclamation declaring nullification incompatible with the existence of the Union and contrary to the Constitution. South Carolina repealed the nullification ordinance after a compromise tariff bill introduced by Henry Clay was enacted. The theory of nullification was entirely suppressed by the defeat of the Confederacy in the Civil War.

NUMBER, in grammar, that form of a word from which it may be determined whether the speaker or writer refers to one or several individuals. There are two numbers, the singular and the plural. The *singular number* denotes but one and the *plural number* denotes more than one. In arithmetic, number is the measure by which quantities are classified. A number divisible by two is called an *even number*; when not so divisible, it is *odd*; and when it cannot be divided by any other number, except itself and unity, it is said to be *prime*. An *abstract number* is one written by itself, as 8; and a *concrete number* is one denoting a certain denomination, as 8 children. *Ordinal numbers* designate the position, as first, second, third, fourth, etc., while *cardinal numbers* answer the question, How many? as 1, 2, 3, 4, etc.

NUMBERING MACHINE, a mechanical apparatus for placing consecutive numbers upon cards and sheets of paper. A variety of machines are in extensive use for this purpose, since they have come to be a necessary supply for printers and blank-book manufacturers. The larger kinds are operated by treadle or power, and the work to be numbered is fed in a manner similar to the method employed in a printing press. In these machines the figures are on wheels, from which the number is printed, and these wheels work automatically so that the next consecutive number is brought into place as the paper is removed. The type figures are inked by the motion of the machine, hence the work of numbering is rapid. The wheels are in series, moving consecutively as each ten units are marked.

NUMBERS, Book of, the fourth of the five books of Moses, called Bemidbar in the Hebrew canon. It describes the numbering of the children of Israel, the continuation of the laws given to Moses in the Wilderness of Sinai, the march through the wilderness, the rejection of the whole generation, and the entrance into the land of Canaan. A period of 38 years is comprehended in this book, which opens with the second month of the second year after the deliverance from the land of Egypt. Its authorship is generally attributed to Moses, but some

writers think that it is composed of several parts written by a number of authors.

NUMIDIA (nū-mīd'ī-à), the name applied by the Romans to a large region in Northern Africa, which nearly corresponds to the region occupied at present by Algeria. The territory varied somewhat according to the fortunes of war, being at one time restricted to the present territory of Tunis, but it was enlarged by the successes of Roman military leaders. The inhabitants at the time of Roman occupation are the progenitors of the modern Berbers. They are noted for their excellent horsemanship, skill in warfare, and unscrupulousness in practicing savagery. At first they were governed by tribal chiefs, but subsequent to the Second Punic War they were united under the king of the eastern Numidians, Masinissa, and soon became allies of the Romans and aided in the contest against Hannibal. Subsequently this king effected a still greater union of the different tribes, and the united nation developed marked power under Jugurtha and Juba. Caesar attained a victory over Juba I. and made Numidia a Roman province in 46 B. C., but a large region in the western part was given by Augustus to Juba II. Cirta was the capital of Numidia under the Romans. Subsequently it became known as Constantine, a name it still retains. Other towns of importance were Hippo Regius, Theveste, Lambaesa, and Zama.

NUMISMATICS (nū-mīz-măt'īks), the study of coins and medals, treating of their historical, economic, and artistic aspects. The word *coin* has reference to a piece of metal bearing an impressed device and designed for circulating as money. A *medal* is a large piece of metal struck with one or more dies, intended to commemorate some event, and is not designed for circulation. The term *medallion* is used as a synonym of medal, while a *medallet* is a small medal, and a *token* is usually but not always of the same size as the current coin of the country in which it is issued, but is struck for the use of private individuals. Coins and medals are sometimes made of gold, but more frequently of silver, bronze, brass, copper, or electrum. The term *billon* denotes a debased silver used in some coinage and *potin* is a softer alloy than billon. The space not occupied by a device or inscription on a coin or medal is called the *field*. Coins of all kinds usually have various inscriptions, such as names, titles, and legends. Genuineness is indicated on a coin by a mint mark.

The study of coins and medals has been pursued from ancient times. It is a prolific source of knowledge of ancient arts and sciences.

Many important dates and knowledge of historic events have been obtained wholly from the coins of ancient nations. This fact was recognized by the Romans, who gave much attention to the science of numismatics, and it is likely that some specimens now in modern museums were included with the collections of ancient Rome. Petrarch is said to have been the first modern collector of coins, and since his time vast accumulations of both coins and medals have been made. The zeal with which collectors have gathered treasures of this kind caused an unusual rise in the value of many specimens, especially those dating from ancient and medieval times. The collections are usually classified as ancient, medieval, and modern, depending upon the period in history in which they were coined. Those dating from before the Byzantine Empire, in 330 A. D., are classed as *ancient*; from that date until the succession of Charlemagne, as *medieval*; and from Charlemagne until the present, as *modern*.

NUMMULITE (nŭm'mŭ-lit), the name given to a class of animals found in the shallow waters of warm seas. They belong to the calcareous foraminifera. The shells are composed of many whirls coiled in a flat spiral. At present only a few species are extant, but in ancient geological times these animals were very abundant. They constituted an important branch of animal life, since the remains of their shells caused limestone formations of great thickness, in some places several hundred feet. Formations of this kind are very prominent in the Alps of Europe, in Central America, in Asia Minor, and in the northern part of Africa. They are known as *nummulitic limestone* and are valuable for construction purposes.

NUN, a member of a religious order of women, who has devoted herself to a religious life and lives in a convent under a perpetual vow of poverty, celibacy, and obedience. The origin of the word is not clearly known, but it is thought to be from a Coptic or Egyptian root, which means *virgin*. Nuns are governed quite largely in convents by rules which are similar to those governing masculine orders. The superiors are known as abbesses or prioresses and generally are called *mother superior*. Their occupations vary according to fitness and the conditions prevailing in the country where the convent is maintained. The most common employment includes the work of education, the care of the sick or poor, and various employments in household or productive arts. It is said that Saint Anthony, in 250 A. D., aided his sister in founding the first nunnery and he was the first to write an authentic account of nuns. At present

there are more nuns in the Roman Catholic Church than monks. In some countries they have a large share in the development of education and educational arts.

NUNCIO (nŭn'shĭ-ō), a prelate representing the Pope at a foreign government. He represents the pontiff only as a temporal sovereign, but is sometimes commissioned to treat of spiritual affairs and to report on the condition of churches and the fitness of candidates for the mitre. A nuncio may be *resident* or *extraordinary*. He is styled an *internuncio*, if he is appointed simply to fill a vacancy. In France the nuncio is only recognized as the papal ambassador and is forbidden by law to exercise ecclesiastical jurisdiction.

NUREMBERG (nŭ'rĕm-bĕrg), or **Nurnberg**, a city of Germany, in Bavaria, on the Pegnitz River, 94 miles northwest of Munich. It is nicely located on a well-cultivated plain, has extensive railroad connections, and is the center of a large trade. Communication by urban and interurban points is maintained by electric railways. Among the manufactures are chemicals, railroad cars, metal products, spirituous liquors, musical instruments, clocks, machinery, cigars, lead pencils, toys, and hardware. Nuremberg is one of the largest hop markets in Europe and is noted for its extensive printing and book-binding industry.

The city has a fine system of public schools and is the seat of the Germanic National Museum and the Bavarian Industrial Museum. It contains the interesting churches of Saint Lawrence, Old Lady, and Saint Sebald, three Gothic structures built between the 13th and 15th centuries. Besides the libraries in its museums, it maintains a public library of 200,000 volumes. It has a number of noted educational institutions, several fine parks, electric lighting, and a number of historic statues and monuments. Among the new buildings are the chamber of commerce, the courthouse, the municipal theater, and the central railroad station.

Nuremberg dates from 1024, when its castle was founded by Conrad II. This building was improved by Frederick Barbarossa in 1158 and was a favorite residence of the German emperors from 1424 to 1806. The palace contains excellent carvings, frescoes, and many treasures of art. Nuremberg entered enthusiastically into the spirit of the Reformation. Gustavus Adolphus was besieged here in 1632 by Wallenstein. The discovery of the sea passage to India caused it to lose a portion of its prosperity and the Thirty Years' War cost 10,000 of its inhabitants their lives. It became a part of the Rhenish Confederation in 1803 and was an-

nexed to Bavaria in 1806. Since the extensive building of railroads in Germany it has again entered upon a period of enlarged prosperity. Population, 1907, 294,426.

NURSE, a person who is especially employed to attend the young, infirm, or sick. Nursing as it is understood at present is of comparatively recent origin and may be said to date from 1872, when trained nurses began to be sent out from training schools to care for the sick. Formerly this duty often devolved upon persons who were ignorant of the care needed by patients, but at present numerous institutions are maintained to thoroughly train both men and women for this class of work. The movement started by Florence Nightingale at the time of the Crimean War tended to stimulate interest in establishing training hospitals for nurses, and in 1887 Queen Victoria devoted a fund of \$350,000 to the foundation of such institutions. At present nurses are trained for special work in all civilized countries, both with the view of caring for the sick in hospitals and to visit the homes on calls as aid is required.

NURSERY (nûrs'ēr-ÿ), an institution for the propagation of useful plants, especially flower and fruit-bearing shrubs and trees. The rearing of herbaceous plants properly belongs to floriculture, while the care and early rearing of woody plants is a department of horticulture. Many nurseries are maintained in Canada and the United States, but the most extensive in America are located in the vicinity of Rochester, N. Y. All classes of shrubs, such as the blackberry, gooseberry, and raspberry, are cultivated. The larger fruits include the plum, grape, apple, peach, prune, pear, and fig. The growth and sale of these classes of plants when they are from one to four years old is an industry of great magnitude. Fully 4,500 nurseries are maintained in the United States. In most cases the scions are grafted into native stock. Most of the nursery products are sold through agents, who have them shipped to some central point to be delivered during the planting season.

NUT, the name used in botany to designate a fruit consisting of a seed, or kernel, inclosed in a hard leathery or woody shell that does not open when ripe. The term is restricted usually to a one-seeded pericarp resulting from a compound ovary, but it is sometimes applied to certain tubers, as those of the sedge, known as *nut grass*. The most valuable and best known nuts include the walnut, hickory nut, hazelnut, Brazil nut, butternut, cocoanut, chestnut, and pecan. Nuts form an important article of commerce, many of them being edible, while others furnish important medical or chemical properties.

Those named above are all edible, while the gallnuts, valonia nuts, and myrobalan nuts serve in dyeing and tanning. Vegetable ivory, secured from the nut of the Peruvian palm, and coquilla nuts serve in the manufacture of ornaments. Betelnuts are used in manufacturing tooth powder and paste. Many of the oil nuts of commercial importance are not edible, though most of the edible nuts are rich in oil and contain sugar, starch, and nitrogenous constituents.

NUTATION (nũ-tā'shũn), in astronomy, a small periodic gyratory movement in the direction of the earth's axis, by which, if it existed independent of the motion in precession, the pole of the earth would describe a minute ellipse in the heavens. The nutation period is 18.6 years and corresponds to that of a revolution of the moon's nodes, with which it is directly connected. The nutation is combined with the precession of the equinoxes, both of which movements are due to the effect of the action of the sun and moon upon the earth. See **Precession**.

NUTCRACKER (nũ'tkrāk-ēr), a genus of birds found widely distributed in Europe and Asia, which somewhat resemble the starlings



A, Nutcracker; B, Nuthatch.

and woodpeckers. They have a cone-shaped bill and square-cut tail and the plumage is of different shades of brown, studded with long white spots. These birds are so named because they feed on nuts, which they carry to some convenient crevice in a tree and hammer them with the beak until the kernel is exposed. However, they likewise feed on insects and beetles. The eggs are a pale bluish-green and are marked by pale olive or ash-colored freckles. An allied

species of birds found in America frequents the shores of streams and seas and is noted for its plumage of diversified hues. It is about thirteen inches long and the bill is about two inches.

NUTHATCH (nŭt'hăch), a genus of birds of the family *Paridae*. These birds are represented in North America by the *white-bellied nuthatch*. It is distinguished for its short legs, a sharp, straight bill, hooked claws, and solitary and shy habits. The genus includes many species, most of which are about six inches long. They build their nests in hollow trees, to which they carry leaves and sticks, and, like the nutcracker, are fond of nuts. However, they also cut into the stems of trees for insects much like the woodpeckers and are noted for being extremely shy. The color is bluish-gray on the upper parts, the under parts are reddish-brown, and the flanks are a rich chestnut color. The bill is wedge-shaped. They are often seen descending the trunk of a tree head downward.

NUTMEG (nŭt'mĕg), the kernel of the fruit of various trees, especially that of the nutmeg tree. The fruit is an edible drupe of a yellow-



NUTMEG.

A, Male flower; B, female flower; C, nut; D, nut with crinellus; E, nut with shell.

ish color. It is about two inches in diameter and, when mature, splits into halves, exposing a single seed. The seed has a thin hard shell, surrounded by a fibrous substance of crimson color, which, when dried, becomes the *mace* of commerce. When the kernel is dried and shelled, it becomes the *nutmeg*, which is valued highly in cooking for its aromatic odor and flavor. The kernel yields the *oil of mace*, or *nut-*

meg butter, which is obtained from it by compression. Nutmegs are produced extensively in the East Indies, but the cultivation of the nutmeg tree is now carried on in the West Indies, portions of Central America, Brazil, and Sumatra, where it has been naturalized. It attains a height of from fifteen to thirty feet, has a reddish-brown bark, and branches considerably.

NUTRITION (nŭ-trĭsh'ŭn), the process by which growth is promoted and waste is repaired in any living organism, which applies both to animal and vegetable life. Animal nutrition embraces the process or change which the food elements in the blood currents undergo for the production of energy or heat, and for the purpose of conveying certain waste matter from the system. Healthful nutrition is stimulated by a wise selection of the food with the view of providing the necessary support to the body. The food is masticated in the mouth and mixed with saliva. It is then swallowed, acted upon in the stomach by the gastric juice, and passed into the intestines, where it is dissolved by the bile, pancreatic juice, and other liquids. In the processes it undergoes in the stomach and intestines the nourishing parts are absorbed and thrown into the blood vessels. The tissues derive their nutrition from the blood in the capillaries. The material for it is prepared in the blood. Each individual part by a process of cell growth carries on the work by which the various portions of the body are enlarged, or by which the waste is overcome. Vegetable nutrition consists of the seven processes known as absorption, circulation, respiration, transpiration, excretion, assimilation, and growth. The root, stem, and leaf are the organs of nutrition.

The varieties of human food differ materially in the per cent. of nutritious substances, as is shown by the following list of common foods:

Raw oils.....	94	Roast pork.....	24
Boiled beans.....	93	Fried veal.....	24
Butter.....	93	Potatoes.....	22½
Boiled barley.....	92	Broiled venison.....	22
Baked cornbread.....	91	Boiled codfish.....	21
Wheat bread.....	90	Peaches.....	20
Barley bread.....	88	Apples.....	16
Boiled rice.....	88	Beets.....	14
Broiled beans.....	87	Whipped eggs.....	13
Rye bread.....	79	Currants.....	10
Oatmeal porridge.....	75	Cabbage.....	7½
Broiled mutton.....	30	Milk.....	7
Raw plums.....	29	Boiled turnips.....	4½
Raw grapes.....	27	Raw melons.....	3
Raw beef.....	26	Raw cucumbers.....	2
Roast poultry.....	26		

NUX VOMICA (nŭks vŏm'ĭ-kă), the name of a tree native to the East Indies, known as *Strychnos nux vomica*, or *poison nut*, by botanists. It has a crooked trunk and smooth bark. The leaves are round, smooth, and ribbed and the flowers are greenish white. It bears

a berrylike fruit about the size of a small apple, but has a bitter shell and a white pulp. The wood of the tree is exceedingly bitter, especially that of the roots, and the seeds are extremely poisonous. Strychnine and other powerful drugs are prepared from the seeds. See **Strychnine**.

NYASSA (nĕ-ās'sà), a lake of Africa, situated on the southwestern boundary of German East Africa. It is 300 miles long and from 20 to 60 miles wide. The surface is 1,525 feet above sea level. It receives the water from several rivers and has a great depth, being 700 feet deep in the southeastern part. The Shire, a tributary of the Zambezi, is its outlet. The Portuguese first discovered the lake in the 17th century and named it Maravi, but definite knowledge of it dates from its discovery by Livingstone, in 1859. It has fresh water and abounds in fish.

NYASSALAND, a region of Africa, situated west of Lake Nyassa and populated by native tribes. It is now included in British Central Africa. The region has extensive forests, is alternated more or less with undulating plains and hills, and much of the soil is highly fertile. The natives cultivate tobacco, maize, cassava, peas, and fruits and engage in trade. Formerly an extensive slave trade was carried on in the region by Arabs, but this has been suppressed recently. Several large Christian missions are maintained among the natives. The principal missionary and trade stations are at Port Johnston, Livingstonia, Marengas, and Blantyre. See **British Central Africa**.

NYLGHAU (nĭl'gā), or Nilgai, an antelope which is native to the forests of Southern Asia. It has a head and body resembling those of the ox, but the limbs are long and slender, fitting it to move with great rapidity. The height at the shoulder is about four and one-half feet. The neck is compressed and characterized by a mane and a tuft of hair adorns the breast. The color is brownish gray and the male has horns which are as long as the ears. Several species are found in India and Persia, where they are hunted for their flesh, which is a favorite article of food. The skin is useful in the manufacture of leather.

NYMPHS (nĭmfs), the graceful beings mentioned in Greek mythology as the presiding deities of the woods, streams, meadows, grottoes, hills, and the sea. These divinities were supposed to be beautiful maidens of fairylike form, though not immortal, and were robed in more or less shadowy garments. They were considered minor beings and no temples were dedicated to them, but they were held in the greatest veneration and were worshiped in grottoes or caves. Several classes of nymphs were held in high esteem. They included the Nereids, who presided over the sea; the Dryads, over the trees and forests; the Naiads, over wells, fountains, and lakes; and the Oreads, over mountains. Much beautiful statuary was dedicated to the nymphs, of which fine specimens are still extant.





O

OAK

O, the fourth vowel and fifteenth letter of the English alphabet. The form of the letter was derived from the Phoenician through the Greek and Latin. It is uttered with the lips rounded and the back part of the tongue raised. In the English, *o* has six sounds or shades of sounds, as *o* in *not*, *thought*, *go*, *move*, *woman*, and *come*. It combines with other letters to form digraphs, as *oa*, *oo*, and *ou*. In arithmetic, it serves as a cipher; in grammar, as an interjection; and in chemistry, to denote the element oxygen.

OAHU (*ō-ā'hōō*), one of the principal islands of the Hawaiian group, the third of the group in size. It is situated between the islands of



Molokai and Kauai, being separated from the former by Kaiwi Channel and from the latter by Kaieie Waho Channel. The coast line is indented by a number of bays. It is fertile and well watered. The vegetation is luxuriant. Honolulu, the capital of the Hawaiian Islands, is situated on its southern coast. Population, 1906, 74,357.

OAJACA. See **Oaxaca**.

OAK, a genus of trees and shrubs of the order *Cupuliferae*, widely distributed in the temperate zones of all the continents, but most

abundant in North America. They are not common to the tropical regions of South America, Africa, or Australia. Fully 300 species have been described, including both deciduous and evergreen trees. Among the latter are the ever-



OAK LEAVES AND ACORNS.

green oak of California and the *live oak* native to the southern section of the United States. The oak tree is noted from remote antiquity on account of its hardy wood and long endurance, from which it has been called the "Monarch of the woods" in poetry and oratory. It is of slow growth, attains a height of from 40 to 150 feet, and has long and spreading branches. All species bear a fruit known as the *acorn*, which is a nut set in a cup. The leaves are variously formed, though they are mostly sinuate-lobed. The flowers are male or female, the male flowers being in scaly spikes and the female being bud-shaped. Among the principal species are the white oak, burr oak, red oak, live oak, black oak, willow oak, scarlet oak, cork oak, Turkey oak, valonia oak, Barbary oak, evergreen oak, manna oak, and gall oak.

The oak tree is one of the noblest appearing forest trees. It reaches maturity in from 125 to 400 years and endures to the age of from 600 to

1,000 years. In some European countries are oak trees that have existed for eight centuries in good condition. Interesting historical incidents are associated with many of these trees, particularly the so-called *King Oak* of Windsor Forest, which is associated with the historical times of William the Conqueror.

The wood of the oak tree is of much value in the industries, owing to its strength and endurance. It serves in the manufacture of furniture, for shipbuilding, in the construction of vehicles and mechanical appliances, and all classes of construction work where a durable and hardy wood is desired. Oak bark is used in the medical practice and for tanning. *Oak galls*, morbid growths resulting from the sting of insects, are likewise employed for the latter purpose. *Cork oak* is grown extensively in the countries adjacent to the Mediterranean and supplies the cork of commerce. Acorns serve in many countries as valuable food for swine and other domestic animals. The acorns of the *Turkey oak* and several other species are sweet and edible, and are used to some extent in making sweetmeats. The *white oak*, one of the most valuable of hardwood trees, is found from Canada to the Gulf of Mexico. Oak sawdust and bark serve in dyeing, yielding drab and brown colors, and a fustian cloth is made of the inner bark. The oak tree thrives best in loamy soils, but does not grow in stagnant water, and its roots penetrate deeply into the ground.

OAK GALLS, or **Oak Apples**, the growths caused upon different kinds of oak trees by the punctures of various insects. About 1,000 species of oak insects are native to North America. These insects pierce the stems of oak trees and deposit a quantity of poisonous fluid and their eggs. An oak gall begins to form rapidly, shortly after the puncture has been made, and before the eggs are hatched they are fully inclosed by it. The young insect develops into a gall fly while in the gall nut, but soon becomes liberated by eating its way out. Oak galls are of value in tanning and for the manufacture of ink.

OAKLAND (ōk'lānd), a city in California, county seat of Alameda County, on the Bay of San Francisco, six miles east of San Francisco. It is conveniently connected with San Francisco and other cities by the Southern Pacific Railroad and by ferries. Communication with urban and interurban points is maintained by an extensive system of electric railways. The climate is healthful and the scenery in the vicinity is very beautiful, making the city a favorite point for tourists and a residential center for San Francisco business men. Many of the streets are finely paved with bitumen and macad-

am. It has systems of sanitary sewerage, waterworks, and police and fire service. Among the manufactures are cotton and woolen goods, flour, leather, lumber products, machinery, jute, boots and shoes, and earthenware.

Oakland is regularly platted and well built. The noteworthy buildings include the county courthouse, the California Military Academy, the California College, the Pacific Theological Seminary, the public library, the Macdonough Theater, and many schools and churches. The public high school is a fine architectural structure. Lake Merritt, a short distance south of the city, is a popular resort. Oakland was first settled in 1850 and incorporated two years later. The place was chartered as a city in 1854. It was so named from a natural grove of oaks. Population, 1900, 66,960; in 1910, 150,174.

OAKUM (ōk'ūm), a substance used for calking the seams of vessels. It is made by picking to pieces the threads of ropes obtained from the rigging and cables of ships. This work was formerly done by hand, but is now prepared by machinery. The rope is first cut into short lengths to be steamed so as to dissolve out the tar, after which the strands are pulled apart and cleaned of dust in carding machines. The finished product is colored a fine yellow by the use of saffron.

OAR, a piece of wood used to propel a boat or barge. It consists of three parts, the blade, handle, and loom. The *blade* is the flat end that is dipped into the water, the *loom* is the middle part, and the *handle* is rounded to be fitted for the hand. Small boats are propelled with two oars, one being worked by each hand, and larger boats have two or more sets. A *sweep* is a large oar and a *scull* is a small one.

OARFISH, a species of the ribbon fishes. It has an elongated body, which is greatly flattened or compressed. On the back is a long dorsal fin, extending the entire length of the body. Some specimens are twenty feet long and only a few inches thick, hence the name. It is probable that this fish has given rise to the frequent reports of sea serpents.

OASIS (ō'ā-sīs), a name now generally applied to any fertile tract of land in a desert region, but it was originally the name of several cultivated spots in the Libyan Desert, which were rendered productive by a number of springs issuing from the ground. The oases of the Libyan Desert are situated about 200 miles west of the Nile. They were known to the ancients by the names of Ammon and the Greater and Lesser Oases. Other oases are common to various parts of the Sahara Desert, the Desert of Gobi in Central Asia, the deserts of Persia

and Arabia, and the Kalahari Desert of South Africa. Several oases of the Libyan Desert were mentioned by Herodotus and were visited by Alexander the Great after the conquest of Egypt. This military hero visited Ammon to witness the celebrated temple of Jupiter Ammon. It is still cultivated, but is now generally called Siwah. Most of the oases occurring in nature are caused by underground rivers that form lakes by appearing on the surface, or whose waters come in close contact with the surface. Artificial oases have been formed in many parts of the Sahara by sinking wells, from which the water flows by pressure, or is pumped by means of windmills.

OATS, a genus of grasses, including about sixty species. Many are grown for the production of hay and for their straw and seed. They

are cultivated extensively in all temperate climates and form valuable food for horses and cattle, but the seed of some species is used for human food. The cultivated species are thought to be native to Asia, where they were grown from an early date. The greatest yield per acre is in the region extending somewhat south of the center between the Tropic of Cancer and the North Polar Circle. The annual production of the United States aggregates fully 812,500,000 bushels, which represents a value of about \$210,000,000. Among the leading oat-producing states are Iowa, Illinois, Wisconsin, New York, Minnesota, Pennsylvania, Nebraska, Ohio, Kansas, Missouri, and Michigan. Canada likewise has a large yield, the average annual crop being about 278,500,000 bushels. Ontario, Manitoba, Alberta, Saskatchewan, British Columbia, Quebec, and Nova Scotia produce large quantities.



HEAD OF OATS.

The best species are the common white oats, Hungarian oats, bristle-pointed oats, Chinese

oats, naked oats, Siberian oats, short oats, and peeled corn oats. The seed is sown in the spring, usually in April, and the crop is harvested in July or August. Oats yield from twenty to eighty bushels per acre, this depending upon the soil and climate, and weigh from 28 to 45 pounds per bushel. They are fed to stock, but principally to horses, after being threshed. Oats are prepared for table use by the kernel being separated from the outer shell, when they become a very nutritious food, and are eaten largely as a porridge and in cakes. Oatmeal mills are vast industrial enterprises, such as are operated in Chicago, Buffalo, Kansas City, Toronto, and elsewhere.

OAXACA (wá-há'ká), or **Oajaca**, a city of Mexico, capital of a state of the same name, 225 miles southeast of Mexico City. It is connected with other Mexican cities by railways. The place is well built and is surrounded by a fertile agricultural and fruit-growing country. In the vicinity are many gardens and cochineal plantations. Among the manufactures are sugar, clothing, cotton and woolen goods, chocolate, machinery, and utensils. The city has a number of fine schools, a cathedral, and a public library. It is the seat of a bishopric and a theological institution. The place was founded in 1486 by the natives and was captured by the Spaniards in 1522. Population, 1906, 36,109.

OBELISK (ób'ě-lisk), a square monument with a pyramidal top, generally diminishing in size toward the upper end. Ancient Egypt contained many obelisks, which were erected as symbols to the supreme god. It is thought that the first obelisk was constructed in the time of the Trojan War by Rameses, King of Egypt, who employed 20,000 men in building a monument forty cubits high. The majority of Egyptian obelisks have a uniform thickness in proportion to their height, being from one-ninth to one-tenth as thick as they are high, though in height they vary from a few inches to 180 feet. Many of the Egyptian monuments of this character were removed to Rome by the Roman emperors. In 1833 a beautiful specimen from Luxor was erected in Paris. Two taken from Heliopolis by Rameses II. and erected in Alexandria became known as Cleopatra's Needles. One of these was erected in Central Park, New York, and the other in London, England, both being presented to the respective governments by the Khedive of Egypt. Formerly obelisks were very common in Egypt, but at present only 42 erected in that country are known. This number includes the two taken to Paris, in 1833 and in 1836, five taken to England, one transported to the United States, and

those erected in Berlin, Rome, Florence, Vienna, and other European cities. Among the most famous obelisks of American construction are the Washington monument, at Washington, and the Bunker Hill monument. The latter is 30 feet square at the base and 231 feet high. It was dedicated in 1843 to commemorate the Battle of Bunker Hill, which took place June 17, 1775. The former is 55 feet square at the base and 555 feet high. It stands at the west end of the Mall, a short distance south of the White House, and was dedicated in 1885.

OBERAMMERGAU (ō'bēr-ām-mēr-gou'), a town of Germany, in the valley of the Ammer, in Upper Bavaria, about 45 miles southwest of Munich. The inhabitants are employed principally in the manufactures of rosaries, crucifixes, images of saints, and toys. The town is noted on account of the celebrated miracle play in which the passion of our Saviour is represented. These passion plays are given on Sundays of the summer months on stages erected in shaded places. Every ten years there is a special exhibit,

to which many thousands of European and American visitors are attracted. The custom of presenting the play every tenth year as a special feature dates from 1633, when the inhabitants were grateful

for escaping the ravages of a plague and vowed that the performance should be given periodically. The passion play, when given in its entirety, requires 350 actors. However, in late years the exhibit has taken on a

form of profit production. The last special exhibit was given in 1900, when the clear profit to the promoters was \$750,000. At that time the gross railroad receipts on account of the passion play were \$1,500,000. See **Miracle Plays**.

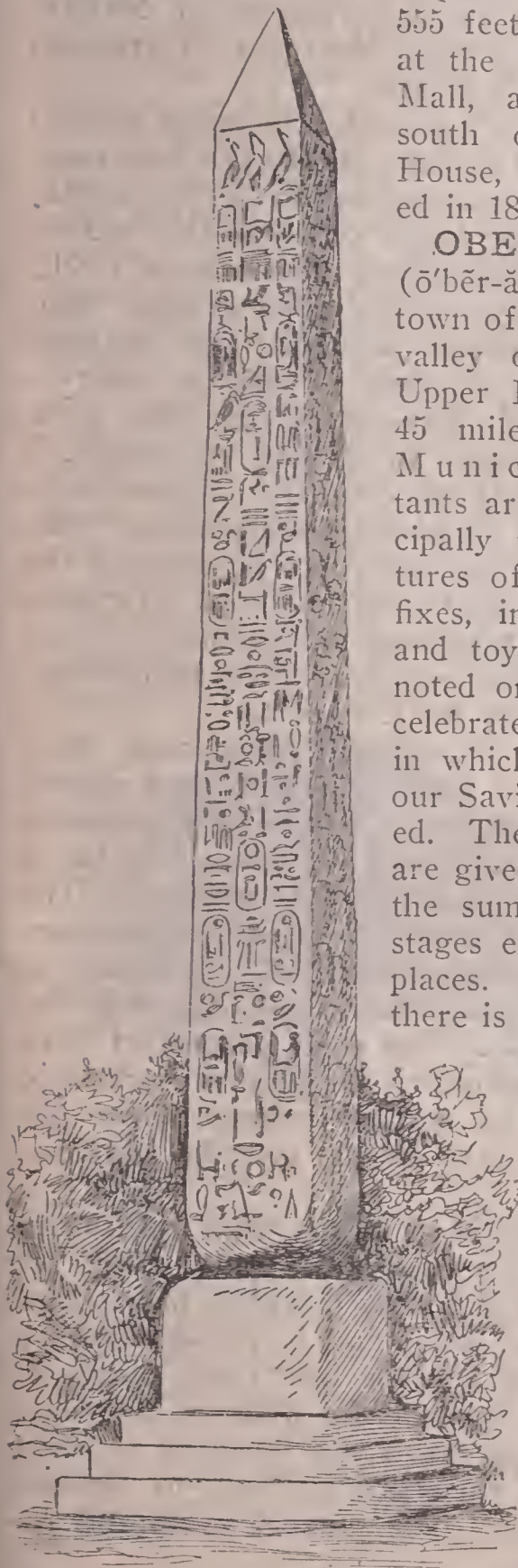
OBERHAUSEN (ō'bēr-hou-zen), a city of Germany, in the Rhine province of Prussia, near the Rhine, forty miles north of Cologne. It is a railroad and manufacturing center, having large interests in the production of glass, soap, flour, porcelain, wire, and machinery. Extensive coal fields are worked in the vicinity. The place is of recent origin, having been platted in 1845, and the buildings are modern and well constructed. Among the principal buildings are the townhall, the opera house, the gymnasium, and the central railroad station. Population, 1905, 52,166.

OBERLIN (ō'bēr-līn), a town of Lorain County, Ohio, on the Lake Shore and Michigan Southern Railroad, 34 miles southwest of Cleveland. The surrounding country is fertile. Oberlin is noted chiefly as the seat of Oberlin College (q. v.). It has electric lighting, well-graded streets, and a municipally owned system of waterworks. The chief buildings include the high school and several churches. It was settled in 1833 and incorporated in 1846. Population, 1900, 4,082.

OBERLIN COLLEGE, a coeducational institution at Oberlin, Ohio; founded in 1833. It was chartered as the Oberlin Collegiate Institute, but the present name was adopted in 1850. It includes the preparatory school, the theological seminary, and departments of drawing, music, art, physical training, and collegiate work. The library contains 75,000 volumes, the endowment is \$1,650,000, and the college property has a value of \$2,500,000. It has a faculty of 115 and is attended by 1,750 students.

OBI (ō'bē), or **Ob**, a river of Siberia, one of the largest of Asia. It rises in the Altai Mountains and flows in a general course toward the northwest until it receives the Irtysh River, when it makes a turn toward the north and flows into the Gulf of Obi. The Obi has a total length, including the estuary, of nearly 3,000 miles, and it drains an area of 1,200,000 square miles. Near Bogorovsk it is crossed by the Trans-Siberian Railway. It flows through a valley of marked fertility, but the region traversed by it has a rigid climate. It is utilized extensively as a commercial route.

OBOE (ō'boi), or **Hautboy**, a wind musical instrument, played in the manner of a clarinet, which it resembles in form. It has a penetrating quality of tone and is sounded by means of a



East face of Obelisk in Central Park, New York.

double reed. This instrument is of great antiquity, dating from an early period in the history of Egypt and Greece. The modern form is about twenty inches in length. Solo compositions for the oboe were written by Handel, Mozart, and Beethoven, all of whom were fond of this instrument.

OBSERVATORY (öb-sěrv'ä-tö-rÿ), an institution or building fitted with optical instruments and designed for systematic observation of physical and astronomical phenomena. Observations were devoted exclusively, until comparatively recent times, to making a study of astronomical aspects, though in some cases a loose account of weather was recorded. Later provisions were made to observe meteorological phenomena and terrestrial magnetism. The Chinese were among the first to record observations in relation to astronomical study. Some writers assert that the Egyptian pyramids were constructed in harmony with certain stellar phenomena, though it can scarcely be said that observatories existed anywhere prior to about 300 B. C. In that year Ptolemy Soter caused the erection of an observatory at Alexandria, which continued in existence for nearly 400 years. Hipparchus investigated the motions of the sun, planets, and moon in the Alexandrian observatory, where he discovered the precession of the equinoxes. Observatories were built by the Arabians at Bagdad and Damascus in the 9th century A. D. In 1260 a splendid institution of a like character was founded in Maragha, in the northwestern part of Persia.

Bernhard Walther built the first observatory in Europe, at Nuremberg, Germany, in 1472. The revival of practical astronomy properly dates from that time, since many of the newer methods of observation were invented by professors of that institution. Tycho Brahe established two observatories on the Danish island of Hven in the 16th century and Landgrave William IV. built a similar institution at Cassel, Germany, in 1561. These institutions gave an impetus to astronomical interest and facilitated observations by introducing valuable improvements in astronomical apparatus. They caused many universities to found observatories as adjuncts to their institutions.

The principal observatories of Europe were founded as follows: Royal Observatory at Paris, 1667; Greenwich Royal Observatory, 1675; Tuscan Observatory, near Copenhagen, 1704; Berlin Observatory, 1705; Saint Petersburg, 1725; Vienna, 1756; Oxford, 1772; Edinburgh, 1776; Dublin, 1783; Königsberg, 1813, and Pultova, near Saint Petersburg, 1839. The observatories at Sydney, Australia, and at the Cape of Good

Hope were established in 1820. Among the leading observatories of the United States are those at Cambridge, founded in 1839; Washington, 1842; Ann Arbor, 1854; Lick Observatory, in California, 1888; and Yerkes Observatory, at Lake Geneva, Wisconsin, 1897. Canada maintains a number of observatories, including those at Toronto, Quebec, and Saint John, New Brunswick. Notable institutions of this kind are supported by the governments of Mexico, Chile, Brazil, Nicaragua, and other Central and South American countries.

The telescope is the chief instrument used in observatories. It contains the largest lens manufactured for optical observation. Other instruments used in the larger observatories include the barometer, micrometer, chronometer, circle, and clock. They employ photography, photometry, and spectrum analysis. The national observatories, in addition to making observations, communicate intelligence regarding them and probable changes in climatic conditions to various portions of the country. Observatories are usually built on prominent elevations. The employment of large telescopes necessitates the construction of substantial buildings. In most cases the larger telescopes are mounted in such a manner that they rest securely on foundations built especially for their support.

OBSIDIAN (öb-sid'ĭ-an), a volcanic rock which consists of lime, or potash, and silicate with alumina and iron. Obsidian is generally found in connection with feldspars. It has a glassy appearance and is brittle and hard. The color usually is black, but sometimes it is brown, green, red, or variously striped. It occurs in several regions of Mexico, South America, Iceland, and Eurasia. The early peoples of Peru and Mexico employed it in the manufacture of ornaments and for cutting weapons, while others used it for arrowheads, utensils, and mirrors.

OCARINA (ök-ä-rē'nä), a wind musical instrument of ancient origin, made chiefly of molded clay. It is hollowed within, has a number of holes for keys, and is supplied with a short mouthpiece. In the later types, a row of keys takes the place of the holes in the older forms. This instrument was invented anciently by the Chinese, but was introduced to America by the Austrians. The tone is sweet and enlivening.

OCEAN. See **Sea.**

OCEAN GROVE, a town of New Jersey, in Monmouth County, thirty miles south of New York City. It is finely located on the Atlantic Ocean, a short distance south of Asbury Park, and may be reached by the Pennsylvania and

the Central of New Jersey railways. The beach is a splendid stretch of coast. Among the public buildings are the post office, the high school, and the Auditorium. The last mentioned has a seating capacity for 10,000 persons and is the scene of many religious and educational meetings. Many summer cottages, boarding houses, and hotels are maintained. Strict Sabbath regulations are in force and the sale of tobacco and intoxicants is prohibited. Ocean Grove is popular as a summer resort, in fact is one of the finest resort towns on the Atlantic coast, and is visited in the summer by over 25,000 people. Population, 1905, 1,174.

OCEANICA (ō-shē-ān'ē-kā), or **Oceania**, the name applied by some geographers to a large part of the Pacific Ocean, within which they include the islands lying between Asia, the Indian Ocean, the Antarctic Ocean, and North and South America. The term Australasia is applied to the same region by some writers, in which sense they include the continent of Australia. The islands of Oceanica proper are divided into three main groups, including Polynesia, Micronesia, and Melanesia.

OCELOT (ō'sē-lōt), a class of carnivorous mammals. The common ocelot is native to the warmer parts of America and is commonly



OCELOT.

called the tiger cat. Several distinct species have been described, varying somewhat in size. They are generally characterized by fur of a tawny-yellow or reddish-gray color, marked with spots of black or brown, and are noted for their blood-thirsty disposition. The ocelot is about three feet long, has a tail of about eighteen inches, and is native from Arkansas to the southern part of Paraguay. It is found mostly in the larger forests, where it is seen frequently in the act of climbing trees. Its food consists mostly of birds and small quadrupeds.

OCHRE (ō'kēr), or **Ocher**, an earthy oxide employed with oil as a paint. It occurs in deposits, usually about springs that flow from mountains, or rocky beds which contain iron pyrites in a decomposed state. The color is not uniform, varying with the degree of oxidation

of the iron, but it may be changed by heat from its usual yellowish color to brown or red. Large deposits are found in many parts of Canada. The output of ochre in the United States is more than 3,500 tons annually, the largest production being in Pennsylvania, Vermont, and Georgia, but there are deposits in many other regions of the country, especially in Missouri and New York. The leading ochre-producing countries of the world take rank as follows: France, Great Britain, the United States, Germany, and Cyprus.

OCKLAWAHA (ōk'lā-wā-hā), a river of Florida, rises in Griffin Lake, and flows into the Saint John's about 22 miles south of Palatka. The general course is toward the north, but in the lower part it flows almost directly east. The basin is wooded with fine forests. It is about 275 miles long.

OCMULGEE (ōk-mūl'gē), a river of Georgia, rising near Atlanta, in the northern part of the State. After a course of about 275 miles toward the south and east, it joins the Oconee in forming the Altamaha River. The valley is fertile and contains extensive forests. On its banks are several thriving cities, of which Macon is the most important. It is navigable for 125 miles. The Little Ocmulgee is its principal affluent.

OCONEE (ō-kō'nē), a river of Georgia, rises in the northeastern part of the State, near Athens. It flows toward the southeast and at its confluence with the Ocmulgee forms the Altamaha. The length is about 260 miles. It is navigable to Milledgeville, about 100 miles.

OCONTO (ō-kōn'tō), a city of Wisconsin, county seat of Oconto County, on Green Bay, at the mouth of the Oconto River, 145 miles north of Milwaukee. It is on the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul railroads. In its vicinity is a fertile agricultural country, which produces cereals and grasses. The noteworthy buildings include the county courthouse, the high school, the public library, and a number of fine churches. It has a large trade in lumber and merchandise. Among the manufactures are ironware, wagons, flour, furniture, and machinery. The place was settled in 1850 and incorporated in 1882. Population, 1905, 5,722; in 1910, 5,629.

OCRACOKE INLET (ō'krā-kōk), a narrow passage between Pamlico Sound and the Atlantic Ocean, located on the coast of North Carolina, about 25 miles southwest of Cape Hatteras. On its north shore is Ocracoke and on its south shore is the town of Portsmouth. Dangerous shoals are on each side of the channel.

OCTAVO (ök-tā'vō), a term used in book binding, having reference to a sheet of paper being folded so as to make eight leaves. It is used to designate a book printed with eight leaves to the sheet and is written *8vo*. Since the size of the paper employed varies, there are different designations, as *demy 8vo*, *imperial 8vo*, and *foolscap 8vo*.

OCTOBER (ök-tō'bēr), the tenth month in the Gregorian calendar, containing 31 days. It was so named from its position as eighth month in the Roman year. October was sacred to Mars in the mythology of Rome.

OCTOPUS (öc'tō-pūs), a genus of fishes which belong to the cephalopod group. They are familiarly known as *cuttlefishes*. They have a warty, oval body and eight arms of unequal length. Forty-six species are known. Octopi are found on the Pacific coast of North America, in the Mediterranean, and other wa-

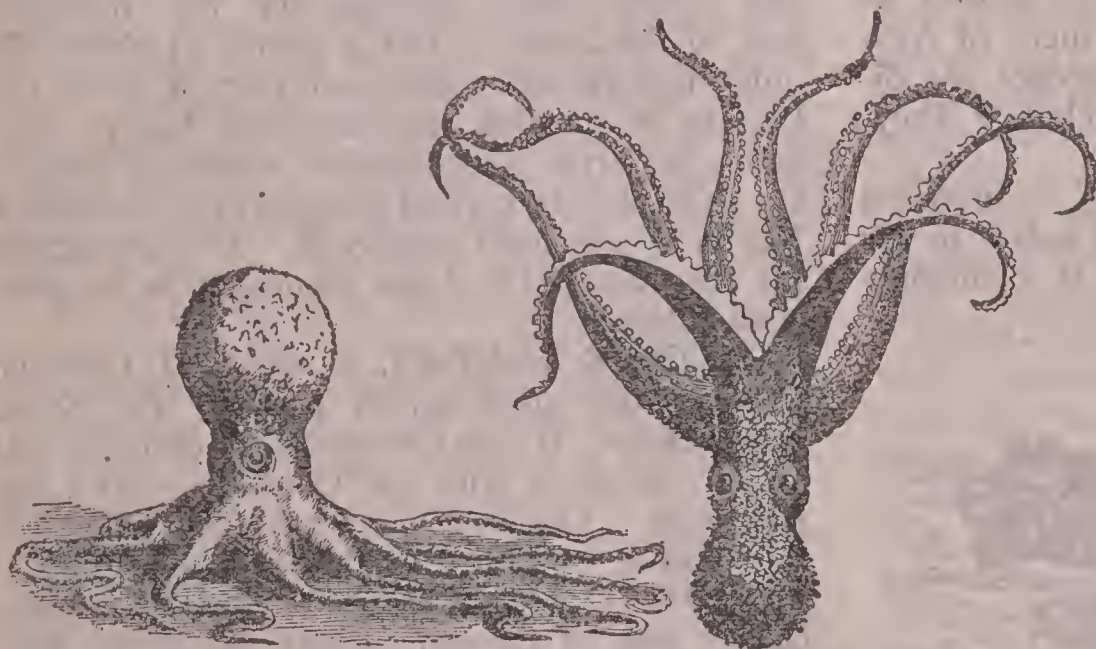
they emit an inky substance that colors the water somewhat and enables them to evade capture. The female deposits its eggs on empty shells and seaweed, where they are guarded against enemies. Most of the species of octopi are timid, inoffensive, and solitary, but all are active and voracious.

ODD FELLOWS, Independent Order of, one of the most extensive social institutions in the world. It dates officially from 1812, when it was instituted at Manchester, England. However, the oldest lodge of Odd Fellows was organized in 1748, at Globe Tavern, London. The first lodge instituted in the United States dates from 1819 and the grand lodge of Maryland was established in 1821. The American society severed its connection with the Manchester Unity in 1842 and the headquarters for Canada and the United States are now at Baltimore, Md. It has steadily increased in membership and has connected lodges in all the continents. The membership in the United States aggregates 1,250,000. In six provinces of Canada it has about 200,000 members.

ODE, a lyrical poem of an elevated character, composed under circumstances of poetic exaltation. The Greeks gave the name ode to every short poem intended to be sung or accompanied by instruments. Among the most noted odes of antiquity are those of Pindar, Sappho, and Anacreon, all Greek writers, and those of the Roman writer Horace. Many odes have been written by modern authors after the style of Pindar, on the supposition that the Greeks ad-

mitted an absolute license of meter in poems of this description. However, many elaborate choruses of Grecian dramatists are constructed on a scheme of metrical regularity. Among the noted odes in English literature are Dryden's "Ode for Saint Cecilia's Day," Burns's "To a Mouse," Shelley's "Ode to a Skylark," Keats's "To a Nightingale," and Tennyson's "On the Death of the Duke of Wellington." In American literature may be mentioned Lowell's "Commemoration Ode" and Bryant's "To a Waterfowl."

ODENSE (ō'thēn-sā), a city of Denmark, capital of the island of Fünen, near the Odense Fiord. It is on both sides of the Odense River, has railroad and electric railway facilities, and is well improved with grading and pavements. The notable buildings include the Cathedral of



OCTOPUS.

CRAWLING.

SWIMMING.

ters. They usually frequent rocky coasts, where they feed on mollusks and crustaceans. The arms or tentacles in the common octopus measure from eight to fifteen feet, while the body is about nine feet long, thus enabling the animal to spread itself to a distance of from 25 to 35 feet. Each arm has a series of suckers, by which they seize their prey and moor themselves to the bottom of the sea. In some species the weight reaches from 60 to 70 pounds, but specimens found in the tropical waters of America weigh 250 pounds. The flesh has a reddish color and is useful for bait, though in some countries on the Mediterranean several species form a favorite article of human food. They have the remarkable characteristic that the color of the flesh changes somewhat with the temper of the animal, and, when pursued by an enemy,

Saint Canute, the Church of Our Lady, the Castle of Odense, the public library, a seminary, and the post office. Among the manufactures are sugar, glass, cigars and pipe tobacco, textiles, clothing, and machinery. It has a fine harbor, which is connected with the sea by the Odense Ship Canal, and is the center of a large export trade in cheese, butter, bacon, and produce. Odense was founded at an early date in Danish history. It is the birth place of Hansen Christian Andersen. Population, 1906, 40,547.

ODER (ō'dēr), a river of Germany, rising in the Obergerige, in Moravia. It has a northeasterly course until after it enters Germany, when it turns toward the northwest and flows into the Baltic Sea by three channels. The Oder has a length of 550 miles, drains a basin of 50,000 square miles, and serves as an important route for commercial navigation, though much expenditure of revenues was necessary to overcome several of its rapids. The valley of the Oder is highly fertile and contains great wealth. It has a number of important tributaries, including the Neisse and the Warthe. The principal cities on its banks are Stettin, Frankfort, Glogau, Breslau, Oppeln, and Ratibor. It is navigable to Breslau for vessels of fifty tons and for small craft to Ratibor. Swinemünde, on the Baltic, is the chief port used for ocean commerce.

ODESSA (ō-dēs'sà), a city of Russia, in the government of Kherson, on the Black Sea, nearly midway between the mouths of the Dniester and Dnieper rivers. It has a fine location on the Bay of Odessa. The two harbors are protected by moles and afford secure protection for its large foreign trade. Among the manufactures are machinery, cotton and woolen goods, chemicals, tobacco products, flour, oil, leather, sailing vessels, soap, and utensils. Railroad connections facilitate interior trade, but the importance of Odessa is due principally to its large export commerce in sugar, flour, cereals, wool, lumber, coal, iron, flax, hemp, and merchandise.

The city is well built. Among the improvements are electric lights, street railways, stone and asphalt pavements, an extensive public school system, and a number of fine educational institutions. The University of Odessa was founded in 1865. It has 75 professors, 850 students, and a library of 160,000 volumes. The city has a number of fine churches, a public museum, several cathedrals, government buildings, public parks, and numerous monuments. It is a modern city. The first building was a Russian fortress, erected in 1793, and around

it the city was built. Its prosperity dates from 1803, when its harbor and wharves were improved, and later railroad construction opened an important trade with Austria, Germany, France, and other countries toward the west. About one-fourth of the inhabitants are Jews, but there are many Turks, Greeks, and Germans. Population, 1906, 452,736.

OELWEIN (ōl'wīn), a city of Iowa, in Fayette County, about 56 miles west of Dubuque. It is on the Chicago Great Western and the Chicago, Rock Island and Pacific railroads. The surrounding country is fertile, producing cereals, vegetables, and fruits. The chief buildings include the high school, the public library, and a number of churches. It has a growing trade in live stock and merchandise. Extensive railroad shops are located here. Among the manufactures are cigars, earthenware, and machinery. The place was named after August Oelwein, who settled here in 1875, and was incorporated in 1888. Population, 1905, 5,632; in 1910, 6,028.

OETA (ē'tà), a group of mountains in Greece, forming the southern boundary of Thessaly. The pass of Thermopylae is at the eastern extremity of these mountains, which form a natural barrier between northern and central Greece.

OFFENBACH (ōf'fēn-bāk), a city of Germany, in the Grand Duchy of Hesse, four miles east of Frankfort. It is finely situated on the Main and a number of railways. The chief buildings include an old palace, the townhall, and several fine schools and churches. The streets are straight and well paved with stone and macadam. An extensive system of electric railways furnishes communication with Frankfort and other cities. Among the manufactures are pipe-tobacco and cigars, textiles and carpets, leather and rubber goods, chemicals, soap, and machinery. It was a place of refuge for many French Protestants in the 17th century. Population, 1905, 59,765.

OGDEN (ōg'dēn), a city of Utah, in Weber County, at the confluence of the Ogden and Weber rivers, 37 miles north of Salt Lake City. It is on the Ogden and Northwestern, the Union Pacific, the Southern Pacific, and the Oregon Short Line railroads. The site is a beautiful tract with an elevation of 4,325 feet above the sea. Among the improvements are electric lighting, waterworks, pavements, and street railways. It has manufactures of canned fruit, clothing, flour, brooms, dairy products, machinery, ironware and earthenware. The architecture is largely of brick and stone. It is the seat of a military academy, the Ogden Academy, and the University of Utah. Ogden has a fine Mormon

tabernacle and a number of churches. The surrounding country is agricultural and mining, producing cereals, grasses, fruits, and precious minerals. Its healthful climate makes it a favorite resort for invalids and tourists. In the vicinity of Ogden are thermal springs of value in the treatment of rheumatism, scrofula, and other diseases. The place was first settled in 1848. It was platted as a town in 1850 and was incorporated the next year. The first settlers were Mormons who came here under the direction of Brigham Young. Population, 1900, 16,313; in 1910, 25,580.

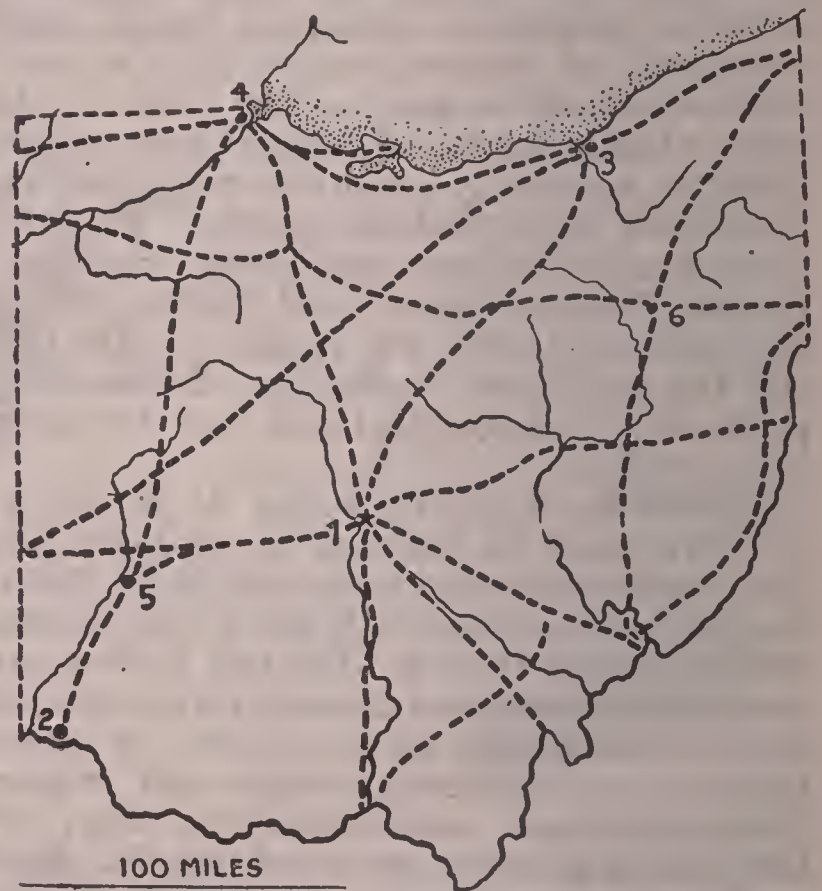
OGDENSBURG (ög'děnz-bürg), a city of New York, in Saint Lawrence County, on the Saint Lawrence River, seventy miles below Lake Ontario. The place has transportation facilities by steamship and by the Rutland and the New York Central railroads. It is a United States port of entry and has a large trade in lumber, grain, and other produce. Among the manufactures are leather goods, flour, machinery, lumber products, and hardware. Among the noteworthy buildings are the Federal customhouse, the public library, the city hall, the State armory, the Ogdensburg Free Academy, the Saint Lawrence Hospital, and the Roman Catholic cathedral. It has fine parks, including Crescent, Grove, Hamilton, Mansion, and Riverside parks. The public utilities include systems of waterworks, sanitary sewerage, and electric street railways. It was settled in 1749 and incorporated in 1817. The British captured it in 1813. Population, 1905, 13,179; in 1910, 15,933.

OGOWE (ō-gō-wā'), or **Ogobay**, a river of West Africa. It rises near the southern boundary of Cameroon and, after a course of about 400 miles toward the southwest, flows into the Atlantic Ocean, near Cape Lopez. It is characterized by a number of rapids and cataracts and enters the ocean by an extensive delta. In the dry season it becomes a narrow current, but during the rainy period it assumes such an immense size that it was long thought to be one of the leading arteries of Africa. Du Chaillu explored the river in 1857, and soon after a number of French stations and missions were established in its valley. A large part of the Ogowe basin is fertile, producing tobacco, fruits, cereals, and grasses.

OHIO (ō-hī'ō), a large river of the United States, formed at Pittsburg, Pa., by the junction of the Monongahela and Allegheny rivers. After a course of 975 miles toward the southwest, it joins the Mississippi at Cairo, Ill. The river is navigable in its entire course from Pittsburg, being 600 yards wide at that city, and it drains a basin of 214,000 square miles. It forms

the southern boundaries of the states of Ohio, Indiana, and Illinois, the northern boundary of Kentucky, and the northwestern boundary of West Virginia. The principal northern tributaries include the Muskingum, Scioto, Miami, and Wabash, and its principal southern affluents are the Great Kanawha, Big Sandy, Licking, Kentucky, Green, Cumberland, and Tennessee. The important cities on its shores include Evansville, New Albany, Louisville, Cincinnati, Portsmouth, Marietta, Wheeling, Cairo, and Pittsburg. As a waterway the Ohio is of vast importance and its valley is noted for great fertility. It is the largest eastern tributary of the Mississippi.

OHIO, a north central state of the United States, popularly called the *Buckeye State*. It is bounded on the north by Michigan and Lake



OHIO.

1, Columbus; 2, Cincinnati; 3, Cleveland; 4, Toledo; 5, Dayton; 6, Canton. Chief railroads shown by dotted lines.

Erie, east by Pennsylvania and West Virginia, south by West Virginia and Kentucky, and west by Indiana. The length from east to west is 223 miles and the width from north to south, 210 miles. The area is 41,060 square miles, of which 300 square miles are water surface.

DESCRIPTION. As a whole, the State has an undulating surface, being quite hilly in the northeastern part, though its general elevation is only from 425 to 1,540 feet above sea level. A ridge crosses the State from the northeastern corner to about the middle of the western boundary, this being the divide between the basin

of the Ohio River and that of the Great Lakes. Near Bellefontaine, in Logan County, is the greatest altitude. Bluffs about 600 feet high extend along the Ohio River. These bluffs are penetrated by many short and rapid streams.

The drainage is principally toward the south into the Ohio River, which forms the entire southern boundary, separating the State from West Virginia and Kentucky. Into it flow the Great Miami, the Little Miami, the White, the Scioto, the Hocking, and the Muskingum, all of which have numerous tributaries. The northern part is drained into Lake Erie by the Maumee, the Sandusky, the Cuyahoga, and the Grand. Maumee Bay and Sandusky Bay extend into the northern coast. A number of islands in Lake Erie belong to the State, including Catawba, Kelly's, and Put in Bay.

The climate is temperate and healthful, though sudden changes in the temperature are quite frequent. The extremes of both heat and cold are influenced and shortened by constantly varying winds. In the north the temperature is modified by the presence of Lake Erie, and here the winters are quite cold and severe, but the southern half is somewhat warmer. The temperature ranges from 30° below zero to 98° or even 105° above. In the northern part the mean temperature is 48° and in the south it is 54° degrees. All parts of the State have an abundance of rainfall, which is evenly distributed throughout the year, being 38 inches annually. Considerable snow falls during the winter, but it does not lie long on the ground in the southern part.

MINING. Bituminous coal of an excellent quality is abundant in the southern and eastern parts of the State, where the veins have a thickness of four to fifteen feet. It is estimated that these fields cover an area of 12,500 square miles. The annual output has been increased considerably in the past decade and is given at 30,500,000 tons. Hocking, Athens, Jackson, Guernsey, Belmont, and Perry counties have extensive mines. In the output of salt the State takes high rank. Petroleum of a good quality is found in two fields, one in the southeastern and the other in the northwestern part, the former being known as the Eastern and the latter as the Lima fields. In the output of petroleum the State ranks third, with a yield of 15,500,000 barrels per annum. Natural gas of an excellent quality is found in the oil-producing districts. Ohio has first rank in the value of clay products, the deposits of clays including those suitable for tile, brick, and pottery. Granite, sandstone, and limestone are well distributed and extensively quarried for building pur-

poses. Stones suitable for lime, grindstones, and whetstones are worked extensively. Iron ore was formerly mined to a considerable extent, but the output has decreased on account of large importations from Michigan and Minnesota. Other minerals include gypsum, bromine, natural cement, and mineral waters.

AGRICULTURE. About 94 per cent. of the land area is in farms, which average 88 acres. The land is farmed with considerable care and in many places commercial fertilizers are used to maintain a high degree of fertility. Corn, wheat, and hay are the leading crops, and in the output of these the State holds a very high rank. Other products embrace oats, potatoes, tobacco, barley, rye, and buckwheat. It takes first rank in the cultivation of fruits grown in the Temperate Zone, the annual yield of apples alone being 21,250,000 bushels. Vegetables of all kinds thrive. Large quantities of cabbage, tomatoes, and sweet corn are grown for canning purposes. Darke and Montgomery counties are noted for the large yield of tobacco.

Stock raising is favored by large areas of grazing lands and a suitable climate. Dairying interests are well developed and dairy cows of a high grade are grown extensively. Many cheese factories are managed on the coöperative plan, but much of the product is marketed as milk and butter. Meat cattle are grown in large numbers. In sheep raising the State for a long time held first rank. Other live stock includes swine, horses, mules, and poultry. Many farms have small preserves of forests, made up largely of maple, ash, walnut, chestnut, spruce, oak, and beech trees. These tracts, though covered with a prolific growth of trees, furnish fine pasturage.

MANUFACTURES. In the value of manufactured products Ohio usually takes fifth rank, being exceeded only by Illinois, Pennsylvania, Massachusetts, and New York. In the output of iron and steel products it is second only to Pennsylvania. Cleveland is the most important manufacturing center, but it is followed closely by Cincinnati, and a high place is held by Toledo, Columbus, Dayton, and Akron. Foundry and machine shop products, flour and grist, and cured and packed meats hold high rank in value and quantity. Malt and distilled liquors are produced in large quantities and considerable wine is made from Catawba grapes. Ohio has first rank in the value of stone and earthen products, such as brick, tile, and pottery. Lumber products, especially furniture and railway cars, are made in large quantities. Other manufactures include pipe tobacco and cigars, carriages and wagons, soap and candles, clothing,

boots and shoes, paper and wood pulp, and products from printing and publishing.

TRANSPORTATION AND COMMERCE. The State is highly favored in transportation facilities, being conveniently located on Lake Erie and the Ohio River. These afford direct water connections with the Atlantic coast, the Gulf of Mexico, and the states lying on the Great Lakes. The Ohio Canal extends from Cleveland to Portsmouth; the Hocking Canal, from Carroll to Nelsonville; the Miami and Erie Canal, from Cincinnati to Toledo; and the Walhonding Canal, from Rochester to Roscoe. Electric railroads are operated in many parts, and it is possible to cross the State in several directions by these lines. The State has 9,250 miles of railroads and is crossed by the principal transcontinental lines passing from the Atlantic seaboard to Chicago and Saint Louis. The longer lines include those of the Lake Shore and Michigan Southern, the Baltimore and Ohio, the Erie, the Pennsylvania, the Wabash, the Toledo and Ohio Central, the Wheeling and Lake Erie, and the Cleveland, Cincinnati, Chicago and Saint Louis. Cleveland and Cincinnati are the largest commercial and jobbing centers. Ohio exports large quantities of petroleum, coal, steel, and iron, liquors, clothing, grain, fruits, and machinery. It imports raw cotton and other materials for manufacturing.

GOVERNMENT. The present constitution was adopted by popular vote in 1851. It vests the chief executive authority in the governor, lieutenant governor, secretary of State, treasurer, attorney-general, and school commissioner, all elected for two years, and an auditor elected for four years. The gas commissioner, State and law librarian, commissioner of railroads and telegraphs, and a number of other officials are appointed by the Governor. Legislative authority is vested in the Legislature, which consists of a senate and a house of representatives. The members in both bodies are apportioned by counties or districts according to population and are elected for terms of two years. The supreme court constitutes the highest judicial authority and subject to it are the circuit courts, courts of common pleas, courts of probate, justices of the peace, and other courts that may be established by the Legislature. All the judges are elected by popular vote. Local government is administered by county, municipal, and township officers.

EDUCATION. Education has received marked attention from the early history of the State. The rate of illiteracy is 4 per cent., but among native whites it is only 2.4 per cent.; among foreign whites, 11 per cent.; and among the colored

people, 17.9 per cent. School attendance is compulsory between the ages of eight and fourteen years. Considerable progress has been made in the centralization of rural schools, giving outlying districts the advantage of graded and high school courses. Ohio has more high schools than any other State, but the high school attendance is greater in New York. Ample facilities have been provided for the instruction of teachers, both in State and private normal schools, and some of the universities maintain courses in pedagogy. Columbus is the seat of the Ohio State University, in which the system of public instruction culminates. Among the higher institutions of learning are the Ohio University, Athens; the Ohio Wesleyan University, Delaware; the Mount Union College, Alliance; the Calvin College, Cleveland; the University of Wooster, Wooster; the Western Reserve University, Cleveland; the Oberlin College, Oberlin; the Marietta College, Marietta; the Hiram College, Hiram; the Saint Xavier College, Cincinnati; the Twin Valley College, Germantown; the Buchtel College, Akron; the Heidelberg University, Tiffin; the Wittenberg College, Springfield; and the Hebrew Union College, Cincinnati.

The benevolent and penal institutions are under the management of a State board of charity, consisting of six members, who are appointed by the Governor. These institutions include State hospitals at Columbus, Cleveland, Athens, Dayton, Massillon, and Toledo, an institution for feeble-minded at Columbus, a soldiers' and sailors' orphans' home at Xenia, an institution for the blind at Columbus, the penitentiary at Columbus, the State reformatory at Mansfield, the boys' industrial school at Lancaster, the girls' industrial home at Delaware, the soldiers' and sailors' home at Sandusky, and institutions for the deaf, blind, and dumb at Columbus. Prisoners in the penitentiary are employed to some extent under the contract system, but they remain under the complete control of the State.

INHABITANTS. Large settlements were made in Ohio by immigrants from Pennsylvania and the eastern states. Many Germans from Switzerland and Germany were attracted to the State and this class constitutes more than half of the people of foreign birth. It is more densely populated than any State west of the Allegheny Mountains, having an average of 102 persons to the square mile. Columbus, on the Scioto River, is the capital. Other cities include Cleveland, Cincinnati, Toledo, Dayton, Youngstown, Akron, Springfield, Canton, Zanesville, Findlay, Sandusky, Hamilton, Lima, Newark, Mansfield,

Steubenville, Portsmouth, Chillicothe, East Liverpool, Ironton, Tiffin, and Massillon. In 1900 it had a population of 4,157,545. This included a total colored population of 97,341, of which 371 were Chinese and 96,901 Negroes. Population, 1910, 4,767,121.

HISTORY. Ohio was formed from the Northwest Territory. French fur traders visited the region as early as 1670 and the following year it was formally claimed as a possession of France. Both France and England made claim to the whole region at the time of the French and Indian War and the treaty of Paris, in 1763, gave the region as far west as the Mississippi to the English. The southern part of the State was claimed by Virginia and the northern part by Connecticut, and in 1783 the former ceded its interest to the general government, while the latter made a similar cession in 1786, but retained ownership of the lands that afterward became known as the Western Reserve. In 1787 an act was passed by Congress for the government of the Northwest Territory and General Putnam founded a settlement at Marietta, in 1788. Settlements followed rapidly until in 1791, when a war broke out with the Indians, who were finally subdued by General Wayne in 1794. Ohio was set off under a separate government in 1800 and on Feb. 19, 1803, it was admitted as a State.

The State gave loyal support to the Union in the War of 1812, when the British were repulsed at Fort Meigs. Although many Indians joined the British, the region was ably defended by William Henry Harrison. The contest ended in the State by Perry's victory on Lake Erie. During the long interval of peace many canals were constructed to connect the natural waterways and railroad building began with much vigor before the Civil War. The State furnished a large number of troops to maintain the Union against the Confederacy, including many leaders of distinction, such as Sherman, Rosecrans, and McDowell. It has vied with Virginia in furnishing presidents of the Union, Grant, Hayes, Garfield, Benjamin Harrison, McKinley, and Taft being native Ohioans.

OHIO STATE UNIVERSITY, a coeducational institution of higher learning at Columbus, Ohio. It was founded in 1870 as the Ohio Agricultural and Mechanical College and assumed its present name in 1878. The institution is supported by special appropriations of the General Assembly and by permanent annual grants from the State and Federal governments. It embraces the six colleges of agriculture and domestic science; arts, philosophy, and science; pharmacy; engineering; law; and veterinary

science. Admission is based upon examinations or certificates from accredited high schools and colleges. The property of the university is valued at \$2,975,000 and the annual income is \$625,000. It has a faculty of 175 instructors, a library of 75,000 volumes, and an attendance of 2,280 students.

OIL CITY, a city of Pennsylvania, in Venango County, on the Allegheny River, 132 miles north of Pittsburg. It is on the Erie, the Pennsylvania, and the Lake Shore and Michigan Southern railroads. The surrounding country is a productive oil and coal region. It has a large trade in oil and merchandise. Among the manufactures are engines, steam boilers, and pipes, machinery, vehicles, cigars, hardware, and refined oils. The noteworthy buildings include the Carnegie Free Library, the Oil Exchange, the high school, and the city hospital. It has Hasson's and Smithman's parks. Waterworks, pavements, electric lighting, and street railways are among the improvements. The place was settled in 1825 and owes its prosperity to the discovery of vast oil deposits in 1859. It was incorporated as a city in 1874. Population, 1900, 13,264; in 1910, 15,657.

OILCLOTH, a cloth treated with oil or paint and used for making garments, covering for floors, and various other purposes. Jute or burlap are used in making the canvas which forms the basis of oilcloth. It is sized by treating with varnish, liquid glue, or rye flour, the canvas being passed through a trough, after which the surplus sizing is removed by pressure between two rollers. It is then rubbed down with pumice stone and given a coat of paint. The better grades are rubbed down with pumice stone several times, after which they are colored by machinery, dried, and varnished. Oilcloth is sold on the market in different widths and many grades. The heavier and more durable kinds are used for floor covering.

OIL PALM. See **Palm Oil.**

OILS, a generic term used to describe various neutral liquids, usually of either animal or vegetable origin, but sometimes of mineral origin. The oils are lighter than water. They are insoluble in water, but sometimes soluble in alcohol and always in ether. They take fire when heated in air and give off a luminous flame when burning. Animal and vegetable oils are divided according to their properties into volatile or essential oils, and fatty or mixed oils. *Essential oils* are obtained chiefly by extracting the volatile principles of plants by distillation, and are used principally in medicine and perfumery, though they also enter extensively into the manufacture of varnishes and serve in the

preparation of coloring matter. Chemically they are composed of hydrocarbons, or mixtures of hydrocarbons with compounds of hydrogen, carbon, and oxygen. Among the many essential oils are those known as the oils of cinnamon, anise, peppermint, nutmeg, mint, lime, lemon, clove, lavender, thyme, orange, bergamot, marjoram, cajeput, chamomile, caraway, fennel, and many others.

Fatty oils penetrate paper and like substances. They communicate to paper a partial transparency and leave a permanent translucent grease spot. The fatty oils from animals are simply the liquid portions of animal fat, but those of vegetable origin are obtained chiefly from seeds by pressure. These oils are composed principally of glycerids of palmitic, stearic, and oleic acids, and are subdivided into drying and non-drying oils. The *drying oils* are of vegetable origin and slowly absorb oxygen from the air, forming a varnish, and are used in the manufacture of paints and varnishes. The *nondrying oils* decompose on exposure to the air, when they change to a darker color and take on a disagreeable smell and taste. They are used as food, in medicine, in soap making, and for many other purposes. Among the principal drying oils are the oils of walnut, linseed, candle nut, hemp, poppy, sunflower, sesame, and madia. The nondrying oils include those made of cotton seed, olive oil, castor oil, rape oil, colza oil, and groundnut oil. Among the *animal oils* are included lard, butter, tallow, sperm oil, cod-liver oil, seal oil, neat's-foot oil, porpoise oil, train oil, shark oil, and many others.

The *mixed oils* enter largely into the foods and medicines and are common sources of artificial light. They are also of service as lubricants. Butter is obtained from milk, tallow from the fat of sheep and cattle, and lard from that of swine. Neat's-foot oil is secured by extracting the fatty substances from the feet of cattle. *Mineral oils* form a class somewhat by themselves and include oils distilled from shale, peat, and other mineral substances. This class of oils also includes petroleum. They are thought to have been formed by the decomposition of vegetable and animal matter, though some writers regard petroleum of purely mineral origin. Mineral oils are composed largely of carbon and hydrogen.

OIL WELLS. See **Petroleum.**

OJIBWAYS (ō-jīb'wāz), or **Chippewas**, a tribe of Algonquin Indians found in the region of Lake Huron and Lake Superior by the early settlers of America. Their number was reduced greatly by warring with neighboring tribes, particularly with the Iroquois and Sioux. They

sided with the French against the English, later joined Pontiac in his wars, and during the Revolution sided with the British. Peace treaties were made with them in 1785 and 1789. Subsequently they joined the uprising of the Miamis, but were reduced by General Wayne, and made another peace treaty in 1795. In the War of 1812 they were again unfriendly, but in 1817 they relinquished all their lands in Ohio, and by 1851 most of the tribe had been moved west of the Mississippi. This Indian tribe includes many who have advanced considerably in industrial and educational arts. Their history from the early settlement of America has been written in an interesting manner by several of their scholars.

OKA (ā-kā'), a river of Central Russia. It rises 35 miles south of the city of Orel and, after a tortuous course toward the northeast, joins the Volga at Nijni Novgorod. The Oka is 950 miles long, flows through one of the most fertile regions of Russia, and is an important commercial route for 600 miles.

OKAPI (ō-kä'pī), an animal discovered in 1899 by Sir Harry Johnston in the Semliki forest of the Congo. It belongs to the giraffe family, is 4½ feet high at the withers, and is about the size of an ox. While the head resembles that of the giraffe, it has no external horns, the tail and neck are short, and the fore legs are considerably elongated. The color of the animal is peculiar, the jaws and cheeks being yellowish white, the neck dark brown, the forehead chestnut, the shoulders ranging from black to vinous red, the tail chestnut, and the belly blackish. Black stripes band the legs, which are white or cream colored with tinges of orange. The ears are large and colored a deep red chestnut fringed with black. Reports published recently agree that the okapis live in pairs in the densest forests, chiefly in the northern Congo basin, where they are hunted for their skins and flesh by the natives.

OKEECHOBEE (ō-kē-chō'bē), a large lake in southern Florida, being 40 miles long and 25 miles wide. The maximum depth is only about 12 feet. It receives the drainage from Lake Kissimmee and a number of other sheets of water by the Kissimmee River, and its outlet is into the Gulf of Mexico by the Caloosahatchee. Within the lake are a number of islands, and in the vicinity are extensive everglades. Much of the region has been redeemed by an extensive system of drainage.

OKHOTSK (ō-kōtsk'), **Sea of**, an Asiatic inlet from the Pacific Ocean, situated east of Siberia and west of Kamchatka. It is partly inclosed by the Kurile Islands. The Gulf of Tar-

tary joins it with the Japan Sea. It is 990 miles long and 495 miles wide. Within it is the large island of Saghalien. The principal inflow of fresh water is by the Amur River. It has extensive fisheries, but its commerce is limited on account of the extremely cold climate. It is quite deep, has no shoals or sand banks, and is subject to fogs and storms.

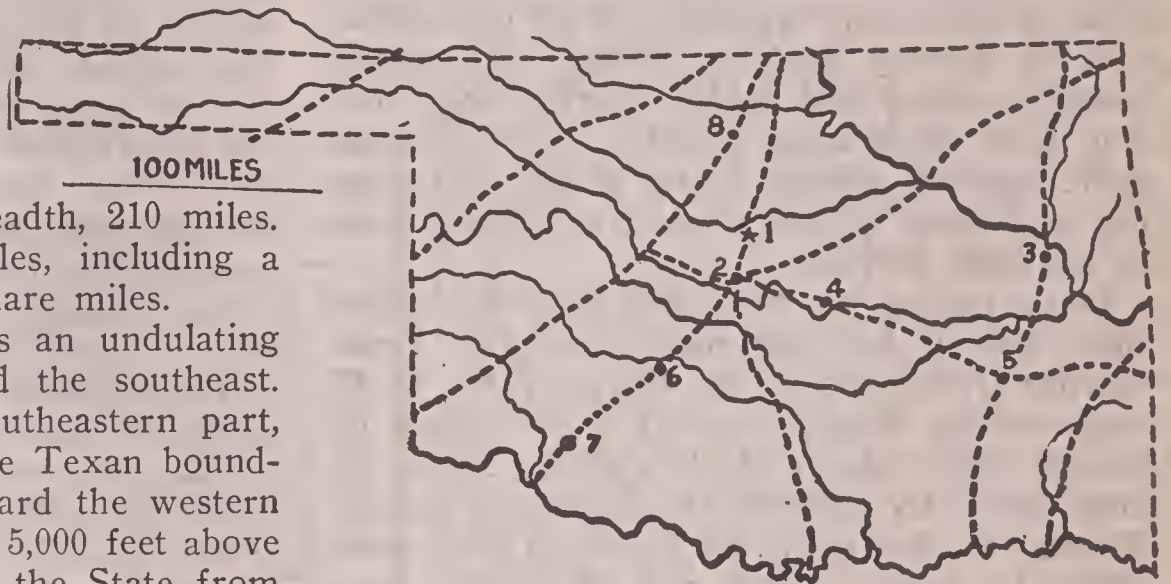
OKLAHOMA (òk-là-hõ'mà), a south central state of the United States, popularly called the *Boomer State*. It is bounded on the north by Colorado and Kansas, east by Missouri and Arkansas, south by Texas, and west by Texas and New Mexico. Its extreme length from east to west is 585 miles; greatest breadth, 210 miles. The area is 70,057 square miles, including a water surface of about 400 square miles.

DESCRIPTION. The surface is an undulating plain, sloping generally toward the southeast. The lowest land is in the southeastern part, where the Red River forms the Texan boundary, and the surface rises toward the western boundary, where the altitude is 5,000 feet above the sea. Ranges of hills enter the State from Arkansas and characterize the portion lying south of the Canadian River as somewhat broken and hilly. The Wichita Mountains are in the southwestern part, chiefly in Kiowa and Comanche counties, where the summits rise about 1,000 feet above the surrounding plains. Along the streams are ranges of hills and bluffs, and these are made up largely of a reddish-colored clay. Sandy tracts characterize the northwestern part, especially the region included in what was formerly known as *No Man's Land*, which is now divided into the counties of Beaver, Texas, and Cimarron.

All of the drainage belongs to the Mississippi system and is carried by the Arkansas and Red rivers. The Red River forms the entire southern boundary, except that of the western prolongation. It receives the inflow from the Washita and the North Fork of the Red rivers. About two-thirds of the State is drained by the Arkansas and its tributaries. The Arkansas enters the State from Kansas, flows through the northeastern corner, and enters the State of Arkansas at Fort Smith. The central part of the State is drained by the Canadian, which crosses the border from Texas and joins the Arkansas near the eastern boundary. In the northern part is the Cimarron River, which flows through the western prolongation, thence passes through a part of Colorado and Kansas, thence reënters Oklahoma, thence reënters Kansas, and thence flows through Oklahoma in a southeasterly di-

rection and joins the Arkansas a short distance above Tulsa. The Salt Fork of the Arkansas enters the State from Kansas and joins the Arkansas on the southeastern border of Kay County. None of the rivers within the State is navigable, being low and shallow during the summer, but most of them are high in the spring. The State has no lakes of importance.

The climate is favorable and healthful and in the eastern part it is especially delightful, being less liable to sudden changes than in the west-



OKLAHOMA.

1, Guthrie; 2, Oklahoma City; 3, Muskogee; 4, Shawnee; 5, McAlester; 6, Chickasha; 7, Lawton; 8, Enid. Chief railroads shown by dotted lines.

ern part. Severely cold weather rarely occurs and the winters are mild. Rainfall is greatest in the eastern part, where it averages about 56 inches, and the rainfall for the State is 31 inches. In the extreme western part the rainfall is scant, usually about 22 inches, and irrigation is employed to some extent. The mean temperature for the State is 59.5°, the extremes ranging from a few degrees below zero to 98° and even 112° above.

MINING. Oklahoma has an abundance of mineral wealth, but mining has not been developed to the extent of its possibilities. Petroleum and natural gas are produced in large quantities. Extensive bituminous coal fields abound in the eastern and southern parts, especially in the Chickasaw Nation. Large deposits of valuable granite are found at Granite and in other localities, where quantities are quarried for monuments and building purposes. Coal takes rank as the most important product of the mines, yielding about 4,500,000 tons per year, and a considerable amount of the output is shipped to adjoining states. Limestone, sandstone, and clays are abundant. Other minerals include gypsum, salt, iron, copper, ocher, glass sand, and mineral waters. Asphalt of a good quality is obtained in the eastern part, from lands con-

trolled largely by the Choctaw and Chickasaw Indians.

AGRICULTURE. The interests in agriculture and stock raising are extensive. At present the farms average 250 acres and the variety of crops grown is larger than in most of the states. Corn and wheat represent the larger acreage. Kaffir corn is grown extensively in the arid regions of the western part. Cotton is cultivated throughout the southern section and the yield per acre is in excess of that of any other State. Considerable profit is obtained from the cultivation of tobacco, peanuts, broom corn, castor beans, potatoes, and fruits. Barley, oats, flax, and millet yield large returns. The fruits include peaches, apples, pears, plums, and cherries and much of the product is shipped fresh to northern markets.

Cattle raising has flourished since the region was opened for settlement, but the larger ranches are located in the western part. Cattle represent the largest interests in the animal industry. This class of stock is grown chiefly for meat, but dairy interests are developing rapidly. Horses of a fine grade are grown in large numbers. In raising swine and sheep the State takes high rank and it has considerable interests in rearing mules. Poultry of all kinds is grown with profit. A large part of the live stock is shipped to the markets without the State, the larger part going to Kansas City, Mo.

MANUFACTURES. Material development has been made in manufacturing the past several years, especially in flouring and grist milling, the products of which have a value of \$15,000,000 per year. The southern and eastern parts have extensive lumber milling interests, where large quantities of oak, hickory, elm, cotton wood, ash, and walnut forests are found. The cotton-seed oil and cake produced make up a material item and considerable quantities of machinery, earthenware, pipe tobacco and cigars, and clothing are made. Blankets, baskets, moccasins, and wearing apparel are made by the Indians. Coke is made from the coal and oil refineries prepare for market a part of the petroleum output.

GOVERNMENT. The present constitution was ratified by the people at a special election in 1907, in which year the former divisions of Oklahoma and Indian Territory were admitted as a single State. It vests the executive authority in the governor, lieutenant governor, secretary of State, auditor, treasurer, attorney-general, State examiner and inspector, chief mine inspector, superintendent of public instruction, commissioner of labor, commissioner of charities and corrections, and commissioner of in-

surance, each being elected for terms of four years, but the governor, secretary, auditor, and treasurer are not eligible immediately to succeed themselves. Legislative authority is vested in a General Assembly, which consists of a senate of 44 members elected for four years and a house of representatives of 109 members elected for two years. Sessions of the Legislature are held biennially, beginning on the Tuesday after the first Monday in January. A supreme court, district courts, county courts, and such other courts as may be established by law comprise the judicial department. Five judges elected for six years constitute the supreme court. Local government is administered by counties, municipalities, and townships. The constitution provides that a day's work shall consist of eight hours in all cases of employment by the State or any county or municipality, and the contracting of convict labor is prohibited.

TRANSPORTATION AND COMMERCE. Communication is almost exclusively by railroads, as none of the rivers is navigated to a considerable extent. A number of trunk lines extend across the State, including the Chicago, Rock Island and Pacific, the Atchison, Topeka and Santa Fé, the Missouri, Kansas and Texas, the St. Louis and San Francisco, and a number of others. All the lines have numerous branches, hence all parts of the State are favored in having transportation facilities. The lines aggregate a total of 6,500 miles. Oklahoma, Guthrie, Muskogee, Ardmore, Enid, and McAlester are railway centers. The exports consist chiefly of grain, live stock, fruits, cotton, lumber, and coal. Manufactured goods, clothing, and machinery are imported. Telephone lines are operated in all parts of the State. Electric railways are maintained in the cities and more densely populated districts.

EDUCATION. The rate of illiteracy, based on the entire population, is given at 5.5 per cent., but it is much smaller among whites and considerably greater among the Indians and Negroes. Public schools are maintained in all sections of the State where settlements have developed. The schools are supported in part from a public fund created by reserving two sections of land in each township, which is sold or leased according to the local demand, but additional support is obtained from county and local taxes. A superintendent of public instruction has general charge of the educational work, but he is aided through county and city superintendents. Attendance upon the schools is free and is compulsory between the ages of five and eighteen years. High schools are maintained in all the towns and cities, but the schools for colored children are separate. Norman is the seat of the University

of Oklahoma; Alva and Edmond, of normal schools; Langston, of the Langston University; Stillwater, of the State Agricultural and Mechanical College; Weatherford, of the Northwestern Normal School; Tonkawa, of the University Preparatory School; and Oklahoma City, of Epworth University. Formerly Indian Territory and Oklahoma Territory had separate schools, but they are now merged into one system, although Federal support is still given to further the education of Indian children. Provisions have been made for the care of the deaf, dumb, insane, and other unfortunates. The State



Map to show the former territory of Oklahoma and Indian Territory.

is rapidly solving the problem of placing the correctional and reformatory institutions on a modern and efficient basis.

INHABITANTS. The population of Oklahoma is made up largely of immigrants from other states and Indians who resided in reservations before the State was admitted. In 1900 Oklahoma had 398,331 inhabitants, of which 11,945 were Indians and 18,831 Negroes. In the same year Indian Territory had a population of 391,960, which included 36,053 Negroes, and 52,500 Indians. Most of the Indians are classed with the Five Civilized Nations, including the Cherokee, Chickasaw, Choctaw, Creek, and Seminole races. Other Indians represented by considerable numbers include the Modoc, Osage, Ottawa, Seneca, Shawnee, and Wyandotte. The population of Oklahoma has been increasing rapidly, mainly through the immigration of whites, who have been attracted by the splendid resources of the State. In 1910 the total population, as ascertained by the federal census, was 1,657,155. Guthrie, in the central part, is the capital. Other cities include Oklahoma City, Ardmore, Muskogee, Lawton, Enid, Shawnee, South McAlester, El Reno, Chickasha, and Tulsa.

HISTORY. It is thought that the first white man to visit the region included in Oklahoma was Don Diego de Penalosa, who, in 1662, made

a tour from the Gulf of Mexico to the regions beyond the Arkansas River. Title to it was secured by the United States in the Louisiana Purchase of 1803. It was included with a large scope of country set apart for the Indians in 1834. The government purchased a strip of land lying between Texas and Kansas, generally known as No Man's Land, in 1889, and this was added to other lands now included in Oklahoma. What was organized as the Territory of Oklahoma, a tract of 39,030 square miles, was detached from Indian Territory in 1890. Subsequently the government purchased titles from the Indians and in 1893 opened for settlement several large tracts by proclamation. Immediately vast numbers of settlers came into the region for staking claims and forming settlements.

In 1906 Congress passed the Statehood bill, which united the Territory of Oklahoma and Indian Territory, and the new State was admitted by proclamation on Nov. 16, 1907. Since tribal relations had already ceased among the Indians under an arrangement made by the government, in 1906, the adoption of statehood did not violate the rights or regulations previously granted to the Indians. The prohibition of the sale and manufacture of

liquor was incorporated in the constitution by a large majority at the time of admission. Women are permitted to vote in school elections, but not in other elections. Having extensive natural resources and a favorable climate, Oklahoma is destined to become one of the wealthiest communities in the Union.

OKLAHOMA CITY, the largest city in Oklahoma, county seat of Oklahoma County, on the North Fork of the Canadian River, thirty miles south of Guthrie. It is on the Missouri, Kansas and Texas, the Saint Louis and San Francisco, the Chicago, Rock Island and Pacific, the Atchison, Topeka and Santa Fé, and other railroads. The noteworthy buildings include the county courthouse, the Carnegie public library, the Epworth University (Methodist), the high school, the city hall, and many schools and churches. It has electric street railways, public waterworks, sanitary sewerage, and pavements of brick and asphalt. The jobbing and wholesaling interests are very extensive. Among the manufactures are machinery, utensils, textiles, and tobacco products. It has a growing trade in agricultural produce, lumber, live stock, and merchandise. Oklahoma City was founded in 1889 and within a month had 800 houses. It was incorporated in 1891. In 1900 it had 10,037 inhabitants. Population, 1910, 64,205.

OKLAHOMA, University of, a coeducational institution at Norman, Okla., established in 1892. It is supported by State appropriations, a State income tax, and an income from the sale of certain public lands. All residents of the State are admitted without the payment of tuition. The university maintains courses in the arts, sciences, pharmacy, medicine, and engineering. With it is connected a preparatory school. The faculty includes about 40 instructors, the library contains 20,000 volumes, and the attendance is 650 students.

ÖLAND (ē-länd'), or **Oeland**, an island in the Baltic Sea, located off the coast of Sweden, to which it belongs. It has an area of 510 square miles. For political purposes it is included with the county of Kalmar. The soil is not naturally fertile, but it has been improved by cultivation and the use of fertilizer. Barley, oats, flax, and cattle are the chief products. Productive fisheries are located off the coast. Borgholm, the capital and chief town, contains an old castle. Population, 1906, 31,216.

OLDENBURG (ōl'den-bûrg), the name of a city and a grand duchy of Germany. The grand duchy of Oldenburg is composed of the principalities of Lübeck and Birkenfeld and the duchy of Oldenburg. The total area is 2,479 square miles. A large part of the drainage is by the Weser into the North Sea. It is celebrated for its fertility of soil and its intimate connections with the history of Germany. In ancient times it was occupied by Teutonic peoples who were later known as Frisians, and it was noted as a Protestant stronghold during the Reformation. The history properly begins with the 12th century, when a count of the House of Oldenburg became the ruler. In the 17th century it became a possession of Denmark, but was made a duchy in 1777. Since 1871 it has belonged to Germany. Population, 1905, 438,856.

The city of Oldenburg is on the Hunte-Ems Canal, 25 miles west of Bremen, and is the capital of the duchy of Oldenburg. It has a public library of 100,000 volumes, a museum of natural history, the Church of Saint Lambert, and a fine railroad station. The palace is surrounded by beautiful gardens and contains many works of art. Among the manufactures are leather, clothing, glass, machinery, and earthenware. Population, 1905, 28,565.

OLD FORGE, a borough of Pennsylvania, in Lackawanna County, on the Lackawanna River, four miles southwest of Scranton. It is on the Delaware, Lackawanna and Western Railroad and is surrounded by a productive anthracite coal-mining region. Old Forge has one of the finest high school buildings in the county.

Waterworks, sewerage, and electric lighting are among the public facilities. The manufactures include glass, fertilizers, chemicals, silk and cotton textiles, and machinery. The first settlement in its vicinity was made in 1830, but it was not incorporated until 1899. Population, 1900, 5,630; in 1910, 11,324.

OLDHAM (ōld'hām), a city of northwestern England, in Lancashire, on the Medloch River, 37 miles northeast of Liverpool. It is connected with other trade emporiums by a number of railroads and is noted for its extensive industries and commercial trade. The manufactures include cotton and woolen goods, leather, machinery, silk textiles, cordage, boilers, and engines. Linens were manufactured in Oldham as early as 1630, but its prosperity is due largely to the development of the extensive coal fields in the vicinity. Water mills were established here in 1770. It is at present one of the most important cotton-manufacturing centers of the world. The noteworthy buildings include the townhall, the parish church, and the commercial exchange. Alexander Park includes sixty acres. Among the general facilities are public baths, electric lights, street railways, and stone and macadam pavements. Population, 1907, 141,730.

OLD POINT COMFORT, a village in Virginia, at the south end of Chesapeake Bay, near the mouth of the James River, about fourteen miles north of Norfolk. Communication is by steamboats and by the New York and Philadelphia and the Chesapeake and Ohio railroads. Near it is Fortress Monroe. It is noted for its scenery and as a popular watering and bathing resort. The village has a number of excellent hotels and other facilities. In 1862 it was almost totally destroyed on account of its proximity to Fortress Monroe, but it was rebuilt soon after the war.

OLD RED SANDSTONE, the name of an important geological formation, belonging to the Devonian Age. It lies below the carboniferous strata and is so named to distinguish it from the New Red Sandstone (q. v.), which occurs above the coal measures. In some places the formation has an estimated thickness of 6,000 to 18,000 feet, including many shales and conglomerates. Many fossils of remarkable fish remains occur in it, hence geologists think that it was deposited in inland lakes or seas. Hugh Miller refers to this formation in his literary works entitled "The Old Red Sandstone" and "Footprints of the Creator."

OLD SOUTH CHURCH, a celebrated church erected in Boston, Mass., in 1730. It was built on a tract of land purchased by John Winthrop and is noted as the meeting place

for the Americans during the Revolution. The British used it as a riding school during the siege of Boston, when the library gathered by the Rev. Thomas Prince was scattered. It is now used as a hall for lectures upon historical subjects and as a museum of relics relating to the early history of the colonies and the United States.

OLDTOWN, a city of Maine, in Penobscot County, on the Penobscot River, twelve miles northeast of Bangor. It is on the Bangor and Aroostook and the Maine Central railroads. The chief buildings include the high school, the public library, the city hospital, and the Odd Fellows' Block. It has waterworks, electric and gas lighting, and sanitary sewerage. Extensive water power is utilized in various manufactories, such as mills and machine shops. It has a large trade in lumber and lumber products. The place was settled in 1820 and incorporated in 1840. Population, 1900, 5,763; in 1910, 6,317.

OLEAN (ō-lē-ān'), a city of New York, in Cattaraugus County, near the Allegheny River, seventy miles southeast of Buffalo. It is on the Erie, the Pennsylvania and other railroads. The surrounding country is agricultural and dairying and has deposits of mineral oil. Among the noteworthy buildings are the public library, the State armory, the General Hospital, and the high school. Waterworks and street railways are among the municipal facilities. The manufactures include ironware, leather, flour, refined oil, machinery, and farming implements. It has a growing trade in farm produce and merchandise. Olean was settled in 1804 and incorporated as a city in 1893. Population, 1905, 9,860; in 1910, 14,743.

OLEANDER (ō-lē-ān'dēr), a class of beautiful evergreen shrubs, known as *rose laurel* in France and as *rose bay* in England. It is native to India, but is now naturalized in many temperate and warm countries, though it requires protection during the winter. The leaves are opposite and lance-shaped and when punctured exude a milky juice. The flowers grow in terminal clusters and are of a rose or white color. They have a beautiful appearance, though their odor is not particularly pleasant. The shrubs attain a height of from eight to ten feet, growing mostly in moist places, and the leaves and roots yield medical and poisonous properties. Several species are grown as house plants. They are easily propagated by cuttings and are kept indoors during the winter.

OLEASTER (ō-lē-ās'tēr), the name of a small tree native to the warm regions of the Eastern Hemisphere. It is planted as an ornamental tree for its silver foliage. Several spe-

cies have been described. It grows to a height of about twenty feet, has exceedingly fragrant flowers, and blooms about the middle of May. A species known as *goumi* is grown in Japan for its acid berries.

OLEIC ACID (ō'lē-īk), a colorless liquid obtained by treating olive oil and animal oils with potash. It is without smell or taste, unless it is exposed to air, and solidifies to a



OLEANDER.

firm mass at low temperature. Oleic acid is a component of olein, which is the glyceride of oleic acid, and is the predominating constituent of olive oil and other liquid fats. It is used in the manufacture of soaps, forming *hard soap* with soda and *soft soap* with potash.

OLEOMARGARINE (ō-lē-ō-mār'gā-rīn), an artificial butter originally made of pure beef fat, sometimes called *margarine* and *butterine*. It is now manufactured from milk, cream, neutral lard, oleo oil, and pure butter and, after these ingredients are thoroughly worked together, a coloring matter is added. The manufacture of butter from animal fat was first suggested in France by a chemist named M. Hippolyte Mège, where the process was patented, and it was subsequently introduced into the United States and other countries. However, the process varies to some extent, this depending upon the particular product desired, and machinery of considerable complexity is involved in the operation. The ingredients named above are those usually employed, the neutral lard being prepared from the leaf lard of the hog, and oleo oil is made from the selected fat of the steer. These fats are the very best obtainable and, after the animal heat is removed, they are washed carefully and freed of the

tissue and fibrin. They are next reduced to a liquid form by heating, when cream and milk are added and the whole mass is churned. The product depends upon the flavor and grade of oleomargarine desired. Usually a considerable per cent. of the finest quality of butter is added, and the whole is colored to resemble the dairy product.

Another process consists of preparing the purest fresh beef suet, which is the fatty tissue found in the region of the loins and kidneys of cattle and sheep, by cleansing it in lukewarm water and cutting it as fine as possible by machinery. The membranes of the fat cells are separated from the fat by heating the suet in large vats of water by means of steam to about 130° Fahr. Usually the entire bulk is allowed to rest about two hours while kept warm, in which time the particles of membrane settle and the fat floats as an oil. The oil is now drawn off and allowed to solidify, after which it is subjected to pressure. In this form it is known as *expressed oleomargarine*. A quantity of milk and butter is now added and the whole is churned until the ingredients are mixed thoroughly. The product is then worked and packed the same as pure butter made from cream, and put up in convenient packages. A national law requires that every package be carefully marked, so that consumers may be able to determine the oleomargarine from dairy butter. The manufacture of this product is now an important industry. Chemists have demonstrated its nutritive value to be practically identical with the dairy product. See **Butter**.

OLIGOCENE PERIOD (öl'i-gō-sēn), a division of geological time, extending from the Eocene to the Miocene. The term was first employed by Sir Charles Lyell, but is not used extensively in Canada and the United States. See **Geology**.

OLIVE (öl'iv), a genus of evergreen trees and shrubs found in the warmer regions of the temperate climates. They attain to a height of from fifteen to thirty feet. The leaves are lanceolate or oblong, have a smooth surface above and are horny beneath, and are bluish or dusky-green in color. The flowers are small and whitish, growing in racemes or clusters, which are terminal. Several species of olives are cultivated, most of which are native to Syria, but they have been acclimated extensively in Asia, Europe, Australia, and North America, particularly in the states south of North Carolina and on the Pacific coast. The olive tree bears a fruit of oblong-spheroidal form, with a thin, smooth skin and a hard stone. In all species the fruit is more or less bitter and is used ex-

tensively as a condiment, although it is cultivated principally for the sake of its oil.

The olive tree grows slowly, but is hardy and long-lived. It yields a wood which is prized in cabinet work. Specimens of olive trees are found in Turkey and other countries on the Mediterranean which are estimated to be fully 1,300 years old, while some in Italy are thought to have existed since the time of Pliny. The olive tree was held sacred to Minerva by the ancients. Many peoples of historical times



OLIVE.

A, Cluster of flowers; B, Single flower; C, Fruit.

gave it particular esteem. Wreaths of olives were placed on the brows of victors by the Greeks and Romans. Twigs and leaves of this tree are still regarded as emblems of peace by many peoples, who use the olive branch as a symbol. The olive tree is propagated by slips, seeds, or grafting. It was introduced into the southeastern part of the United States more than 200 years ago. Plantations of olive trees are especially abundant in Turkey, Spain, France, Italy, Malta, Greece, and the Ionian Islands. Several species are cultivated in Japan and China, where the leaves are used for adulterating tea and the flowers serve to give a pleasant flavor to that drink.

Olives intended for table use are picked in an unripe condition. A portion of the bitterness is removed by soaking them in water containing potash, after which they are bottled in

an aromatized brine. *Olive oil* is a non-drying oil and is extracted from the fruit by pressure. The olives are gathered and immediately placed in a crushing mill, where they are ground into pulp. Usually the pulp is placed in a press operated by a screw and the oil oozes from it into a barrel containing water, where it is separated from impurities by the particles settling to the bottom, the oil remaining on the top. The product secured from the first pressure is the best grade of *virgin olive oil*, but the pulp is pressed a second time and sometimes a third and fourth times. The last product is an inferior quality and is used for soap making, while the pulp serves for fuel. Olive oil is clarified by filtration through sand and charcoal, when it assumes a beautiful golden color. An oil made from peanuts somewhat resembles olive oil and is often sold on the market as a substitute.

OLIVE OIL. See **Olive.**

OLIVES, Mount of, or Mount Olivet, an eminence situated east of Jerusalem, separated from the city by the Jehoshaphat valley. It was so named from groups of olive trees that formerly grew here, but most of them have been destroyed. The center is somewhat rounded, is 2,640 feet above sea level and about 385 feet above the valley. A brook called the Kedron flows through the valley, near which stream was the garden of Gethsemane. The village of Olivet, or Tur, occupies the central part of the hill. On the principal summit is a beautiful Armenian church, which is said to mark the spot whence the Ascension occurred, though according to the gospel of Luke that event took place on the farther side of the hill from Jerusalem, near Bethany. Near the church tourists are shown what is thought to be the place where the Savior wept over Jerusalem and where He taught the Lord's Prayer to His disciples. The road leading to Jerusalem around the eastern and southern sides of the Mount of Olives is said to be the one on which He made His triumphant entry into the city.

OLLA-PODRIDA (öl'lä pö-drē'dä), the name of a favorite dish of the Spaniards, consisting of a stew made of meat and vegetables. The ingredients are cut into small pieces and boiled in water, after which milk and seasoning are added. The term is applied figuratively to any miscellaneous collection, particularly to productions in literature.

OLMÜTZ (öl'müts), a city of Austria-Hungary, in the province of Moravia, on the March River, forty miles northeast of Brünn. It has communication by railroads and electric railways. Formerly it was strongly fortified, but

the works have been converted into parks and promenades. Among the principal buildings are the Church of Saint Mauritius, the Jesuit monastery, the commercial exchange, the *Realschule*, the industrial museum, and the public library of 80,000 volumes. It has manufactures of flour, chemicals, clothing, and spirituous liquors. The place is mentioned as early as 1863, when it had a large castle, and became the seat of a bishopric in 1063. Ferdinand I. abdicated here in 1848. Population, 1906, 23,836.

OLYMPIA (ō-līm'pī-a), capital of the State of Washington, county seat of Thurston County, at the southern extremity of Puget Sound, about 100 miles north of Portland, Ore. It is on the Northern Pacific Railroad and has regular communication by steamboats. An abundance of water power is obtained from the Deschutes River, which has a succession of falls that descend 85 feet. A bridge 2,300 feet long spans the southern part of the sound. Among the noteworthy buildings are the State capitol, the county courthouse, the high school, the Saint Peter's Hospital, the McKenney Block, and the Capital National Bank building. The manufactures include lumber products, soap, shoes, and earthenware. It is surrounded by a fertile country, which produces cereals, grasses, fruits, and lumber. Waterworks, gas and electric lighting, and sanitary sewerage are among the utilities. In 1846 the first settlement in Washington was made near Olympia. The place was chartered as a city in 1859. Population, 1900, 4,082; in 1910, 6,996.

OLYMPIA, a valley of Greece, in the southeastern part of Elis, on the banks of the Alpheus River. It is noted as the scene of the Olympic games. In the Altis, or sacred grove, said to have been inclosed by Hercules, was the temple of Zeus, which contained his celebrated statue by Phidias. The vicinity contained many statues of gods and victors in the games, especially in the time of Pliny the Elder, about the year 50 A. D., but the space is now occupied with gardens and fields. Extensive excavations were made in the vicinity by the government of Germany, which resulted in finding coins, medals, and many sculptures, including that of Hermes by Praxiteles.

OLYMPIAD, the period of four years between any two successive celebrations of the Olympic games, used by the ancient Greeks in computing time. It was their custom to designate the Olympiads by numbers, beginning with 776 B. C., when Coroebus won a famous foot race. It was customary to state that an occurrence took place in a year of a certain Olympiad, or that it happened in a particular Olym-

piad. The last Olympiad, which was the 293d, occurred in the year 394 of the Christian era.

OLYMPIC GAMES, the national festivals of the ancient Greeks, celebrated on the plain of Olympia once in four years. They were given in honor of Zeus and constituted their most noted national institution. Olympia, the scene of these games, was a locality in the beautiful valley of the ancient district of Elis, in the Peloponnesus, through which flows the Alpheus River. It was adorned by many exquisite works of art, including statues of the gods and celebrated victors, and many monuments, temples, tombs, altars, and treasures of art. It had fully 3,000 statues in the time of the elder Pliny. Among other improvements were the temple of Zeus, known as the Olympium; the temple of Hera, the wife of Zeus; the ten treasuries, in which were stored the dedicatory offerings of the Greek cities; and the Hippodrome and the Stadium, where the contests occurred. The valley was finely improved by highways, groves, and gardens. Recent excavations have thrown much light upon this locality by the discovery of sculptures and the remains of buildings.

The Olympic games date from 776 B. C., but they were discontinued in 396 A. D. by Emperor Theodosius. Time was reckoned by the Greeks from the year in which the Olympic games were instituted as a national festival, naming the periods of four years between the celebrations as *Olympiads*. The contests took place originally only between Greeks, but after the Roman conquest the competition became general. Among those victorious at the games were Tiberius, Nero, and other distinguished personages. Processions indicating the beginning of the games passed along the Pompic Way, a road that crossed a beautiful spot 660 by 580 feet in extent, which contained the sacred grove of Altis and sanctuaries of great beauty and value. Hostilities between contending parties ceased while the games were in progress. Every Greek who had left his native country made it a point to return on these occasions, if possible, in order to contend in the various athletic sports. These sports consisted of running, wrestling, and other exercises calling into account the various muscles of the body, the favorite games being chariot and horse racing, throwing the quoits and spears, and leaping.

It was necessary for all who took part in these games to have at least ten months' training in the Elis Gymnasium. Judges were selected to determine who should receive the prizes. Those receiving the highest stations of honor were adorned with wreaths of palm leaves and

in later years with garlands taken from the olive trees in the sacred grove. Many of the distinguished victors had statues erected to their memory, and they were otherwise honored by favorable mention and by exemption from taxation. During the festivals many sacrifices and services of devotion were offered to the gods. The period was enlivened by a profusion of inspiring instrumental and vocal music.

A movement originated in modern Greece in 1896 to revive the Olympic games, that year being exactly 1,500 years after they were abolished by Emperor Theodosius. At that time a fine stadium was erected and the performances were witnessed by distinguished people from all countries. The sports consisted of aquatic and athletic performances. Many Greeks, as a result of this movement, have acquired a new impetus for the development of athletic skill, exercises calculated to benefit the nation as a whole. Subsequently these games developed into international sports. Contests for the world's championship were held at Paris, France, in 1900; in Saint Louis, Mo., in 1904; in Athens, Greece, in 1906; and in London, England, in 1908.

OLYMPUS (ô-lîm'pûs), **Mount**, a range of mountains in Turkey, on the boundary between Macedonia and Thessaly. The highest peak rises 9,740 feet above sea level. In the region are many deep ravines and precipices in which forest trees are abundant. This group of mountains entered largely into the mythology of the ancient Greeks, since they believed that Zeus occupied a palace on the top of Mount Olympus. They regarded its peak wrapped so densely in clouds and mist that it was hidden from mortal view. Their poetry relates that its atmosphere is bright and refreshing and that youth never ages there. On its summit was the palace of Zeus and Hera, a structure of burnished gold, cast silver, and gleaming ivory. The later legends, originating at a time when the knowledge of the universe and divine powers became enlarged, convey the view that the gods have their existence in the heavens, among the planets, and it was thus that the name of Olympus became attached to the firmament.

OLYPHANT (ôl'i-fant), a borough of Pennsylvania, in Lackawanna County, on the Lackawanna River, five miles northeast of Scranton. It is on the Delaware and Hudson and the New York, Ontario and Western railroads, and is noted as a mining and shipping center of anthracite coal. The improvements include electric lighting, street paving, and sewerage. Among the manufactures are blasting powder, cigars, and machinery. The first settle-

ment on its site was made in 1857, but its growth dates from the opening of the extensive coal fields in its vicinity. Population, 1910, 8,505.

OMAHA (ō'mā-hā), the largest city in Nebraska, county seat of Douglas County, on the Missouri River, opposite Council Bluffs, Iowa. It is on the trunk lines and the terminus of many railways, including the Union Pacific, the Wabash, the Burlington and Missouri River, the Illinois Central, the Missouri Pacific, the Chicago, Rock Island and Pacific, the Chicago and Northwestern, the Chicago, Milwaukee and Saint Paul, and a number of others. The Missouri River is crossed by several bridges, including the famous structure that connects the railway lines on both sides. An extensive system of electric railways furnishes transportation to all parts of the city and has branches to Council Bluffs, South Omaha, and other points in the two states.

Omaha occupies a fine site on the west side of the Missouri River, consisting chiefly of a gently rolling plot and including an area of about 30 square miles. The streets are broad and regularly platted, and about 95 miles are substantially paved with granite, brick, or asphalt. About 600 acres are included in the public parks, of which Riverview, Hanscom, Elmwood, and Bemis parks are the most noted. The architecture is modern and substantial, including the county courthouse, the city hall, the Federal building, the Coliseum, the Omaha Bee building, and the Paxton Hotel. It has a fine high school and two cathedrals, those of the Protestant Episcopal and the Roman Catholic churches. In the public library are 65,000 volumes. The institutions of higher learning include the Bellevue College, the Nebraska College of Pharmacy, the University of Omaha, the Creighton University (Roman Catholic), the Brownell Hall, and the Creighton Medical College. It is the seat of the State school for the deaf and has many private schools and hospitals. All the leading religious denominations have fine church edifices.

Omaha has large shops of the Union Pacific Railway. It is the seat of extensive establishments for smelting and refining the ores of lead, copper, gold, silver, and other metals, which are transported to the city from points in Wyoming and Colorado. South Omaha, a short distance south, has large slaughtering and meat-packing establishments, which, in the amount of stock slaughtered, is exceeded only by Chicago and Kansas City. Having extensive communication by railways, Omaha is important as a wholesaling and jobbing center of groceries and dry goods. It contains large lumber yards

and grain elevators and has manufactures of brick and tile, machinery, clothing, white lead, linseed oil, and malt and distilled liquors. The systems of waterworks, telephones, sewerage, and gas and electric lighting are well managed.

The site of Omaha was visited by Lewis and Clark in 1804. Fur traders built a stockade and trading station in the vicinity in 1825. The first permanent settlement was established in 1854, when it became the capital of Nebraska, and it remained the seat of government until 1867. It was incorporated as a city in 1857, but its growth dates from 1864, when work was commenced on the Union Pacific Railway. In 1898 it was the seat of the Trans-Mississippi and International Exhibition, which was kept open during two seasons. Population, 1900, 102,555; in 1910, 124,096.

OMAHAS, an Indian tribe of the Dakota family, which was first met in 1673 by Father Marquette. The Omahas formerly occupied the region now included in eastern Nebraska and western Iowa. In 1820 they ceded their lands at Council Bluffs. Several wars occurred between them and the Sioux Indians, but in 1854 a general peace was declared. Their reservation is situated in the northeastern part of Nebraska, where they have made material advancement in the arts of peace, especially in agriculture. They patronize schools and churches and engage extensively in the culture of cereals, live stock, and vegetables.

OMAN (ō-män'), a political division of Arabia, in the southeastern part of the Arabian Peninsula. It extends along the Persian Gulf, the Gulf of Oman, and the Arabian Sea, including a coast line of about 1,500 miles. The area is 81,500 square miles. It is divided into a number of districts or states, of which Muscat is the most important. The surface, though fertile in many places, includes large stretches of rocky and sandy deserts. Along the coast is a highland with numerous mountains, some of which rise 10,000 feet above the sea. Beyond the mountains is a region of grazing lands, but these gradually merge into the great deserts of Arabia. Dates, cotton, sugar, coffee, rice, and camels are the chief products. Pearls and mother-of-pearl are exported. The imports consist chiefly of ammunition, silk textiles, and foodstuffs.

A large part of the region became a possession of Portugal in 1508, but it fell into the hands of the Arabs in the 17th century. Later the imams, or sultans, of Muscat annexed a narrow tract along the eastern coast of Africa. At present the country is nominally under the protection of Great Britain. Muscat is the capital

and principal seaport. The inhabitants consist chiefly of Mussulmans of Arab origin. In habits of life they are partly nomadic. They are Mohammedan in religion. Population, about 1,500,000.

OMEN (ō'mĕn), a sign or presage that is supposed to indicate a future event. The ancient Romans supposed that the gods indicate their favor or displeasure by some sign or token. They considered it necessary to observe omens. This was done under the direction of magistrates, who were assisted by the *haruspices* and *augurs*. Belief in omens fell into disrepute among the intelligent classes in the time of Cicero.

OMNIBUS (ōm'nĭ-bŭs). See **Carriage**.

OMNIBUS BILL, a term frequently applied to legislative acts, especially those in which several measures are more or less closely related. In the United States it was first applied to a bill submitted to Congress by Henry Clay in 1850. This bill provided for the admission of California as a free State, the erection of territorial governments in New Mexico and Utah without reference to slavery, the establishment of a boundary line between New Mexico and Texas, the abolition of the slave trade in the District of Columbia, the more effective enforcement of the fugitive slave law, and the payment of \$10,000,000 to Texas for her claim to a part of New Mexico. This bill is incorrectly called a compromise, or omnibus bill, since the different matters referred to were later covered by separate bills.

OMSK (ōmsk), a city of Asiatic Russia, capital of the government of Akmolinsk, in the western part of Siberia. It is at the junction of the Om and Irtysh rivers, on the Trans-Siberian Railway, and is surrounded by a barren steppe. The architecture is inferior, but the city has a technical school, two gymnasiums, and a normal school for teachers. As a military station it is important and it has considerable inland trade. Population, 1906, 54,150.

ONEGA (ō-nĕ'gā), a river of northern Russia. It rises in Lake Latcha, in the government of Olonetz, and after a course of 275 miles toward the north flows into Onega Bay, an inlet from the White Sea. It is navigable for a distance of 80 miles.

ONEGA, a large lake of northern Russia, in the government of Olonetz, located northeast of Lake Ladoga, next to which it is the largest lake in Europe. It is 146 miles long and 52 miles wide. The area is 3,760 square miles. Several rivers flow into it. Its outlet is the Svir River, which flows into Lake Ladoga. It has a depth of about 600 feet, is rich in fish, and contains a

number of islands. Lake Onega is connected by canal with the Volga system of Caspian Sea navigation and with the White Sea by the Dwina canal system.

ONEIDA (ō-nĭ'dā), a city of New York, in Madison County, in a fertile farming region, 26 miles east of Syracuse. It is on the West Shore, the New York, Ontario and Western, and the New York Central railroads. Allen and Higenbotham parks are fine public resorts. The chief buildings include the public library, the high school, the city hospital, and several churches. Among the manufactures are flour, steam engines, cotton and woolen goods, and machinery. Waterworks, sanitary sewerage, and electric street railways are among the public utilities. The Oneida Community is about two miles south. Oneida was settled in 1834 and incorporated in 1848. Population, 1910, 8,317.

ONEIDA, a lake in northeastern New York, in Oneida, Oswego, Onondaga, and Madison counties, about twenty miles southeast of Lake Ontario. The length is twenty miles and the width is from two to seven miles. It discharges through the Oneida and Oswego rivers into Lake Ontario. The lake and tributary streams abound in fish.

ONEONTA (ō-nĕ-ōn'tā), a city of New York, in Otsego County, on the Susquehanna River, sixty miles northeast of Binghamton. It is on the Ulster and Delaware and the Delaware and Hudson railroads and is surrounded by a farming and stock-raising country. The noteworthy buildings include the public library, the Oneonta State Normal School, the State armory, and the Amelia Fox Memorial Hospital. Among the manufactures are shirts, pianos, cotton and woolen goods, machinery, and cigars. It has modern municipal facilities, including pavements, waterworks, and sanitary sewerage. The place was settled in 1800 and incorporated in 1848. Population, 1905, 8,054; in 1910, 9,491.

ONION, an edible bulb, produced by a biennial herb of the lily family. The plant has tubulated leaves and a pithy stalk bearing the seed. The root is a bulb with a strong odor and taste, due to an acrid volatile oil that is destroyed by boiling. Onions are native to Central Asia, but they have been cultivated from the tropics to regions far into high latitudes for centuries. They attain the largest size in warm countries. The cultivated plants include about twenty species, including the Strassburg, Egyptian, Spanish, Danvers, Portuguese, Bermuda, and Pearl. Onions have a stimulating influence on the secreting organs and are used in medicine. *Garlic* belongs to the same family, but has a stronger odor and taste, and its bulb is composed of from

eight to twelve smaller ones, called *cloves*. Onions can be grown successively on the same ground from year to year, but they require much manuring. Some species bear bulbs at the top,



ROOTED ONIONS.



TOP ONIONS.

but those generally grown for the markets yield large rooted bulbs.

ONONDAGA (ōn-ōn-dā'gā), a tribe of Iroquois Indians of New York, who resided in the vicinity of Lake Onondago. They were peaceable and industrious and many were converted to Christianity. In 1660 they numbered about 1,650, but a large number went with Brant to Canada, where they were later assigned to the reservation on Grand River, Ontario. At present about 600 of these Indians reside in Canada and nearly 1,000 are on the reservation in New York.

ONTARIO (ōn-tā'rī-ō), a Province of Canada, the most populous subdivision of the Dominion. It is bounded on the north by Keewatin and James Bay; east and northeast by Quebec; south by the Saint Lawrence, the Niagara, the Detroit, the Saint Clair, and the Rainy rivers and lakes Ontario, Erie, Saint Clair, Huron, and Superior, and the Lake of the Woods; and west by Manitoba and the international boundary line. The northern boundary is formed largely by the Albany River, which separates it from Keewatin. The length from east to west is about 1,000 miles; the greatest breadth from north to south, about 700 miles; and area, 222,800 square miles, of which 2,350 square miles are water surface.

DESCRIPTION. The greater part of the surface is included in the Laurentian Plateau, which extends across the border from Quebec. It constitutes the divide between the water systems of the Hudson Bay and the Great Lakes, but the general altitude does not range more than from 800 to 1,200 feet. However, these highlands do not continue to the northern border, where a

considerable area is included in the lower valleys of the Moose and Albany rivers. In this section the surface slopes gently down to James Bay and the region is underlaid by horizontal strata of limestones. In the southeastern part are the lowlands of the Saint Lawrence. They are divided by a spur of the Laurentian Highlands, which cross the Saint Lawrence at the Thousand Islands, extending a short distance into New York. The western section of the lowlands extends along the shore of the Great Lakes, but is divided by the elevation of the rock known as the Niagara escarpment, which forms the precipice at Niagara Falls and extends to the Manitoulin Islands, in Lake Huron. Between the escarpment and the Laurentian spur is a plain with a general elevation of 250 feet above sea level. The portion

extending southwest between lakes Huron and Eric, to the eastern border of Michigan, is known as the Western Peninsula.

The drainage is principally into the Great Lakes and the Saint Lawrence, but a portion of the northern part drains into James Bay. The Albany River belongs partly to Keewatin, the Ottawa River forms most of the boundary with Quebec, and the Rainy, Saint Marys, Saint Clair, Detroit, Niagara, and Saint Lawrence rivers are on the boundary with the United States. Among the principal streams in the extreme western part of the Province are the English, Moose, and Abitibi. The Thames flows into Lake Erie; the Petawawa, into the Ottawa; and the Maganetawan, into Georgian Bay. The French River is the outlet of Lake Nipissing, located northeast of Georgian Bay. Other lakes include Nipigon, north of Lake Superior; Simcoe, southeast of Georgian Bay; and Lake of the Woods, in the extreme west.

The climate is equable and healthful throughout, but the winters are severe in the northern part. Sudden and marked changes are not common in the region of the lakes, which have a marked modifying influence. In this section the thermometer rarely falls to 10° below zero and in the summer seldom rises to 92° above. Farther north the summers are warm and pleasant, but the winters are quite cold. Snow falls to a considerable depth in the northeast, but severe blizzards do not occur in any part. All sections of the Province have an abundant rainfall, which ranges from 30 to 40 inches. As a whole the climate compares favorably to that of the New England states and the northern sections of New York and Michigan. In the Western Penin-

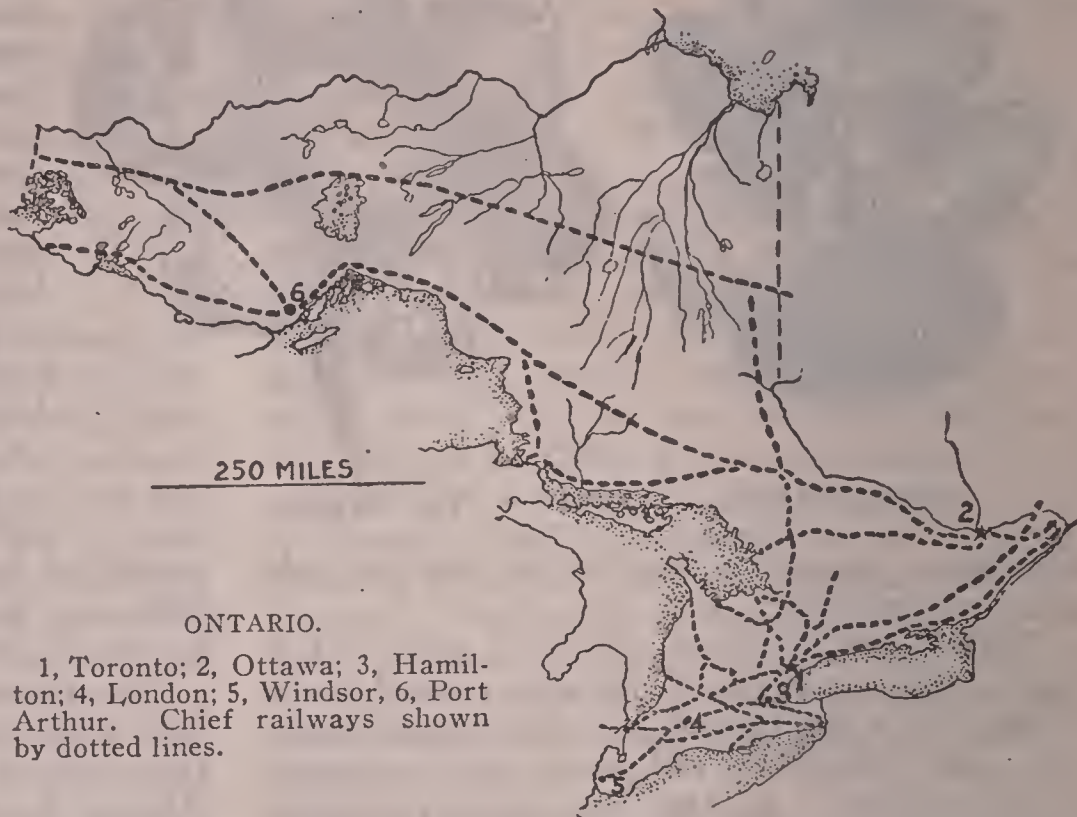
sula the climate is most favorable for farming.

MINING. The Province is exceptionally rich in mineral resources, but the mining industry has not been developed to the extent of its possibility. In the vicinity of Lake Nipissing are the largest nickel mines in the world, known as the Sudbury mines, which produce nearly one-half the world's supply of this mineral. Petroleum is produced in greater quantity than in any other Province of the Dominion. The largest oil fields are in the region bordering on the south shore of Lake Huron, including Lambton, Essex and Kent counties. Copper is obtained in large quantities north of lakes Huron and Superior, and in the same fields are extensive deposits of iron. Ontario is rich in the deposits of salt, the supply being sufficient to endure for centuries. Gold and silver are mined on the western shore of Lake Superior. Gas fields of considerable extent abound in the vicinity of the Detroit and the Niagara rivers. Limestone, sandstone, marble, and granite are quarried extensively for building purposes. Other minerals include gypsum and mineral fertilizers and pigments.

AGRICULTURE. Ontario has vast areas of fertile soil, but the more densely settled portions and those which have proved its chief source of wealth are included in the region that extends along the Saint Lawrence and thence west to Lake Huron. Here the climate is adapted to the growth of plants common to the Temperate Zone. Oats and hay are cultivated most extensively, but large interests are vested in the cultivation of wheat. Corn of a fine quality matures in the Western Peninsula, where the seasons are long enough and the sunshine is sufficient to make this cereal profitable. Peas are grown on a large acreage, the product being shipped to market or used as feed for cattle. Barley of a fine quality is grown and the quality is such that it serves as the basis of a profitable malting industry. Large apple orchards and vineyards are found throughout the southern part and peaches are grown successfully in the region of the lakes. Other crops include rye, buckwheat, potatoes, turnips, and garden vegetables.

Large interests are vested in the rearing of live stock. The Province excels in the quality of the various breeds that are raised. Cattle are grown both for meat and dairy purposes and

the total has increased materially every decade. The number of cattle of all kinds is placed at 2,750,000 head. Swine and sheep rank next in number. Horses of a superior grade are grown for domestic use and export. Mules and goats are reared in small numbers, but large interests are vested in poultry.



MANUFACTURES. The Province has an abundance of raw materials to stimulate manufacturing enterprises, but there is no supply of coal, and this essential commodity is imported largely from Nova Scotia and the United States. Vast forests of great commercial value, such as spruce, pine, cedar, poplar, and oak, supply a large quantity of material for milling and shipping. Pork packing and flour milling rank in importance next to lumbering. Large quantities of cheese and canned milk are produced and considerable interests are vested in the manufacture of cotton and woolen goods, machinery, hardware, and chemicals. Other manufactures include furniture, engines and boilers, tobacco and cigars, carriages and wagons, boots and shoes, soap and candles, and canned and cured fish.

TRANSPORTATION AND COMMERCE. Facilities for transportation are afforded by the Ottawa River along the northeastern border and by the extensive waterways of the Great Lakes and the Saint Lawrence River. The latter affords direct communication by the largest vessels with the ocean. Several important canals are maintained to avoid a number of falls and rapids in some of the waterways. These include the Welland Canal, about 27 miles long, which connects Lake Erie with Lake Ontario. The Province has transportation facilities by a number of

trunk and many branch railways, including a total of 7,500 miles. Across the northern part, running nearly parallel to the Ottawa River, passes the transcontinental line of the Canadian Pacific Railway. Other lines include those of the Grand Trunk, the Wabash, the Canadian Northern, and the Michigan Central railways. Electric lines are maintained to provide communication in the larger cities, with branches extending to many interurban points. Toronto, Ottawa, Hamilton, Saint Thomas, London, and Renfrew are the leading railway centers.

Ontario has developed an extensive domestic and foreign commerce since its union with the Dominion in 1867. Lumber and lumber products are exported in large quantities. Other exports include butter and cheese, grain, live stock, hides, cured and packed meats, and manufactured goods. Among the chief imports are coal, tea and coffee, and raw cotton. The merchant marine consists of about 1,850 steamers and vessels. A large share of the foreign trade is with Great Britain and the United States.

GOVERNMENT. The Lieutenant Governor is appointed for five years by the Governor General of Canada and is assisted by a council of eight members. This council consists of the attorney-general, commissioner of agriculture, treasurer, secretary, registrar, commissioner of crown lands, minister of education, and commissioner of public works. The legislative functions are exercised by an assembly of one house, chosen by popular vote, and made up of 98 members. All male British subjects who are 21 years of age are entitled to the right of suffrage. The highest judicial authority is vested in a supreme court of judicature, consisting of the high court of justice and the court of appeal. Local government is administered by the towns, municipalities, and counties.

EDUCATION. The system of public schools is maintained by general taxation, under the immediate supervision of the minister of education. Attendance upon the elementary schools is free and compulsory. As a means of safeguarding the interests of the French and those who have religious scruples in the matter of instruction, separate schools may be maintained by diverting a part of the taxes. The same privilege is extended to Protestants in communities where the Roman Catholics are in a majority, hence many communities have two classes of schools. Elementary instruction extends from the kindergarten to the high schools, the latter being generally maintained in the towns and cities. The qualifications of teachers are prescribed by law, but the details of administration are in the hands of the local taxpayers. A normal col-

lege and many model and normal schools are maintained, many of which are supported by the counties.

The University of Toronto, at Toronto, is at the head of the provincial system of education, but with it are affiliated a number of denominational institutions, including Knox College (Presbyterian), Victoria University (Methodist), Trinity University (Anglican), Wycliff College and Huron College (Anglican), and Saint Michael's College (Roman Catholic). Other institutions include the Upper Canada College, Toronto; the Ontario School of Mining and Agriculture, Kingston; the School of Practical Science, Toronto; the College of Music and School of Elocution, Toronto; and the Toronto Conservatory of Music. Ample provisions have been made for the care of the unfortunate and incorrigible. These dependents are generally in institutions which are supported by the Province, but the poor are generally provided for in the several counties.

INHABITANTS. Ontario has a larger population than any other Province of Canada. The people are largely of English and Scotch descent, but include a considerable number of Germans, Irish, and other nationalities. Fully five-sixths are Protestants, including chiefly Methodists, Presbyterians, Episcopalians, and Baptists. In 1901 the population was 2,182,947. Toronto, on Lake Ontario, is the capital and largest city. Ottawa, in the northeastern part, is the capital of the Dominion of Canada. Other cities include Hamilton, London, Kingston, Brantford, Windsor, Guelph, Saint Catharines, Berlin, Belleville, Kenora (Rat Portage), Chatham, Stratford, and Galt.

HISTORY. Champlain visited the region included in Ontario in 1615, but the first settlement was not established until 1673, when Frontenac built a fort at Kingston. The French established a settlement at Toronto in 1749, when they built Fort Rouillé as a protection and a means to prevent trade between the Indians of the north and the English on the south shore of Lake Ontario. Until 1791 the region now included in the Province belonged to Quebec, but in that year it was separated and called Upper Canada. Previous to that time it had been inhabited by a roaming tribe of Indians and for many years was important as a fur-producing district.

France was the recognized authority in Canada until 1763, when it was ceded to Great Britain by the Treaty of Paris. At the time of the American Revolution a large number of British loyalists settled within the region. Niagara was made the capital in 1792, but it was afterward

removed to Toronto. An army of the United States invaded the Province during the War of 1812, in which occurred the battles of the Thames and Lundy's Lane, and in 1837 occurred the rebellion instigated by William Lyon McKenzie. It was organized under its present name in 1867, at the time of the Confederation. The Province has grown rapidly in wealth and population, though the most populous parts still remain largely in the region lying adjacent to lakes Huron, Erie, and Ontario. Within recent years a large influx of people has been attracted to the northwestern section, chiefly through the development of iron and copper mines and the construction of railways.

ONTARIO, Lake, the smallest and most easterly of the Great Lakes of North America, which forms a connection between the Niagara and Saint Lawrence rivers. Its altitude above sea level is 247 feet and the greatest depth is 600 feet. The lake has a length of 190 miles and a breadth of 54 miles, and covers an area of 7,240 square miles. It has a number of important coast indentations and many islands, most of them being in the northeastern part. It is open for navigation practically the entire year, thus serving as a convenient and important commercial route, though at some seasons of the year storms of more or less violence prevail. The principal canal connections are with the Atlantic Ocean by the Hudson River and the Oswego and Erie canals, with Lake Erie by the Welland Canal, and with Ottawa by the Rideau Canal. Oswego is the most important lake port on its New York shore. The chief ports of Canada include Kingston, Hamilton, Coburg, and Toronto. Besides receiving the inflow of the Niagara River, it is fed by the Oswego, Genesee, and Black rivers. It has fine fisheries.

ONYX (ō'nīks), a variety of quartz, consisting of layers that have different colors which are strongly contrasted, chiefly white and white with black, brown, or red. The layers are usually in even planes, hence it is specially adapted for cameos, for which purpose it was used by the ancients. The name is applied to chalcedony, jasper, and other crystalline minerals when they are strongly marked in colors of several shades. A species marked with white stripes alternated by red bands of carnelian is known as sardonyx, which is highly valued on account of its rarity. *Onyx marble* is a beautiful clear white stalagmitic carbonate of lime. It is of value in the manufacture of ornaments. A similar product, known as *Mexican onyx*, is found in Mexico, Arizona, and California. It is a banded species of aragonite.

ONYX MARBLE, the name of a variety of

limestone beautifully colored by iron or manganese. True onyx is a banded variety of marble, while onyx marble is a cheaper grade of stone. It is used extensively in making paperweights, inkstands, table tops, and various decorative articles. This class of stone was quarried by the ancient Romans in Persia and Northern Africa. Deposits of it are found in Mexico and various parts of the United States, especially in Arizona, California, and Missouri.

OÖLITE (ō'ō-līt), the name of a variety of limestone, composed of rounded particles clustered together. Each one of the grains usually has a small fragment of sand as a nucleus, around which concentric layers of calcareous matter have formed. Several varieties have been classified, such as *roe stone*, in which the grains are rounded and very distinct, and *pea stone*, having grains about the size of a pea. The name Oölite is applied to a group of strata of the Jurassic period, immediately succeeding the Liassic period. See **Geology**.

OORI LIMPOPO (ō-ō'rē līm-pō'pō), or **Crocodile**, a river of South Africa. It rises in the Transvaal Colony, near Pretoria, thence flows northwest to the Transvaal boundary, whence it makes a semicircle until it enters the Indian Ocean through the northern part of Delagoa Bay. The entire course is 980 miles, but the navigation does not extend farther than 250 miles from its mouth, being obstructed at that point by rapids and falls. It has a number of tributaries, the most important being the Olifant River. The lower valley in Portuguese East Africa is level, but the upper course is through an elevated region.

OPAH (ō'pā), or **Kingfish**, the name of a fish found in the waters of the Arctic and Atlantic oceans. It has an oval-shaped body, is from four to five feet long, and has a powerful tail. The color is brilliant, ranging from greenish to golden above and yellowish-green below. It is esteemed for its flesh. Locally it is sometimes called *moonfish*, or *mariposa*.

OPAL, a precious stone, consisting mainly of silica with about ten per cent. of water. It is very brittle and is distinguished by its reflection of light of many colors. Opals do not occur as crystals and their value depends upon the display of delicate colors, the finest grades constituting valuable gems when cut. They are usually prepared with a convex surface, since they display the colors to the best advantage in that form. Opals of a fine quality are produced in Hungary, the East Indies, South America, Saxony, and many other regions, and occur generally in sandstone having the nature of iron.

The species of opal are very numerous. They

include the *common opal*, a grade having yellow, white, green, brown, or red colors, but not displaying them; *semiopal*, which is nearly opaque; *fire opal*, a grade giving only red reflections; *menilite*, a variety slightly translucent or opaque, but formed in irregular masses; *hydrophane*, which is transparent only when placed in water; and *precious* or *noble opal*, the grade reflecting brilliant and changeable colors of red, blue, green, and yellow. Precious or noble opal is the most valuable. A noted specimen of it is owned by the imperial family of Austria. This gem has a length of five inches, a width of about three inches, and a thickness of about one inch. The ancients attributed magical properties to opals. In the time of the Romans they were held in high esteem. It is said that Mark Antony was desirous of possessing an opal belonging to the Roman senator Nonius, but the latter preferred exile to parting with it, and Pliny ascribes to this particular gem a value of \$500,000.

OPERA (öp'ēr-ä), the musical form of drama which is composed of quartets, trios, duets, solos, recitatives, choruses, and finales, or a variety of them. Instrumental music accompanies an operatic entertainment throughout. The musical part is variously combined and modified to produce certain desired effects. The whole is preceded by an instrumental overture or introduction, as is usually every act or division. Costumes and scenery are employed to heighten the dramatic effect, though these are not absolutely essential. *Grand opera* relates usually to serious themes, but sometimes it is either comic or tragic. On the other hand, *opéra comique* is light and fanciful. The Italian drama, known as *romantic opera*, is an intermixture of the lively and the grave. *Opéra bouffe* is a farcical form of opera.

The three recognized schools of opera are Italian, German, and French, but they have been modified more or less to suit the taste of various countries. The Italian opera was developed largely from the miracle plays of the Middle Ages and dates from the 16th century, when the classical story of *Daphne* was reduced to a drama by Rinuccini, which Peri soon after set to music. However, the real founder was Scarlatti (1659-1725), who wrote a number of productions that created a widespread interest. Rossini is regarded the most purely Italian operatic composer, and "The Barber of Seville" and "William Tell" are his best productions. Other famous composers of this school include Piccini, Cimarosa, Jomelli, Bellini, Verdi, and Donizetti.

The German opera developed principally from the Italian, but in later times assumed an inde-

pendent form and is now the highest in point of perfection. Dresden and Vienna were the first centers in which Italian operatic plays were transplanted, but at Hamburg a profound interest was developed by Reinhard Keiser (1674-1739), who wrote about one hundred operas. Mozart is among the eminent German operatic masters, giving Germany the first national opera, entitled "The Magic Flute." Beethoven is famous for his "Fidelio," and Von Weber in his "Der Freischütz" gathered with masterful effect the national folklore. Others of the school include Handel, Gluck, Flötow, Meyerbeer, and Wagner. The *melodrama*, a musical drama interspersed with spoken dialogue, is of German origin.

The opera was taken to France by Cardinal Mazarin in 1646. In the French school recitatives are prominent features, while special stress is laid on theatrical exactness. Among the principal composers of France are Monsigny, Rousseau, Auber, Hérold, Gounod, Hervé, Bizet, Offenbach, and Lecoq. Much of the writings of Meyerbeer and Handel was incorporated with the French. The opera in England was developed chiefly from the German and Italian by Purcell. Handel aided in making it popular by adapting a number of compositions from the German. The English operatic composers include Wallace, Balfe, Mackenzie, Macfarren, and Sullivan. Operatics became popular in America about 1825, since which time many noted productions appeared. Among the leading American composers are Damrosch, Reginald De Koven, Sousa, and Fry.

OPÉRA BOUFFE, a form of opera in which the music and character are light, farcical, and burlesque. It is generally termed *musical comedy*, when the dialogues are interspersed with musical selections. This form of the opera has become popular in America and Europe within recent years. The plays that may be classed as opéra bouffe include George Ade's "The Sultan of Sulu," Victor Herbert's "The Idol's Eye," Reginald De Koven's "Robin Hood," and William Schwenk Gilbert's "The Mikado."

OPERA GLASS, a double telescope of small size for magnifying a large field of view, used chiefly by spectators in attending theater or opera, hence its name. The opera glass permits the use of both eyes. Most opera glasses have a magnifying power of two or three times. They have a plano-concave or double-concave eyeglass, so that the image is not inverted and little light is lost, thus securing much distinctness. The principal manufacturers of opera glasses are in Europe, the largest establishments

being located in Paris. *Field glasses* are the finest class of opera glasses. They have both achromatic eye lenses and object lenses.

OPHICLEIDE (ōf'ī-klid), a wind musical instrument of the trumpet class, having a loud tone and a deep pitch. It is usually large in size, is made of brass, and is used in military bands. In length it varies from two to four feet. It consists of a conical tube, fitted on one end with a mouthpiece and terminated at the other in a large bell like that of a horn. The compass is about three octaves.

OPHIR (ō'fēr), a name applied in the Bible to a region from which Solomon secured precious stones, gold, sandalwood, and other valuables, but its exact location has continued to be a matter of conjecture. The Bible specifies that Solomon's vessels were fitted up in the harbors of Edom and that three years were required to make the voyage. Some writers think that the name Ophir applied to a locality in Eastern Africa, others have expressed the view that India was meant, and Josephus ascribes to Malacca that distinction. Within recent years it has been asserted by a number of travelers that the Ophir of Solomon was in the regions of South Africa which is now included in the Transvaal Colony. This view is expressed because traces of gold and silver mines have been found in that part of Africa which were worked in ancient times.

OPIUM (ō'pī-ŭm), the milky juice obtained from the unripe capsules of several species of the poppy, which is rendered concrete and dark colored by exposure to the air. The poppy is cultivated in many places as a garden plant for its beautiful single or double flowers of white, violet, red, or variegated colors, but in Turkey, India, China, Hindustan, and other countries it is grown extensively in plantations for its yield of opium. Poppies require a rich soil to mature to their best form. In many localities irrigation is utilized to supply an abundance of moisture. The time of sowing varies somewhat in different regions, owing to a difference in latitude, but the plants mature sufficiently in about three months to supply conditions favorable for collecting the milky juice from the heads or capsules, then about the size of a small hen's egg. At that time incisions are made in the unripe capsules with a small instrument having several little blades. After allowing the juice to exude and dry over night, it is collected in an earthen vessel by scraping it from the capsule with a blunt knife. It is next dried uniformly, being turned at frequent intervals for that purpose. When the moisture has sufficiently evaporated, it is taken to the

factory, where it is treated in vats, made into small tablets or balls, and boxed for the market.

Chemically opium is a mixture of alkaloids, the chief of which are morphine, narcotine, and codeine, with various organic acids. These are valuable in medicine for their narcotic and sedative properties, as is also the drug itself. *Morphine* is a derivative of opium and laudanum is a simple tincture in spirits of wine. Opium has a faint smell, is bitter and acrid to the taste, and can be easily indented with the finger. Though serving as a useful medicine in producing sleep and allaying pain, it forms a very dangerous and harmful drug to those who acquire the habit of using it continuously. Shortly after taking opium there is a stage of increased mental activity, but this is followed by a relapse, nervousness, and depression, which the user seeks to overcome by taking another dose. The habitual opium taker becomes spare of body, his skin grows sallow, his appetite diminishes, and the functions of the vital organs are interfered with to a considerable extent.

It is estimated that there are about 1,000,000 persons who smoke opium in the United States. The number using this drug in Canada is correspondingly large. Those smoking opium have a peculiarly constructed pipe in which they place a small quantity, about the size of a pea, the smoke of which is inhaled and then exhaled through the nostrils until the desired intoxication is effected. As the habit grows, larger quantities are required. Some users take two or more of the opium balls. Opium smoking is very prevalent in China, India, and other countries of Eastern Asia, where special pipes are made for the purpose and opium smoking rooms are maintained. India is the main source from which the Chinese secure their supply of opium. Under the British the trade in opium has been a government monopoly in India since 1793. China prohibited the importation of opium in 1796 and until 1839 made strenuous efforts to enforce the law, but the desire of Great Britain to promote commerce by maintaining its market in China for Indian opium products caused it to



OPIUM POPPY.

declare a war, forcing China to recognize and legalize the traffic.

OPORTO (ô-pôr'tōō), a city and seaport of Portugal, next in size to Lisbon, capital of the province of Minho, on the Douro River, 172 miles north of Lisbon. The site is a fine tract of land along the river, rising by successive terraces toward the inland. It has communication by steamboats and steam and electric railways. Several fine bridges cross the river, connecting it with Villa Nova de Gaia, on the opposite side. The noteworthy buildings include the Gothic Church of San Francisco, the bishop's palace, the Clerigos Church, the Crystal Palace, the commercial exchange, the government mint, the opera house, and the central railway station. It is a distinctly modern city and is regularly platted. It has systems of gas and electric lighting, sanitary sewerage, and stone and asphalt pavements. The manufactures include wines and liquors, cotton and woolen goods, boots and shoes, sugar, cork, tobacco products, ribbons, soap, hats, porcelain, machinery, and sailing vessels. It has a large export trade in oranges, port wine, and cereals. Oporto had a reputation as a commercial city in the time of the Moors, when it was largely in the hands of the Christians. It obtained historic importance by its strong fortifications that withstood many attacks during the Middle Ages, but was captured by the French in 1808. Later, in 1832, it was held successfully by Dom Pedro, the ex-Emperor of Brazil, against the forces of Don Miguel. The capital of Portugal was for some time at Oporto. Population, 1906, 173,214.

OPOSSUM (ô-pôs'süm), a class of marsupial mammals which are native to America. They include a large number of species, ranging in size from that of a house mouse to that of a large cat. The hair is soft and woollike and the color in most species is whitish-gray, with several stripes down the back. They live largely on trees, where they pursue insects, birds, and other forms of animal life for food, though some species partake of fruits and tender vegetable forms, while still others feed on crabs and crustaceans. From eight to fifteen young are produced by the female. The young are nourished in the pouch for some time, where they also seek safety in case of alarm. Some species do not have pouches, but, instead, carry their young on the back, the tail of the young being entwined around that of the mother. Most of the species are clumsy and awkward in moving from place to place while on the ground, but they have great activity and skill in moving among the branches of trees, being especially fitted for this by their handlike feet, which are

adapted for grasping, and by reason of their prehensile tail. The *common* or *Virginia opossum* ranges from the central part of the United States to Brazil. It is whitish-gray in color, has black ears and feet, and is esteemed as food. The *murine opossum* is about the size of a house mouse and is found from central Mexico to Brazil. The term "playing 'possum" originated from the habit of the opossum of counterfeiting death when in danger. It is used to describe conduct or proceedings which are deceitful.

OPPELN (ôp'pěln), a city of Germany, in province of Silesia, on the Oder River, 48 miles southeast of Breslau. It has communication by railroads and electric railways and is surrounded by a farming country. The

chief buildings include the public library, the teachers' normal school, the gymnasium, and a school of agriculture. Among the manufactures are cigars, cement, clothing, furniture, and machinery. It has a large trade in grain and cattle. Oppeln was annexed to Prussia in 1742. A large proportion of the inhabitants are of Polish descent. Population, 1905, 30,765.

OPTICS (ôp'tiks), the branch of science that treats of the properties of light and vision as pertaining to the human eye. See **Light**.

OPTIMISM (ôp'ti-miz'm), the doctrine that everything in nature and the history of mankind is ordered for the best. It embraces the philosophical belief that the order of things in the universe is adapted to produce the highest good. This doctrine is of ancient origin and is supported by philosophers both of ancient and modern times. Leibnitz is the leading modern advocate of it. Its tenets are fully exemplified



OPOSSUM.

in his work entitled "Theodicae." Optimism stands opposed to pessimism, according to which the evil in this life overrules the good.

ORACLE (ör'á-k'l), a term applied in classical antiquity to the seat of worship of some special divinity, where prophecies were given in answer to inquiries relating to some event or to some proposed course of action. Priests or priestesses usually announced the revelations, but in some cases they were given out by signs. The desire to avert threatened danger or secure success by penetrating into futurity has animated mankind in all ages of the world. Anciently people flocked from far and near to consult the oracles situated at different places, the advice and approval of these mouthpieces of the gods being deemed essential in all great undertakings, such as proposed conclusions of peace, declarations of war, the enactment of laws, and various personal matters.

The most famous Grecian oracle was that of Apollo at Delphi, where a priestess called Pythia, named after the serpent Python slain by Apollo, delivered the oracles. To prepare for the important task, Pythia first bathed in the waters of the Castalian spring, after which she was conducted into the temple by the priests, where she was surrounded by clouds of incense and uttered peculiar phrases, which the priests interpreted to the people as coming directly from the god Apollo. The Greeks had 22 oracles for the consultation of Apollo. Among the important oracles were those of Miletus and Argos, that of Zeus at Dodona, and that of Jupiter Ammon in the Libyan Desert. The people continued to consult the oracles until the time of Theodosius, who caused the prophetic deities to be destroyed and their temple to be closed.

ORAN (ö-rän'), a seaport city of Algeria, capital of the government of Oran, on the Gulf of Oran, an inlet of the Mediterranean Sea. The city is defended by several forts, has a beautiful location on the hills that form an amphitheater above the gulf, and its harbor is amply protected by moles. Though a North African city, it is largely European in appearance. It has good railroad facilities, electric lights, and other municipal improvements. The city has a well-organized school system, several colleges, a military hospital, a seminary, a Roman Catholic cathedral, and a number of mosques, churches, and synagogues. The export and import trade is extensive. Among the manufactures are tobacco products, utensils, wine and other spirituous liquors, clothing, toys, and earthenware. The Moors founded the city in the 15th century. It passed successively to the Spaniards, Turks, and French, the last named

securing permanent possession of it in 1831. Fully three-fourths of the population are Europeans, mostly French. Population, 1906, 100,499.

ORANG, or **Orang-Outang** (ö-räng'ō-täng'), the name of an anthropoid ape, signifying "man of the woods," native to Sumatra, Borneo, and Malacca. This animal is confined to a single species. Like the chimpanzee and gorilla, it approaches in many respects the



ORANG-OUTANG.

physical structure of man, though it is inferior to both these classes. The brain and spine are quite manlike. It is unable to walk with ease in an erect posture. At maturity it attains a height of from four to five feet. The hairs have a reddish-brown color, peculiarly resembling those of the people native to the countries where it is found, and the arms reach to the ankles when standing erect. The short hind limbs make it impossible to move with facility while on the ground, but when among the branches of trees the oranges pass rapidly from limb to limb, or swing themselves from one tree to another. They build nests in trees, where they live the greater portion of the time. At night they rest by sleeping on a rudely constructed bed or nest in the branches. Their intelligence and strength are alike remarkable. When captured young, they may be domesticated and taught many skillful tricks. It is remarkable that the orang does not live long in captivity. With the increase of age, the temper becomes quite disagreeable.

ORANGE (ör'ěnj), a class of fruit trees of the order *Rutaceae*, including several species,

These trees are related to the lime and citron. They are native to China, India, and other countries of Eastern Asia. The orange tree was grown for its fruit from remote antiquity, but it was not introduced into Europe until it was brought there by the Moors in the 14th century, and was first cultivated in Portugal about 1520. Since then it has been naturalized in all the warmer climates. Many species have been improved by careful propagation. The United States produces large quantities of oranges, the most productive plantations being in California, Florida, and Louisiana. Other countries taking high rank in the yield of oranges include Mexico, the West Indies, the East Indies, China, India, Australia, and North Africa. The orange tree is an evergreen. It has oblong, thick, and



ORANGE.

smooth leaves, bears fragrant white flowers, and grows to a medium height. The fruit has a bright yellow color, is globose in form, and has a thick rind and a pulp containing luscious juices. Some species have seeds while others are seedless. The trees bear in about six years and often live 600 years. Large specimens produce from 2,000 to 12,000 oranges in a year.

The wood of the orange tree is fine grained and smooth. It is of value in making fine cabinet work. Many species, some sweet and some bitter, have been originated by cultivation. The sweet oranges are most desired for eating, while the bitter yield flavoring and medicines. Among the common species sold on the market are the China orange, the Lisbon orange, the Maltese or red pulped, the Mandarin or clove, the Saint Michael, the Majorca seedless, the Tangerine, the Valencia, and the oval-shaped egg orange. A favorite species known as *navel oranges* is

seedless. *Blood oranges* have a dark red juice. The *russets* are grown extensively in Florida. The fruit which is intended for distant markets is picked before fully ripened and wrapped in paper. It is shipped in boxes containing about 250 oranges. Fragrant oils are secured from the rind, leaves, and flowers. These oils are of use for flavoring and in perfumery. Orange blossoms are used extensively at weddings to decorate the bride. A drink called *curaçoa* is prepared from the oranges that are shaken from the tree by winds or otherwise before ripening.

ORANGE, a town of Massachusetts, in Franklin County, 85 miles northwest of Boston. It is located on Millers River and the Boston and Maine Railway. The public library has 8,500 volumes. Waterworks, electric lighting, and sewerage are among the public improvements. It has several parks and a number of fine school buildings. The manufactures include furniture, needles, sewing machines, automobiles, and machinery. It was incorporated as a town in 1810. Population, 1910, 5,282.

ORANGE, a city of New Jersey, in Essex County, twelve miles west of New York City. It is on the Erie, the Lackawanna, and several lines of electric railroads. The site is on elevated ground near the base of First or Orange Mountain. Llewellyn Park is a fine public resort of 750 acres. Among the notable buildings are the Stickler Memorial Library, the Masonic Temple, the First Presbyterian Church, the Seton Hall College, the Locke College for boys, the Columbus School building, the Orange Memorial Hospital, and the House of the Good Shepherd. It has a fine public library and many social and religious organizations. The manufactures include carriages, hats, clothing, shoes, machinery, and earthenware. It has public waterworks and well graded and paved streets. The place was settled in 1667, but was long a part of Newark, and was incorporated in 1806. Population, 1905, 26,101; in 1910, 29,630.

ORANGE, a river of South Africa, rising in the Drakenberg Mountains of Natal. After a course of about 1,000 miles toward the west, it flows into the Atlantic Ocean, between Cape Colony and German Southwest Africa. It drains a basin of 325,000 square miles. The volume of its water is reduced considerably during the dry season, but during the rainy season the river is navigable for a considerable distance, though there is a large bar obstructing its mouth. The Vaal is its principal tributary.

ORANGEMEN, the members of a society in Great Britain, officially called the Loyal Orange Institution. It was founded in the northern part of Ireland in 1795 and is composed exclusively

of Protestants. The objects for which it was organized are to support and defend the reigning king or queen of Great Britain, the Protestant religion, the legislative union of Great Britain and Ireland, and the succession to the throne of the present royal family so long as it remains Protestant. It was named in honor of William III., Prince of Orange, who pledged the ascendancy of Protestantism in Great Britain and Ireland at the time of the Battle of the Boyne, on July 12, 1690. Lodges of this society were established at different times in England and Canada, but it is confined chiefly to Ireland. Parliament suspended it from 1813 until 1828, owing to intrigues in the army, but it was revived soon after. The anniversary of the Battle of the Boyne, July 12, is known as Orange Day, on which public demonstrations take place.

ORANGE RIVER COLONY, a colony of Great Britain in South Africa, situated between Cape Colony and the Vaal River. It is bounded on the north by the Transvaal Colony, east by Natal and Basutoland, south by Cape Colony, and west by Bechuanaland. The area is 50,392 square miles.

DESCRIPTION. The surface consists largely of a plain elevated from 3,000 to 5,000 feet above sea level. East of this plain, on the boundary with Natal, are the lofty Drakenberg Mountains, with altitudes of 7,000 to 11,000 feet. The larger part of the colony consists of a prairie country, but belts of timber are distributed along the streams and in the highlands. In general the slope is toward the east, all of the drainage belonging to the basin of the Orange River.

The southern part is drained directly by the Orange River, which forms the southern boundary. In the southeastern part is the Caledon River, a tributary of the Orange. The northern and eastern borders are formed by the Vaal, which receives the inflow from the Wilge, Rhenoster, Valsch, and Modder rivers. As a whole the climate is agreeable and healthful, but hot winds sometimes cause a sudden rise in the temperature. The mean temperature is 61° and the extremes range from 20° in June to 98° in January. Prolonged droughts frequently occur in the summer season, especially in January, but the rainfall is sufficient in most parts to insure the maturity of crops.

PRODUCTIONS. Agriculture and stock raising are the principal industries, but remarkable developments have been made in mining within recent years. Cattle are grown extensively on the grazing lands of the prairies, which are well adapted to the pastoral industry. The number of cattle is given at 750,500 head. Sheep raising

represents extensive interests and 4,500,000 head are reported. Swine, horses, and poultry are grown with profit. Agriculture is developing rapidly, but irrigation is resorted to in some sections. The principal cereal crops include Kaffir corn, wheat, oats, barley, and rye. Vegetables and fruits yield large returns.

The colony has extensive mineral deposits. Diamonds are mined at Jagersfontein and Koffyfontein. Gold is mined in the foothills of the Drakenberg Mountains and a large coal field has been developed around Kroonstad, in the northern part. Salt is mined in several places. Limestone, granite, and clays are abundant. The output of diamonds is larger than that of any other minerals, having an annual value of \$6,750,000. Manufacturing is confined chiefly to railway shops and the mines, but considerable quantities of earthenware and brick are produced.

GOVERNMENT. The colony is administered under a constitution granted in 1907, which vests the chief executive authority in the Governor. He is assisted by an executive council. The legislative functions are exercised by a legislative assembly of 38 members, elected for five years by popular vote. All laws must have the assent of the Governor, but his sanction must be reserved until the approval of the home government is obtained. A system of schools is maintained by the government and additional support may be voted by the local authorities.

TRANSPORTATION. A railway extends through the central part of the colony, passing from the southwest toward the northeast and connecting with Port Elizabeth, on the southern coast of Africa. The Cape-to-Cairo Railway passes along the western border, furnishing direct connection with Cape Town, Mafeking, and other commercial centers. Several branches extend to inland ports. The railways are largely under ownership and control of the colony. Wool, diamonds, corn, hides, and live stock are exported. The imports consist chiefly of clothing and machinery. Much of the trade is with other sections of South Africa. The exports are mainly through Port Elizabeth and Cape Town. The railways are given at 850 miles and about 1,500 miles of telegraph lines are in operation.

INHABITANTS. The people consist chiefly of natives and Europeans. Most of the Christians belong to the Dutch Reformed Church. A small per cent. are Jews and Catholics. Bloemfontein, in the south central part, is the capital and largest city. Other cities include Kroonstad, Jagersfontein, Harrismith, and Ladybrand. The total population is 387,315. This number includes 142,679 whites. The remainder are natives, mostly Zulus and Bushmen.

HISTORY. The region included in the colony was formerly populated by African tribes, but Boers from Cape Colony made extensive settlements in 1835 with the view of founding a republic. This movement, known as the Great Trek, caused much of the colony as well as Natal to be settled by Europeans and their descendants. The settlements were confined largely to the territory between the Orange and the Vaal rivers, and a republic was established in 1842. Some friction resulted between the new government and that of the British in Cape Colony. The British annexed the region then known as the Orange River Free State, but in 1854 it again became independent. The discovery of gold in 1887 caused a rapid settlement and development in many localities and this gave rise to local contentions. In 1899 a war broke out between the British and the Transvaal Republic, an independent state located north of the Vaal River. The Orange River Free State became involved in this war by reason of a defensive alliance between the two republics, and after a prolonged war the British annexed the territory in 1900. President Steyn, the chief executive of the republic, resisted annexation by force of arms, and was one of the last to submit to superior numbers.

ORATION (ō-rā'shūn), an elaborate discourse delivered in public, treating in a formal and dignified manner some important subject. An oration may be *informal* or *formal*, the former having reference to an address delivered without previous preparation, while the latter is one that has been prepared by the orator so as to express the sentiments in the most elegant language. In a *deliberative* oration the speaker endeavors to arouse his audience by convincing them of a truth, while in a *demonstrative* address he aims rather to please than to persuade. *Judiciary* orations are addressed by advocates to a court or jury and are characterized by a logical construction and earnestness.

Many orations are included in the literature of the world, a number coming down from an early date in the history of Greece, such as the *Philippics* delivered by Demosthenes against Philip of Macedon. Cicero's "Orations Against Catiline" are among the most famous that have come down to us from ancient Rome. Among the orators of antiquity may be mentioned Isocrates, Pericles, Cato, and Mark Antony. Burke and Pitt are among the eminent English orators. Those of America include Patrick Henry, Thomas Jefferson, John C. Calhoun, Daniel Webster, Stephen A. Douglas, Wendell Phillips, Rufus Choate, and Robert G. Ingersoll.

ORATORIO (ōr-ā-tō'rī-ō), a composition

taken directly from Scripture or paraphrased upon some theme in sacred history. It is generally semidramatic and is arranged to include quartettes, trios, duets, solos, recitatives, choruses, and other forms of music. The oratorio is so named from the oratory of a church near Rome, the Church of Santa Maria Maggiore, where it was desired to make religious services attractive by presenting scenes from Scripture in the form of musical performances. The date of these performances is ascribed to the period intervening between 1571 and 1594, though Saint Filippo de' Neri is credited with having founded a congregation of oratory in Rome as early as 1540. The general interest attracted by this class of musical presentations of sacred subjects induced many eminent poets and composers to devote their attention to the production of oratorios.

Saint Filippo de' Neri induced composers to set to music many parts of scriptural history, among them the incidents connected with the Prodigal Son, of Job and his friends, and of the Angel Gabriel with the Virgin. Metastasio and Zeno prepared a number of oratorios and Sebastian Bach, in 1729, wrote his celebrated "Saint Matthew." Other notable productions include Handel's "Messiah" and "Israel in Egypt," Beethoven's "Mount of Olives," Mendelssohn's "Saint Paul" and "Elijah," Haydn's "Creation," and the celebrated "Passion of Christ," which is still popular above all others. Among the more recent oratorios may be named Liszt's "Saint Elizabeth," Paine's "Saint Peter," Sullivan's "Light of the World," Schumann's "Paradise and the Peri," Cowen's "Deluge" and "Ruth," and Mackenzie's "Rose of Sharon." Leopold Damrosch established the Oratorio Society of New York, the first American institution of that character, in 1873.

ORCHESTRA (ōr'kēs-trā), the term applied to a body of instrumental performers in which the violin is prominent. More recently the name is given to a band of musicians performing in a theater, concert hall, or other place of public amusement, though formerly it was applicable only to performances of symphonies and overtures, especially to the accompaniments of operas, oratorios, cantatas, and masses. The term does not apply to a body of musicians using principally wind instruments, since such a body is more properly called a *band*. In the Greek theater the orchestra was that part of the edifice in which the chorus performed its dances and evolutions. It was circular in shape, was surrounded by steps, and extended in front of the spectators. In modern theaters the orchestra is the space between the audience and

the stage allotted to the musicians. The name applies in concert rooms to a raised platform occupied by both vocal and instrumental performers.

ORCHIDS (ôr'kîds), the general name of plants which belong to the family *Orchidaceae*. They include the most highly organized flowers among the monocotyledons. It is estimated that more than 400 genera and 6,000 species belong to this group of plants. Although many species are found in the Temperate Zone, they are most numerous and of larger size in the tropics. In very dry and cold climates there are only a limited number of species, where they grow in

is known as its *lip* or *labellum*. In many American and European countries the culture of orchids has developed into an important industry. The form and size of the flowers produced by some cultivated species, such as the *dendrobium densiflorum* and the *calipso-borealis*, cause them to demand high prices. The roots and tubers of several species yield a nutritive substance known as *salep* and others yield vanilla.

ORDINANCE OF 1787 (ôr'dî-nans). See **Northwest Territory**.

ORDINARY (ôr'dî-nă-rÿ), an official of ancient Rome, whose duty was to hear and decide the most important civil and criminal cases. The term was applied in England to a bishop, or his deputy, when acting as an ecclesiastical judge, but after the Reformation the jurisdiction of this officer was transferred to the civil courts. In the colonial period of Canada and the United States, the colonial governor was ex-officio ordinary, or head of the ecclesiastical courts, which then had jurisdiction of probate and some equity causes. In some states, as in New Jersey, the probate judge is still called an ordinary.

ORDOVICIAN (ôr-dô-vîsh'an), the name of a system of rocks, classed by some writers as intermediate between the Cambrian and Silurian systems. The term is used more extensively in America than elsewhere. The system is divided into Trenton and Canadian strata, the latter being the lower and the former being the more recent. Both are again subdivided, the Canadian into *Beekmantown* and *Chazy* and the Trenton into *Trenton*, *Utica*, *Cincinnati*, and *Hudson* strata, though these names have a somewhat local significance. In general the

ordovician rocks are chiefly limestones, but in some places they are made up largely of shales. Zinc and lead ores are common to the formations belonging to his system, as in Missouri and Wisconsin, while petroleum and natural gas occur to a considerable extent, as in Ohio and Ontario.

ORE, a natural substance found in the earth, which yields metals by applying various processes, principally roasting and smelting. The term is applied usually to a mineral from which the metal can be extracted profitably, but is sometimes extended to nonmetallic minerals, as sulphur ore. Metals occurring in a pure state free from other substances are called *native*. Ore consists of metals in combination with one



ORCHIDS.

1, *Dendrobium densiflorum*; 2, *Calipso-Borealis*.

the ground as herbs or shrubs, but in warm and moist regions they are connected with rocks and trees and their roots do not draw moisture from the soil. Under such conditions they subsist on nourishment derived from the air. Orchids are especially abundant in the moist regions of the East Indies and the vast forests of the Amazon valley of South America, but they are well represented and of considerable size in the West Indies, Mexico, and Central America. Many species have been acclimated and are cultivated in gardens for the beauty and peculiar shape of their flowers. The flowers are fragrant, have bright colors, and are especially peculiar because of the various forms taken on by one of the six petals, which

or more of the nonmetallic elements, the principal combinations being metals with sulphur, forming sulphide; with chlorine, forming chlorides; with oxygen, forming oxides; and with carbonic, sulphuric, arsenic, silicic, and phosphoric acids, forming carbonates, sulphates, arsenates, silicates, and phosphates. Ores are commonly found in veins or lodes and in imbedded masses. A large part of the gold and silver bearing ores is of too low a grade to be profitable and many tons are dumped aside as valueless. It is possible that improved methods of cheapening transportation to the smelters and treating the ores when placed there will yet cause much of what now is valueless to be used profitably. An electrical process of treating low grade ores was proposed by Edison, though only partial success has yet been obtained by means of it.

OREGON (ör'ê-gŏn), a Pacific state of the United States, popularly called the *Beaver State*. It is bounded on the north by Washington, east



1. Salem; 2. Portland; 3. Astoria; 4. Pendleton; 5. Baker City; 6. Albany. Dotted lines indicate chief railroads.

by Idaho, south by Nevada and California, and west by the Pacific Ocean. The extent from east to west is 395 miles; breadth from north to south, 275 miles; and area, 96,030 square miles, including a water surface of 1,470 square miles. In size it ranks seventh among the states.

DESCRIPTION. The State is crossed by two ranges of mountains from the north to the south, the Coast Range and the Cascade Mountains. They trend parallel with the coast through the western part. In the northeastern section are the Blue Mountains, and in the southeastern part is a group known as the Stein Mountains. In general, the surface is uneven and rolling, with valleys along the streams and through the highland section. A narrow coast

plain is located in some places along the Pacific, but in most sections the land rises abruptly from the sea to the crest of the Coast Range, which is about twenty miles inland, and the summits rise in altitudes of from 1,000 to 4,000 feet. The Cascade Mountains, located about 120 miles from the coast, are a continuation of the Sierra Nevadas. Mount Hood, the highest peak, is near the northern boundary and has an altitude of 11,230 feet. Other peaks include Mount Pitt, Mount McLoughlin, and Mount Jefferson. The mountains include a number of extinct volcanoes and some of them are snow-capped the entire year. Extensive forests of pine, fir, cedar, oak, ash, hemlock, maple, and cotton wood abound in the mountains and along the streams.

The drainage is principally into the Pacific Ocean by the Columbia River, which forms the greater part of the northern boundary. About half of the eastern boundary is formed by the Snake River, which receives the inflow from the Owyhee, Malheur, and Powder rivers and joins the Columbia in Washington. Among the streams flowing north into the Columbia are the Umatilla, John Day's, Deschutes, and Willamette rivers. The Rogue, Umpqua, Alsea, and Nehalem drain into the Pacific. A number of streams in the south central part of the State are inland, flowing into lakes that have no outlet to the sea. Lower Klamath and Goose lakes extend across the border into California. Upper Klamath, Summer, Christmas, and Malheur lakes are located wholly within the State. Cape Blanco extends farthest west. The coast is not indented by any large inlets.

The climatic conditions are somewhat diversified, owing to the differences of altitude, periodical winds, and mountain barriers, but as a whole the State is healthful. Warm winds from the Pacific render the climate of the section west of the Cascades both mild and equable, the average temperature ranging from 42° in winter to 63° in summer. East of these highlands the thermometer registers as low as 28° below zero and in the summer rises to 95° and even 110° above. Rainfall is most abundant along the coast, where it ranges from 50 to 90 inches, but Tillamook County sometimes has 135 inches, while in the plateau of the eastern part it is very scant, usually from 10 to 15 inches. In the southwestern part precipitation rarely exceeds 10 inches, but the arid region has grasses of value for pasturage.

MINING. Many minerals of value are found within the State. The Blue Mountains, in the northeastern part, have gold mines of vast value. The output of this mineral is about \$1,500,000 per annum. Silver is mined in many parts of

the State. Lignite coal deposits occur in the Cascades and other localities and bituminous veins are worked to some extent. Limestone, sandstone, and granite are quarried extensively for building purposes. Large quantities of gypsum valuable for cement are found. Other minerals include nickel, iron, copper, zinc, lead, platinum, manganese, cobalt, and mineral waters. The output of the mines has shown a steady increase the last decade.

AGRICULTURE. About twenty per cent. of the land area is included in farms, which are somewhat larger than the average farms in the East. In 1909 520,000 acres were watered artificially. Irrigation is employed to a considerable extent in Harney County, for which purpose water is drawn from Harney and Malheur lakes. Wheat is cultivated on a larger acreage than any other crop, but it is followed closely by hay and forage. Oats are grown on a large acreage and yield well. Other farm crops include barley, potatoes, corn, and hops. The State holds a high rank in the yield of fruits, especially plums, prunes, apples, and grapes.

Live stock is raised in all sections of the State where settlements have been made, but sheep and cattle ranching are the leading live-stock industries. The largest ranches are in the eastern portion of the State, where the natural grasses cure on the root and furnish nutritive pasturage the entire year. Dairy farming is confined principally to the Willamette valley. Large interests are vested in rearing horses and swine. The raising of mules has increased materially the last decade. Poultry of all kinds is grown profitably.

MANUFACTURES. Large interests are vested in canning salmon along the Columbia River, which has some of the best fisheries in America. Considerable interests are vested in canning and curing sturgeon, halibut, and oysters. Astoria is the principal canning center. Lumbering is an important enterprise and large quantities of lumber and timber products are exported. The flouring and grist mill output ranks next to timber products in importance and it is followed closely by the slaughtering and meat-packing industry. Other manufactures include woolen goods, furniture, clothing, hardware, machinery, and iron and steel vessels. Portland is the most important manufacturing center.

TRANSPORTATION AND COMMERCE. Extensive shipping facilities are furnished by the Willamette and the Columbia rivers and the Pacific. The western and northern parts are quite well supplied with railway facilities, but the southeastern section is without railway communication. The line of the Oregon Railroad and Nav-

igation Company extends through the State from east to west, following closely along the Columbia River, and numerous branches are operated inland. In the western part is the trunk line of the Southern Pacific, which furnishes direct connection with San Francisco and other cities of California. Several other lines pass into the State from Washington to Portland, which is the principal railroad center. The lines include a total of 2,075 miles.

Fruits, grain, live stock, lumber, preserved meats, and fresh and canned fish are the chief exports. Various food products, clothing, sugar, and machinery are imported. The commerce carried on the Columbia and Willamette rivers is exceeded in importance only by that of the Mississippi River. Astoria, on the Columbia, Portland, on the Willamette, and Coos Bay, on the Pacific, are ports of entry.

GOVERNMENT. The present constitution was adopted in 1867, when the State was admitted. It vests the executive authority in the governor, secretary of State, treasurer, State printer, and superintendent of public instruction, each elected by the people for four years. The Legislature consists of two houses, the senate having 30 and the house of representatives 60 members. Members of both branches are elected by the people, the senators for four and the representatives for two years. Sessions of the Legislature are held biennially, beginning on the second Monday of September of even years. A supreme court of five judges has appellate jurisdiction to review causes. Five circuit courts are maintained, each presided over by one of the judges of the supreme court, and these have jurisdiction of civil and criminal cases. Other courts include the circuit, probate, and justices' courts. Local government is administered by township, municipal, and county officers.

EDUCATION. The rate of illiteracy based on the total population over ten years of age is 3.3 per cent., but it is smaller among the white inhabitants: A State board of education is composed of the Governor, secretary of State, and superintendent of public instruction, the last mentioned having direct supervision of the entire educational system. County and city superintendents supervise the schools within their respective localities. Women are eligible to become school directors and superintendents of schools. State normal schools are maintained at Drain, Monmouth, Weston, Ashland, and Gold Beach, but normal instruction is likewise provided for in a number of private institutions. The University of Oregon, located at Eugene, is at the head of the educational system. Other institutions of higher learning include the Wil-

lamette University, Salem; the Pacific University, Forest Grove; the McMinnville College, McMinnville; the Philomath College, Philomath; the Corvallis College, Corvallis; the Lafayette Seminary, Lafayette; the Collegiate Institute, Albany; the Blue Mountain University, Llangrango; and the Portland University, Portland.

Ample provisions have been made for the care of the unfortunate and incorrigible. Roseburg has a soldiers' home. The State constitution provides that the charitable institutions shall be located at the capital, hence Salem has the State penitentiary, the insane asylum, the school for deaf mutes, the boys' reform school, and the school for the blind.

INHABITANTS. About half of the population is in the Willamette valley. The State was settled chiefly by immigrants from states farther east. Five reservations are maintained for the Indians, namely, Klamath, Umatilla, Grand Ronde, Siletz, and Warm Spring. A large majority of the people are Protestants, including the Methodist, Episcopal, Baptist, Presbyterian, and Congregational denominations. However, a considerable number of Roman Catholics reside within the State. Salem, on the Willamette, is the capital. Other cities include Portland, Astoria, Baker City, Pendleton, Albany, Jacksonville, and Oregon City. In 1900 the State had a population of 413,536. This included a total colored population of 18,954, of which 1,105 were Negroes, 2,501 Japanese, 4,951 Indians, and 10,397 Chinese. Population, 1910, 672,765.

HISTORY. The first European to visit the region of Oregon was Drake, who cruised upon its coast in 1579. Vancouver, an English officer, surveyed its coast in 1792. The United States claimed Oregon because of the Louisiana Purchase, but this claim was not recognized by England, and in 1818 a treaty of joint occupancy was agreed upon. Lewis and Clark surveyed the country in 1804 and 1806 and John Jacob Astor founded Astoria in 1811. Spain ceded the rights claimed to the Oregon Territory at the time of the Florida Purchase, in 1819. Russia ceded all claims in 1821 and France gave up title in the Louisiana Purchase, in 1803. In 1844 the occupation of Oregon entered into the political campaign with "fifty-four-forty or fight" as an issue, meaning that the United States should occupy the region as far north as 54° 40' north latitude. The Democratic party being successful in that campaign, a war was threatened with England, in 1846, and soon after the boundary line was extended to the Strait of Juan de Fuca. Oregon Territory was formed in 1848. The present constitution was prepared in 1857 and two years later Oregon was admitted

as a State. It is specially provided in the constitution that Negroes are prohibited from entering and residing in the State, but this clause is not enforced. In 1896 the Cascade Locks on the Columbia were completed, at that time the largest in the world.

OREGON, University of, a coeducational institution at Eugene, Ore., established in 1872. It is at the head of the public school system and comprises the departments of literature, science and arts, commerce, law, journalism, engineering, medicine, dentistry, music, and teaching. The schools of law and medicine, though located at Portland, are an integral part of the university. Students are admitted on examination or by certificates from accredited schools. The library contains about 20,000 volumes. It has 75 instructors and an attendance of 500 students.

OREGON CITY, county seat of Clackamas County, Oregon, on the Willamette River, fifteen miles south of Portland. It is on the Southern Pacific Railroad and on several electric railways. The surrounding country is a fertile farming and fruit-growing district. An abundance of water power is derived from the Willamette River, which has falls of forty feet. Boats pass the falls by a system of locks. Among the chief buildings are the public library, the high school, and the House of the Good Shepherd. The manufactures include flour, paper, woolen goods, machinery, canned fruits, and utensils. It has a growing trade in merchandise. Population, 1900, 3,494; 1910, 4,287.

OREL (âr-yôl'), a city of Central Russia, capital of a government of the same name, at the confluence of the Orlik and Oka rivers. The surrounding country produces large quantities of hops, tobacco, cereals, and hemp, in which commodities it has a considerable trade. Among the noteworthy buildings are the public library, a theological seminary, the city hall, the central railroad station, and three *Realschulen*. It is a market for horses and other live stock. Among the manufactures are cordage, cotton and woolen goods, tobacco products, spirituous liquors, and machinery. It has convenient railroad connections and is joined by canal and river navigation with the Caspian, Baltic, and Black seas. Population, 1906, 78,468.

ORENBURG (â-rĕn-böörg'), a city of Russia, capital of a government of the same name, on the Ural River, near the Asiatic boundary. It is located on the slopes of a range of hills, has good railroad connections, and is the center of a large trade in cereals, live stock, and merchandise. The principal buildings include the arsenal, the public museum, the municipal theater,

two gymnasiums, and a theological seminary. Among the manufactures are leather, clothing, cotton and woolen goods, soap, machinery, silk textiles, and ironware. The government of Orenburg has valuable deposits of salt, copper, gold, and iron. Orenburg was founded in 1742. Population, 1906, 74,086.

ORGAN, a wind musical instrument, the largest and most important of all musical instruments. It contains a collection of metallic or wooden pipes, which are made to sound by means of compressed air from bellows, and is played through the agency of keys. The organ is of great antiquity and can be traced back to a small collection of pipes, from which it has gradually grown in size and number of pipes until now a single performer is able to call into use several thousand. The ancient Greeks and others of remote date employed water to graduate the pressure of the compressed air upon the pipes, which entered from a chamber, hence their instruments were known as *hydraulic*, or *water organs*. Instruments of this form were in common use among the people of wealth from the earliest history of the Grecians, and continued popular in the Roman and Byzantine empires and in the reign of Charlemagne.

Three essentials are employed in the construction of all organs, but to these have been added a variety of mechanical devices for the purpose of increasing the beauty and intensity of the musical effect. These essentials consist of a *wind box* to contain compressed air, a number of *pipes* in communication with the wind box to produce musical sound, and a *keyboard* to supply communication at the pleasure of the player. After these essential parts of organ construction were perfected, additional progress was made by constructing instruments so that a single player could operate several instruments. Pedals were added as a means of using the feet, greater variety of tones were introduced, more power was centered in the bellows to supply a greater volume of air to the wind box, and finally the *sound-board* was placed at the upper part of the wind chest, a device by which air is conveyed to any particular pipe desired to be called into use.

The larger organs of modern construction are made of different systems of pipes, called *partial organs*, each of which is connected with a separate keyboard, often having four or five rows of keys, but all are in reach of the performer. A large church organ usually has three partial organs, the *great organ*, the *swell organ*, and the *choir organ*. A fourth, called the *solo organ*, is added to large concert organs and sometimes a fifth is placed at some distance

from the others, called the *echo organ*. *Pedal organs* are attached to either the church or concert organs and are operated by the feet, having a keyboard for that purpose called a *pedal*. The keyboards to be operated by the hand are called *manuals*, or *claviers*. Each partial organ usually has a manual with a compass of five octaves, ranging from the C below the tenor C, while the pedal has a compass commonly of 27 notes, ranging from the C below the lowest manual C. The pipes range in length from less than one inch to 32 feet. They are divided into two classes, *reed pipes* and *flute* or *mouth pipes*, and the quality and character of their sound depend upon their dimensions, shape, and the material of which they are made. Air is admitted into the pipes by means of valves connected with the keys.

The several sets of pipes of each partial organ are called *stops*. Each stop has its own characteristic of tone, the quality of tone being designated as *clarinet*, *flute*, *diapason*, *trumpet*, *vox humana*, *oboe*, *violin*, *bassoon*, *dulciana*, etc. Most of the instruments have mechanical combinations by which several stops or pedals may be operated at once, organ couplers for joining keys in different manuals, swell pedals for increasing the volume, and tremulants for producing a trembling effect. The bellows for compressing air in the wind box are worked by hand in small organs, but in the larger instruments they are operated by a hydraulic or electric motor, or a gas engine. Organs of large dimensions are abundant in the cathedrals and churches of Europe and America. Among the largest in America are those in the Chicago Auditorium, the Cincinnati Music Hall, the Brooklyn Tabernacle, the Cathedral of Saint Patrick in New York, and the cathedrals of Boston and Montreal. The organs of much renown in Europe include those in Saint Peter's, Rome, in Notre Dame, Paris, and others at Haarlem, Seville, Strassburg, Utrecht, Berlin, Rotterdam, London, and Vienna.

The *reed* or *cabinet organ* is an American invention. The first instrument of this kind was made by Aaron M. Peasley in 1818 and became known as the *melodion*. In this class of instruments the bellows are worked by the feet and the reeds are generally worked on by suction instead of by blowing. Emmons Hamlin, in 1848, made an improvement by twisting and bending the reeds, thus increasing the capacity and quality of the tone. Extensive manufacture of this class of instruments began in 1854, when the Mason & Hamlin Organ Company commenced to place a superior article on the market known as the *American organ*. Since then these instru-

ments have been improved in size and style, both of which are very various, and they have entered extensively into the homes and into missionary, Sunday school, and church work.

ORIFLAMME (ōr'ī-flām), the royal standard of the Capetian kings of France. Originally it belonged to the Abbe Saint Denis, near Paris, and was used in various religious ceremonies. Later it was carried by the counts of Vexin and, when Philip I. of France annexed Vexin to his dominions, it devolved upon him and his successors to carry the oriflamme. Louis VI. raised it for the first time in 1124, but it went out of use after the defeat at Agincourt in 1415. The banner was made of red silk, with two notches at its end, and was adorned with green silk tassels.

ORIGINAL PACKAGE, the term used in the United States to designate a shipment of goods that are inclosed in the covering in which they were packed at the time of being shipped from one state into another. Considerable interest has been attached to packages of this kind, especially where consignments of spirituous liquors are shipped into a state where the sale and manufacture of intoxicating beverages are prohibited by law. The courts held that under the Interstate Commerce Law a package so shipped could be sold without a violation of the state law. This gave rise to a considerable trade in liquor even in states that prohibited the liquor traffic, and large quantities were shipped and sold directly to consumers in the original packages. By the terms of a law enacted in 1890 all liquors shipped from one state to another became subject to the laws of the state in which they were received, hence it became possible to enforce the prohibitory liquor laws more effectually. However, the law referred to does not apply to any other commodities, and this has given rise to considerable complication, especially in the sale of cigarettes where trade in them is forbidden.

ORINOCO (ō-rī-nō'kō), a river of South America. It rises in the Parima Mountains, near the boundary between Venezuela and Brazil, and, after a course of 1,570 miles, flows into the Atlantic Ocean by an extensive delta, near the island of Trinidad. The Orinoco drains a basin of 366,000 square miles. It is remarkable for being connected with the Rio Negro, a tributary of the Amazon, by the Cassiquiari River, thus forming a natural canal between the two great river systems. In its upper course are several rapids and falls, from which it is navigable to the Atlantic, a distance of about 815 miles. The course is through a region of vast and luxuriant vegetation. It receives a large number of tributaries, among them the Guaviare,

Meta, Ventuari, Caura, and Apuré rivers. In the rainy season, which occurs from May to January, there are vast floods, often covering an extent more than a hundred miles, and the delta assumes at that time the appearance of an extensive sea. The valley of the Orinoco includes vast tracts of forest, and on its banks are a number of ports and trade stations. Humboldt was one of the first explorers of the Orinoco.

ORIOLE (ō-rī-ōl), a class of small birds found in the Old World, but principally in Europe, Asia, and the Indian Archipelago. Several allied species are native to America, known as the *Baltimore oriole* and the *orchard oriole*. The orioles proper have a bright yellow color, but the wings and tail are black, and in size they resemble the thrushes, to which they are allied. More than twenty species have been described. The nests are built to hang from the smaller branches of trees. They have a loud, flutelike song and are prized as cage birds. The eggs are of a shining white color, sometimes tinged with pink, and have small, dark purple spots. These birds feed on insects, seeds, and fruits. See **Baltimore Bird**.

ORION (ō-rī'ōn), a giant hunter mentioned in Greek mythology, reputed by Homer as the most handsome man in the world. He was born in Boeotia. Writers describe him to have been so large that he could wade the deepest seas. When on land, his shoulders reached the clouds, and, after falling in love with Eos (Aurora), he destroyed the wild beasts of the Aegean region for her protection. The father of Eos postponed the marriage until Orion became offended, and in a fit of inebriety his eyes were put out, but by exposing them to the rising sun his sight was restored. Subsequently Artemis slew him with an arrow, because the gods became offended on account of the love Eos bore him for his beauty. Some writers assert that he died by the sting of a scorpion, but all agree that he and the hounds that accompanied him in the chase were placed as a constellation in the heavens, known as Orion.

ORION, an ancient constellation, situated on the line of the equinoctial, visible at some season of the year in every land. In the wintry sky it becomes one of the most clearly defined and conspicuous constellations in the heavens. The outlines are marked by four brilliant stars in the form of a parallelogram, and near the center are three stars forming the *Belt of Orion*. The outline of this constellation is supposed to resemble the human form of the mythical giant, Orion, for whom it was named. South of Orion are four stars called the Hare, which form a beautiful figure resembling that animal.

ORISKANY (ô-rîs'kâ-nÿ), **Battle of**, an engagement of the Revolutionary War, fought about two miles west of Oriskany, N. Y., on Aug. 6, 1777. The Americans under General Herkimér numbered about 800. They undertook to relieve Fort Stanwix, which was besieged by a force of British and Indians under Sir John Johnson and Joseph Brant, but were attacked in a deep ravine. The battle raged for several hours, despite a severe thunderstorm, and both sides were badly disabled, but the Americans remained masters of the field. Saint Leger, who had been informed of the approach of Benedict Arnold, retreated toward Canada. General Herkimer was mortally wounded while in action.

ORIZABA (ô-rê-sâ'vá), a city of Mexico, in the state of Vera Cruz, sixty miles southwest of Vera Cruz. It is connected by railway with the principal cities of southern Mexico. The site is on an elevation 3,970 feet above sea level, but it is surrounded by a fertile country, producing cereals and fruits. Nearly all the buildings are one-storied, owing to the region being subject to earthquakes. Among the manufactures are cotton and woolen goods, tobacco products, leather, machinery, and earthenware. About 25 miles north of the city is Pico de Orizaba, an extinct volcano, having an altitude of 17,380 feet. Population, 20,720.

ORKNEY ISLANDS (ôrk'nê), an island group situated north of Scotland, separated from the mainland by the Pentland Firth, a channel averaging about seven miles in width. The group contains about 90 islands, of which 28 are inhabited. The total area is 375 square miles. Pomona, or Mainland, is the largest island. Others of considerable size include Hoy, Sanday, Westray, and Ronaldsay islands. It has a moist but healthful climate, but the winters are mild. None of the elevations is of considerable height. Fresh-water springs and lakes are abundant. Fishing and farming are the principal industries, but it has manufactures of hosiery, straw hats, clothing, and utensils. The chief products include potatoes, barley, hay, oats, turnips, horses, cattle, sheep, swine, poultry, and many varieties of fish. Kirkwall and Stromness are the principal towns. Kirkwall, the capital, contains the Cathedral of Saint Magnus, founded in 1138, and a museum with many valuable antiquities. It is the center of a considerable trade.

The Orkney Islands were known to the ancient Greeks as the *Orcades*, but little is known of their inhabitants until about the time of the Middle Ages, when they were inhabited by Picts and Northmen. Harold Haarfager annexed them to Norway in the 9th century. They re-

mained under the Scandinavian sovereigns until 1468, when they passed as a dowry with Margaret of Norway to James III. of Scotland. Since then they have belonged to Scotland and are now incorporated with Great Britain. They are governed as a separate county. The inhabitants consist of a mixture of Scandinavians and Scotch. Population, 1906, 31,045.

ORLEANS (ôr'lê-anz), a city of France, capital of the department of Loire, on the Loire River, 72 miles southwest of Paris. It is an important railroad-center, has canal connection from the Loire to the Seine, and maintains a convenient harbor on the river. The Loire is crossed by a number of splendid bridges, uniting the two portions of the city at convenient places. Orleans was formerly surrounded by walls, but these have been converted into boulevards. It has a fine public school system, a number of institutions of higher learning, and several parks, landscape gardens, and beautiful statues and monuments. Electric lights, a number of libraries, and several theaters and museums are maintained. The cathedral was partly destroyed in 1567 by the Huguenots, but was rebuilt by Henry IV., and besides it are several public buildings, including a palais de justice. The manufactures include hosiery, sugar, porcelain, bleached wax, cotton and woolen goods, vinegar, leather, machinery, and spirituous liquors.

Orleans was founded before the Christian era. The Gallic name, in 52 B. C., was *Genabum*. In 272 A. D. it was renamed *Aurelianum* by the Romans, from which its present name was formed. Attila besieged it in 451, but he was defeated by the Romans. Subsequently it passed successively into possession of the Franks and the Northmen, and in 1428 was relieved by Joan of Arc from a siege laid by the English under the Duke of Bedford. The German army occupied it in the Franco-German War, from 1870 to 1871, and made it the base of their operations against the French army of the Loire. Population, 1906, 68,614.

ORMUZ (ôr'müz), or **Hormuz**, an island of Asia, in the Persian Gulf, near the coast of Persia. The surface is hilly and nearly destitute of vegetation, but it is valuable for the extensive deposits of sulphur, iron, and salt rock. The Portuguese took possession of the island in 1507, but it was captured by the English and Persians in 1622, since which time it has belonged to Persia. At one time it contained a town with 40,000 inhabitants, when it was the seat of a large inland and coastwise trade. At present the trade of the vicinity is confined to the port of Bender Abbas, on the mainland.

ORMUZD (ôr'müz'd), or **Ormadz**, the supreme deity worshipped by the ancient Persians and their descendants, the Parsees and Ghebers. He is regarded the god of the firmament, the representative of goodness and truth, and is worshipped as the creator of the universe. Zoroaster (q. v.) taught that an incomprehensible being named *Ahura Masda*, the eternal one, existed from all eternity and that Ormuzd came or sprang from him. His opponent, *Ahriman*, the evil one, corresponds to the Devil of the Christians, hence he is the antagonist of Ormuzd. They are opposing principles and are known as the king of light and the prince of darkness.

ORNITHOLOGY (ôr-nĩ-thõl'õ-gÿ), the branch of zoölogy that treats of birds, their form, structure, habits, and classification. It is sometimes divided into *field* and *closet* ornithology, the former relating to the study of living birds from observation in their haunts and the latter, to the study of dead birds by dissection. See **Birds**.

ORNITHORHYNCHUS (ôr-nĩ-thõ-rĩn'küs), or **Duckbill**, an animal of Australia, the only genus of its class. It is characterized by webbed feet, a short tail, very small eyes, soft and close fur, and a beak with mandibles shaped like those of a duck. This animal and the porcupine ant-eater of Australia constitute the lowest species of mammals. The habits are aquatic, feeding on water insects, worms, and small mollusks. The feet have five developed toes and are well adapted to aid the animal in swimming and for making burrows in the banks of streams. In some instances they construct houses near the banks, which often attain a height of from fifteen to twenty feet above the surface of the water, and in the upper end they form a nest. Though the general structure of this animal is mammalian, it is oviparous and lays two eggs at a time. The young come forth in a blind and hairless condition and feed by sucking milk from the nippleless glands of the female. In the young the beak is short and flexible and is adapted for sucking.

ORONTES (õ-rõn'tëz), the name anciently applied to a river in Syria, now called Nahr-el-Asi. It has its source between the Lebanon and Anti-Lebanon Mountains, courses toward the north to Antioch, and thence flows toward the west into the Mediterranean Sea. The course is about 215 miles, but it is not navigable. The valley of the Orontes is fertile, containing splendid clusters of figs, laurels, sycamores, and other trees and shrubs.

ORRIS ROOT (õr'ris), the name of the dried root of the white iris, a plant native to the southern part of Europe. It has an aro-

matic odor and a subacid taste and is employed in the manufacture of perfumery and tooth powder. In some places the rootstalks of the purple iris, or flower-de-lucé, is used for the same purpose. The roots of some species of these plants contain much starch and are eaten.

ORTHOPEDECS (ôr-thõ-pëd'iks), the branch of medical science which relates to the prevention and cure of deformities in the human body. Originally it was applied only to this science as it relates to infants and children, but it is now extended to any age. However, no sharply drawn line has been established between general and orthopedic surgery. In general, it relates both to careful nursing and the treatment of deformities by mechanical means. Among the particular ailments with which it is concerned include rickets, bowlegs and knock-knee, curvatures of the spine and the arms, clubfoot, hammertoe, and diseases of the joints. Many instruments and much apparatus for treating these and similar ailments are sold on the market.

ORTHOPTERA (ôr-thõp'të-rà), an order of insects, including several thousand species. They are supplied with chewing jaws, two rather thick and opaque upper wings, and two larger thin plaited straight wings. The young, when first hatched, closely resemble the adult insects, except that they are wingless. Four groups are included in the order. These are known as the runners, the graspers, the walkers, and the jumpers. Among the familiar species are the grasshoppers, crickets, praying mantis, leaf insects, walking sticks, and locusts. The graspers are carnivorous and the other groups feed upon vegetation and household articles. This order includes some of the largest and strangest species of insects.

ORTLER (õrt'lër), or **Ortler Spitze**, the name of a mountain of Austria-Hungary, in Tyrol, about 65 miles southwest of Innsbruck. It belongs to the Rhaetian Alps and is the highest peak in the empire, having a height of 12,795 feet. Explorers ascended it in 1804 and shortly after published an account of its extensive ice fields and imposing outlook.

ORTOLAN (ôr'tõ-lan), or **Ortulan**, a species of birds of the bunting family. It is native to Europe, Asia, and Northern Africa. The ortolan is a migratory bird, spending its summers as far north as the Arctic Circle and passing to the Mediterranean and countries of Southern Asia in autumn. The warble is pleasant and flutelike. Its length is about six inches, the color is yellowish-gray with brown wings, and the male has a particularly vivid hue. The

bill is conical and small and the tail is somewhat forked. Large numbers of these birds are caught with nets as they migrate, since their flesh is valued for its delicious flavor. In many countries the captured birds are fattened before they are killed for table use. The ancient Romans were fond of the ortolans. They are still valued in Italy, Cyprus, France, and other countries, where they serve as a favorite food for epicures.

ORURO (ō-rōō'rō), a city of Bolivia, capital of a department of the same name, near the Desaguadero River, 25 miles north of Lake Poopo Choro. It is surrounded by a region containing vast deposits of gold, silver, lead, iron, copper, tin, and antimony. The lake has salty water and in its vicinity are productive salt deposits. Oruro was founded in 1590, when silver was discovered in the vicinity, and in the height of its prosperity possessed much wealth and a population of 70,000. Insurrectional movements and the discovery of mines of greater importance in the adjacent country have caused it to decline. Population, 1908, 18,766.

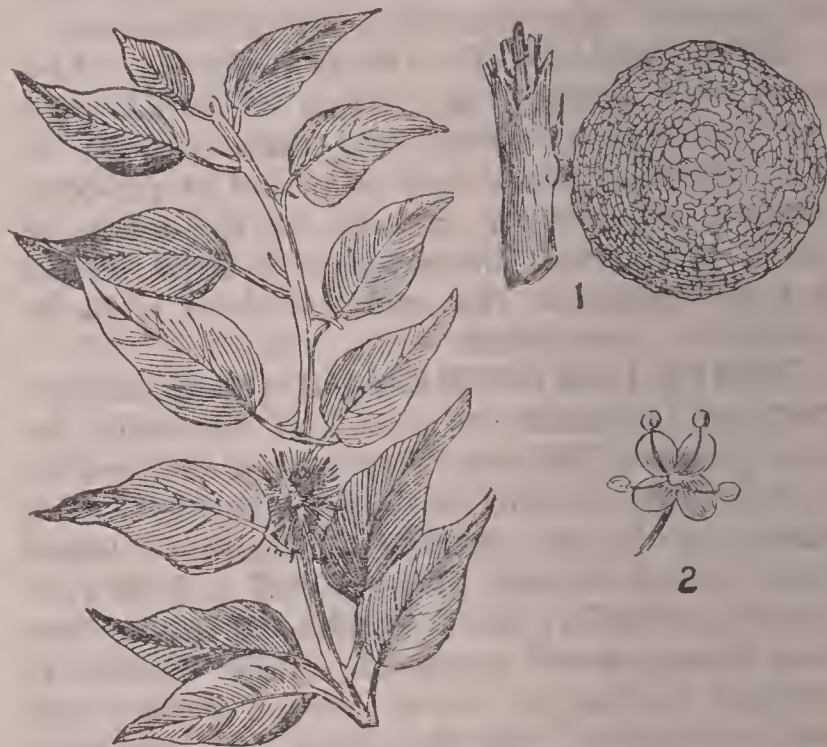
ORYX (ō'rīks), a species of large antelope, native to the northern part of Africa. It has very long horns that curve backward and is distinguished by its whitish color. Large herds are met with in the Sudan and Nubia, where they are hunted for their flesh and skins. This animal belongs to the same genus as the addax, gemsbok, and beatrix antelope, but is larger in size.

OSAGE ORANGE (ō'sāj), a tree of the nettle family, so named from the Osage Mountains of Arkansas, where it is native, but it is also found in other regions of North America. The leaves are glossy and alternate. It bears a fruit which somewhat resembles an orange in size and color, but it is not edible. It attains a height of from fifteen to sixty feet, this depending upon climate and treatment, and yields a fine-grained yellowish wood that takes a high polish. The wood is used on account of its durability for paving blocks, fencing posts, and bridges. The leaves have been substituted for those of the mulberry as a food for silk worms, but the tree is used more largely for hedges. Its rapidity of growth, thorny branches, and ability to bear dwarfing make it of special value for all classes of hedge fencing. It may be propagated by cuttings of the roots, but for hedging the plants are grown from the seed and afterward are transplanted.

OSAGE RIVER, a river of the United States, having its source in eastern Kansas. After a tortuous course of about 500 miles it flows into the Missouri River at Osage City,

some distance below Jefferson City, Mo. It is joined by a number of tributaries in Missouri and courses through an agricultural and mining country. In its valley are extensive forests. The Osage valley is highly fertile, producing cereals, grasses, and fruits.

OSAGES, an Indian tribe of North America, belonging to the Dakota family, first met by Marquette on the Missouri in 1673. Later they occupied the regions of the Arkansas and sided with the French against the English. In 1808 they ceded a part of their land to the govern-



OSAGE ORANGE.

1, Fruit; 2, Flower.

ment and made several subsequent cessions. At the beginning of the Civil War, in 1861, 1,000 Osages moved toward the south, but entered into a treaty in 1865, and in 1870 they conveyed their lands to the government and removed to Indian Territory, now Oklahoma. The Osages have prospered under governmental supervision. They include a large per cent. of persons who are advanced in educational and industrial arts and possess valuable cultivated lands. Several literary works have been translated into their language.

OSAKA (ō'zā-kä), or **Ozaka**, a city of Japan, on the island of Hondo, 28 miles southwest of Kyoto. It has a fine location on the estuary of the Yodogawa, is a free port city, and has communication by canals and railways. The surrounding country is fertile and produces large quantities of tea and cereals. All the principal streets are clean and regularly platted, intersecting each other at right angles. It has manufactures of toys, machinery, clothing, cigars,

edged tools, earthenware, and food products. Among the important buildings are the mint, a government college, a number of public schools, several colleges and hospitals, and about 1,400 Buddhist temples. Electric lights, telephones, waterworks, and street railways are among the improvements. It has a large trade in rice, tea, leather, and various manufactures. Population, 1909, 996,508.

ÖSEL (ē'zēl), or **Oesel**, an island in the Baltic Sea, at the entrance to the Gulf of Riga, belonging to the Russian government of Livonia. The area is 995 square miles. It is hilly and undulating in many parts, but has marshy tracts of considerable extent. The soil is fertile and produces wheat, oats, and fruits. Fishing and the raising of cattle and horses are important industries. Arensburg, on the coast in the southeastern part, is the principal town. Denmark had possession of the island until 1645, when it was ceded to Sweden, and in 1721 it became a part of Russia. The inhabitants consist largely of Esthonians. Population, 1906, 57,812.

OSHKOSH (ōsh'kōsh), a city of Wisconsin, county seat of Winnebago County, on Lake Winnebago, at the mouth of the Fox River, eighty miles northwest of Milwaukee. It is on the Wisconsin Central, the Chicago and North-western, and the Chicago, Milwaukee and Saint Paul railroads. Intercommunication is by a system of electric railways. Among the manufactures are lumber products, flour, ironware, matches, furniture, coffins, vinegar, spirituous liquors, packed meats, machinery, vehicles, and tobacco products. The noteworthy buildings include the county courthouse, the public library, the high school, the Saint Mary's Hospital, and the State normal school. Near the city are the Northern Hospital for the Insane and the county poor farm. The trade in live stock, lumber, and manufactures is extensive. Within recent years it has developed a wide popularity as a summer resort, owing to its proximity to the lake and its numerous facilities for entertaining visitors. The site of Oshkosh was first settled in 1836 and it was incorporated as a city in 1853. Population, 1910, 33,062.

OSIER (ō'zhēr). See **Willow**.

OSKALOOSA (ōs-kā-lōō'sā), a city in Iowa, county seat of Mahaska County, 58 miles southeast of Des Moines. It is on the Iowa Central, the Chicago, Burlington and Quincy, and the Chicago, Rock Island and Pacific railroads. The surrounding country is agricultural and stock raising and contains extensive deposits of bituminous coal. It has electric street railways, sewerage, and public waterworks. Among the

manufactures are flour, ironware, machinery, tobacco products, steam heaters, and earthenware. The principal buildings include the county courthouse, the public library, the high school, and several churches. It is the seat of Penn College, a Friends' coeducational institution founded in 1873, and of Oskaloosa College, a Christian institution established in 1862. The city has a large trade in coal and merchandise. It was settled in 1853 and incorporated in 1863. Population, 1905, 10,203; in 1910, 9,466.

OSMIUM (ōz'mī-ūm), a metal associated in nature with platinum, so named because of the acrid odor of its oxide. It is obtained in thin flexible plates and when pure has a bluish-white color and a specific gravity of about 22. Various processes are employed for separating it from the elements with which it is alloyed, which include ruthenium, rhodium, and palladium. It is difficult to fuse osmium with other metals. The acid obtained from it is used to convert alcohol into acetic acid, to remove carbon from indigo, and as an oxidizer. See **Chemistry**.

OSMOSIS (ōz-mō'sīs), the tendency of liquids to mix or become equably diffused when in contact. It is a form of molecular attraction, allied to that of adhesion, and was first observed between fluids of different density. When the flow is from a thinner to a thicker fluid, it takes place more rapidly and is called *endosmose*, and the slower current from the thicker to the thinner fluid is known as *exosmose*. Osmosis ceases between two liquids when they become of the same density. It is an essential function in the economy of plant and animal life and takes place largely through a thin membrane. It is probable that nutritious fluids circulate by this means in plants. The interchange due to osmosis is employed to a considerable extent in the medical profession, especially to the treatment of tender parts within the body.

OSNABRÜCK (ōs-nā-brük'), a city of Germany, in the province of Hanover, thirty miles northeast of Münster. It is on the Hase River, at the junction of several railways, and is surrounded by a fertile farming and fruit-growing country. The streets are regularly platted and well improved by paving. It has a fine Roman Catholic cathedral, the Protestant Church of Saint Mary, and a large and well-built public hall. The gymnasium was founded by Charlemagne. It has a theological seminary, two normal schools, and a fine public museum. The manufactures include wire and nails, pianos and organs, cotton and woolen goods, tobacco and cigars, earthenware, and machinery. Large

stone quarries and coal mines are worked in the vicinity. The city was a member of the Hanseatic League. Population, 1905, 59,580.

OSPREY (ös'prā). See **Fishhawk**.

OSSINING (ös'sin-ing), a village of New York, in Westchester County, thirty miles north of New York City. It is on the Hudson River and the New York Central Railway and is located on a beautiful site that overlooks the wide expanse of the Hudson known as Tappan Bay. Near the village is the famous Sing Sing State prison. The Croton Aqueduct, seventy feet above water, is an interesting feature at this place. Many fine residences and yards beautify the village. It has manufactures of boots and shoes, medicines, machinery, and clothing. Waterworks, electric lighting, and sewerage are among the public improvements. It was named Sing Sing from the Sin Sincks Indians, but the name was changed to Ossining in 1901. It was incorporated in 1813. Population, 1905, 7,135; in 1910, 11,480.

OSTEND (öst-čnd'), a seaport city of Belgium, on the North Sea, in West Flanders, connected with other cities by a number of railroads and steamboat lines. It is 68 miles northwest of Brussels, in a fertile agricultural country, and has a large trade in dairy products, oysters, codfish, herring, poultry, and merchandise. Among the manufactures are cotton and woolen goods, sugar, clothing, tobacco, salt, candles, boots and shoes, chemicals, and machinery. The city has several fine parks, electric street railways, and many villas and hotels for the entertainment of tourists. Many thousands of visitors flock to the place between May and November. It was founded in the 9th century, was besieged by the Spaniards in 1601, and capitulated to the French in 1745. The modern prosperity dates from the opening of the Ostend and Bruges Canal and the building of railways. Population, 1906, 41,846.

OSTEND MANIFESTO, a declaration drawn up at Ostend, Belgium, on Oct. 9, 1854, by representatives of France, Spain, Great Britain, and the United States. They feared that the filibustering expeditions against Cuba would finally result in that island becoming Africanized like San Domingo, which induced these countries to favor a sale of Cuba to the United States. The manifesto declared that such a sale would be advantageous to both governments, but that, in case Spain refused to sell, the United States should acquire and annex the island by force of arms. This action was due largely to the interests of those who advocated slavery in the United States and was not approved in the platforms of either political

party. The people of Europe generally condemned it.

OSTEOPATHY (ös-tê-öp'ä-thÿ), an art or science of treating diseases, so termed from *os-teon*=bone, and *pathos*=suffering. It is based upon the theory that the body contains within itself the elements requisite to cure all infirmities and that all diseases are due mainly to a displacement of some bone, which, owing to its dislodgment, causes obstruction to the flow of one or more of the fluids of the body. The mode of treatment practiced by osteopaths consists chiefly in the adjustment of all parts and organs to their natural relations, which is done by pressing, rubbing, and otherwise manually treating the affected parts. The mechanical stimulation given is designed to remove obstructions to the vital forces and fluids and to induce more vigorous action in the organs, thereby aiming to incite greater energy. In this branch of healing it is particularly necessary that the practitioner be skilled in detecting the affected parts, as well as in determining the kind and amount of exercise to be applied to the different organs needing special treatment. A. T. Still, a physician of Kirksville, Mo., is the founder of the science, which may be said to date from 1894. Many schools and periodicals devoted to osteopathy are maintained in Canada and the United States. In 1908 there were not less than 3,125 practitioners in the United States. The practice is recognized and regulated by law in many states and countries.

OSTIA (ös'ti-ä), an ancient city of Latium, at the mouth of the Tiber, fifteen miles from Rome. It was founded by Ancus Marcius, who established salt works in the district. Later it became important as a port and naval station. During the civil war between Sulla and Marius, in 87 B. C., it was captured and plundered by the latter, but it soon recovered its former importance. The silt deposited by the Tiber gradually filled up its harbor and Emperor Claudius located a new harbor two miles west of the city, known as *Portus Augusti*. This harbor was enlarged by Trajan, but it was unprotected by walls and declined during the later years of the empire. Extensive ruins of Ostia still exist, but they are uninteresting and about three miles from the sea, owing to land having been formed by the alluvial deposits of the Tiber.

OSTRACISM (ös'trä-siz'm), a system of banishment practiced in Athens during the time of the republic, instituted to rid the state for a limited period of any person deemed dangerous to the government. Aristotle, in writing of this system, explained the subject as follows:

"Democratical states used to ostracize, and remove from the city for a definite time, those who appeared to be preëminent above their fellow citizens, by reason of their wealth, the number of their friends, or any other means of influence." At first the banishment was for ten years, but it was subsequently reduced to five. It required 6,000 votes to banish a person, and, when that number or more votes were cast against any one person, he withdrew from the city within ten days. This sentence was pronounced against many distinguished men, including Alcibiades, Aristides, Cimon, and Themistocles. It went out of use about 416 B. C.

OSTRICH (ös'trich), a genus of cursorial birds, of which it is the type. They are native to the deserts of Africa and Arabia, and some-



RHEA.

OSTRICH.

what resemble the rhea, emu, and cassowary. The ostrich is the largest of living birds, standing from six to eight feet high, and has been known from remote antiquity. Xenophon and other ancient writers mention it, and it is frequently referred to in the literature of later Rome. Among its characteristics are that it has only two toes, which correspond to the third and fourth of other birds, a long, naked neck, small wings of little service in flight, and long and powerful legs, giving it great speed. Ostriches are usually seen in flocks following an-

telopes, zebras, camels, and giraffes. Their principal means of safety against enemies is their remarkable speed, being able to exceed the fleetest horse. The plumage of the male is black, with white plumes at the ends of the wings and tail, and is much esteemed for ornamental purposes. In some places it is reared and domesticated on large ostrich farms, a good bird yielding annually from twenty to forty plumes. The hen is colored somewhat differently than the cock, being more grayish and flecked, and as a whole its feathers are not so valuable. Ostrich feathers are prized principally for dress decoration, the back feathers being the most valuable, and those of the tail and wings taking the next rank. White plumes possess the greatest market value, the black being obtained by dyeing those partially colored by nature, and the price ranges from \$75 to \$200 per pound. Choice plumes frequently sell at \$50 each.

Ostriches are hunted on horseback, or by the hunter putting on an ostrich skin to enable him to come within shooting range. They very infrequently give any sound and when they do it is somewhat like a cackle, but sometimes their cry is heard at a great distance, especially while in distress or when lost from their companions. The nest is made in the sand, where they lay the eggs, usually from eight to fifteen in the same nest, but these are from several hens. Ostrich eggs weigh about three pounds and hatch in six weeks. They are incubated by the hen and cock alternating, the cock usually occupying the nest at night, though in desert regions the sun has an assisting influence.

The ostrich is a vegetable feeder, but, like domestic fowls, swallows stones and other hard substances to aid the gizzard in its functions. Ostrich farming is carried on mainly in South Africa, North Africa, California, and Australia. The industry is altogether for the feathers, since the flesh is rarely eaten, though that of the young is quite palatable. An average-sized ostrich stands seven or eight feet high and weighs from seventy to ninety pounds. In walking the stride is about two feet, but when running the average stride is twelve feet.

OSTROGOTHS (ös'trō-gōths). See **Goths**.

OSWEGO (ös-wē'gō), a city and port of entry of New York, county seat of Oswego County, on Lake Ontario, 35 miles northwest of Syracuse, at the mouth of the Oswego River. It is on the New York Central, the Delaware,

Lackawanna and Western, and other railroads. It has municipally owned waterworks, stone and asphalt pavements, and a system of electric street railways. The manufacturing enterprises are facilitated by water power derived from the Oswego River. Among the manufactures are cotton and woolen goods, starch, oil, matches, boilers, hardware, spirituous liquors, and edged tools. The noteworthy buildings include the county courthouse, the high school, the city hall, and the Federal building. It is the seat of a State normal school, the State armory, and the Gerritt Smith Library. The harbor is well protected by a breakwater and a lighthouse. Extensive jetties are at the mouth of the river. Settlements were first made in the vicinity of Oswego in 1720. It was captured by the French in 1756 and in 1812 by the British. In 1848 it was chartered as a city. Population, 1910, 23,368.

OTO (ō'tō), a small tribe of Sioux Indians, formerly resident in the region of Nebraska which lies south of the Platte and west of the Missouri. They were united with the Missouris and now reside on a reservation in the eastern part of Oklahoma.

OTRANTO (ō-trän'tō), **Strait of**, a passage of water in the Mediterranean, uniting the Ionian Sea with the Adriatic Sea. It is about forty miles wide and separates the Italian from the Balkan Peninsula.

OTTAWA (ōt'tā-wā), a city in Illinois, county seat of LaSalle County, at the junction of the Fox and Des Plaines rivers, 84 miles southwest of Chicago. It is on the Illinois and Michigan Canal and on the Chicago, Burlington and Quincy and the Chicago, Rock Island and Pacific railroads. The surrounding country is a fertile farming and dairying district. Among the principal buildings are the county courthouse, the Reddick Library, the high school, the Ryburn Memorial Hospital, the Pleasant View College (Lutheran), and the Saint Francis Xavier Academy. The manufactures include glass, starch, cutlery, tile, cigars, pottery, clothing, lumber products, and machinery. Among the municipal facilities are electric street railways, brick and asphalt pavements, and waterworks. The city water is drawn from artesian wells in the vicinity and near by are marble quarries and coal mines. It was settled in 1830 and incorporated in 1853. Population, 1900, 10,588; in 1910, 9,535.

OTTAWA, a city in Kansas, county seat of Franklin County, 54 miles southwest of Kansas City, on the Marias des Cygnes River. It is on the Missouri Pacific and the Atchison, Topeka and Santa Fé railroads. The place is surrounded by a fertile farming and dairying coun-

try. The manufactures include ironware, flour, castor oil, sorghum, soap, dairy products, furniture, and machinery. Among the noteworthy buildings are the county courthouse, the high school, the First Methodist Church, the First Baptist Church, and the Rohrbaugh Theater. It is the seat of Ottawa University, a Baptist institution of higher learning. Ottawa was founded by John T. Jones, a missionary, and was chartered as a city in 1867. Population, 1905, 7,743; in 1910, 7,650.

OTTAWA, the capital of the Dominion of Canada, in the Province of Ontario, at the junction of the Ottawa and Rideau rivers. It is located in Carleton County, of which it is the capital, and is 100 miles west of Montreal.



Communication is maintained by the Canadian Pacific, the Ottawa and New York, the Canada Atlantic, and other railways, and by steamer on the Ottawa River and the Rideau Canal, giving it direct connection with Montreal and the cities on the Great Lakes. Chaudière Falls, the fine cataract of the Ottawa, is at the west end of the city. Rideau Falls, divided by Green Island, are two cataracts at the place where the Rideau discharges into the Ottawa. These falls supply an immense water power for industrial use. Hull, in the Province of Quebec, is located across the river and is reached by several railway and road bridges.

The streets are wide, regularly platted, and substantially paved. On Parliament Hill are the capitol buildings of the Dominion, constructed of sandstone at a cost of \$4,500,000. They cover nearly four acres and are constructed in the Italian-Gothic style of architecture. The post

office, the city hall, the residence of the Governor General, and the county courthouse are other public structures of note. The Christ Church Cathedral, the Roman Catholic Cathedral of Notra Dame, and many other ecclesiastical buildings are within the city. It is the seat of the Coligny Ladies' College, the Ottawa Roman Catholic University, several normal schools, a museum, and many charitable and benevolent institutions. About 210,000 volumes are contained in the Parliamentary Library. The city has an extensive museum and a valuable art gallery. Victoria Tower, a fine memorial to Queen Victoria, is 180 feet high. The city has several fine public grounds, such as Lansdowne Park and Cartier Square, and the scenery surrounding the city is among the finest in Canada.

Ottawa has extensive manufactures of flour and lumber, both of which are exported in large quantities. Other products include brick, cloth-



SEA OTTER.

ing, cigars, ironware, machinery, and farming implements. An extensive system of electric railways furnish communication to all parts of the city and many interurban districts. Electric and gas lighting, waterworks, telephone communication, and sewerage are among the public improvements. Ottawa is the seat of the Anglican Bishop of Ontario, the Roman Catholic Archbishop of Ottawa, and a number of foreign consulates. It was founded by Colonel By and named Bytown in 1827, but was incorporated under its present name in 1854. Queen Victoria selected it as the capital of Canada in 1868. Population, 1901, 59,902.

OTTAWA, a river of Canada, the principal tributary of the Saint Lawrence. It rises 160

miles north of Ottawa, on the Laurentian divide, and after a tortuous course toward the west enters Temiscamingue Lake. After passing through the lake, it flows toward the southeast and joins the Saint Lawrence by two mouths, by which the island of Montreal is formed. It has a total length of 625 miles and drains a basin of 70,000 square miles. Among the tributaries are the Rideau, Madawasca, and Rivière du Lièvre. In its course are several rapids and falls, including the Carillan Falls, above Rigaud; the Chaudière Falls, near the city of Ottawa; and Les Chots Falls, about thirty miles above the latter city. The course is through a valuable lumbering country and vast improvements have been made by canals to facilitate lumbering. It is connected by the Rideau Canal at Kingston with Lake Ontario.

OTTAWAS, an American Indian tribe of the Algonquin family. They were originally resident in the northern part of Michigan, where they were first met by French explorers. The Ottawas were friendly to the French, whom they aided in the wars against the English, and in the Revolutionary War they assisted the latter. Treaties were made with them in 1785 and 1789, but afterward a war broke out between them and the Miamis, which was concluded by another treaty in 1795. Soon after they ceded their land around Lake Michigan to the United States and a reservation was provided for a part of them on the Miami River, whence a number removed in 1836. A part of the

tribe settled in Missouri, others in Indian Territory, and some are still found in the region north of Lake Superior. The Ottawas counted among their chiefs the celebrated Pontiac. Within late years a number of Indians who are advanced in educational arts have traced their lineage back to him and other warriors famous in the early history of America.

OTTER (öt'tēr), a class of carnivorous mammals of the weasel family. These animals include about twenty species that vary greatly in size. The *common otter* measures a little over two feet from the nose to the tail, which is relatively short. It has soft fur of a brownish color, webbed feet adapted for swimming, and a weight of about twenty pounds. Otters are

found along the shores of streams and lakes, where they construct holes and channels through the ground, and subsist by feeding on fish, small birds, frogs, and other aquatic animals. In most species the fur consists of long, coarse, and shining hairs, with a short under fur of fine texture. The *great sea otter* inhabits the coast regions of the North Pacific Ocean, weighs from fifty to seventy pounds, and bears a very beautiful and valuable fur. This species and most others are destructive to fish, particularly to salmon, and have been hunted until they are of rather rare occurrence in the regions of America that were formerly inhabited by them. The *Canadian* or *American otter* formerly was plentiful throughout central Canada, but is now rare in the southern section. It has a valuable fur, which is dark brown in winter and reddish brown in summer.

OTTERBURN (öt'tēr-bûrn), **Battle of**, a contest that occurred near the village of Otterburn, in Northumberland, in August, 1388, between the Scotch under Earl Douglas and the English under Harry Percy. It is important from a historical standpoint for the reason that the "Chevy Chase," perhaps the most famous of English ballads, and the "Scotch Ballad of Otterburn," are based upon this event, though the former ballad apparently does not date earlier than the beginning of the 17th century. It appears that Douglas, clad in armor, with his Scottish spears bravely led his countrymen against the assault under Percy, and after a most valorous fight was struck to the heart by an English arrow, but Sir Hugh Montgomery immediately dashed forward and struck his spear through the heart of Percy. The contest raged until the ringing of the curfew bell and both sides claimed the victory. That both fought with remarkable valor was attested by the many nobles who lay bleeding on either side of the line of battle.

OTTOMAN EMPIRE. See **Turkey.**

OTTUMWA (öt-tüm'wá), a city in Iowa, county seat of Wapello County, on the Des Moines River, eighty miles southeast of Des Moines. Communication is by the Wabash, the Iowa Central, the Chicago, Rock Island and Pacific, the Chicago, Burlington and Quincy, the Chicago, Milwaukee and Saint Paul, and other railroads. It is surrounded by a fine agricultural and dairying country, which contains valuable deposits of coal and clays. Electric street railways, sanitary sewerage, and brick and asphalt pavements are among the public utilities. The noteworthy buildings include the county courthouse, the Federal building, the public library, the high school, the Y. M. C. A. building,

and the Union passenger station. Among the manufactures are linseed oil, starch, tobacco products, flour, cutlery, ironware, boilers, stoves, and packed meats. The manufacturing enterprises are facilitated by excellent water power. It has a growing trade in merchandise, cereals, coal, and live stock. Ottumwa was settled in 1849 and incorporated in 1851. Population, 1905, 20,181; in 1910, 22,012.

OUDENARDE (ou'den-är-de), or **Oudenarde**, a town of Belgium, in the province of East Flanders, on the Scheldt River, 36 miles west of Brussels. It has good railroad connections with other cities of the Netherlands, a fine Gothic council house, and manufactures of leather, cotton and woolen goods, and machinery. Oudenarde is important mainly because of several historic battles, among them the battle of 1674, when William of Orange conducted a long siege against the French. It was the scene of the celebrated victory of Marlborough over a French army under the Duke of Burgundy on July 11, 1708. Population, 1908, 8,146.

LOUDH (oud), or **Oude**, an extensive region of British India, located south of the Himalayas, southwest of Nepal, and west of Bengal. The area is 24,217 square miles. For administrative purposes it is connected with the United Provinces of Agra. The surface is an alluvial plain, which is drained by the Gogra, the Gumti, and other tributaries of the Ganges. Agriculture is the principal industry and much of the surface can be cropped twice during the year. Rice, millet, wheat, rye, barley, tobacco, opium, and indigo are the chief crops. Cattle and buffaloes are reared extensively, being used as beasts of burden. Manufactured products are imported extensively, but opium, wheat, and tobacco are exported.

Oudh is more densely populated than any other portion of India. A large part of the inhabitants are Hindus, only about one-seventh being Mohammedans. It was a center of civilization in ancient times and was conquered by an army of Mohammedans in 1195. For several centuries it was a province in the Mogul Empire. In 1857 it was foremost in the Sepoy Mutiny, having been annexed by the East India Company the year previous. Lucknow is the capital and largest city. Population, 1906, 13,035,172.

OUNCE, a species of the cat which is native to Asia and North Africa. It somewhat resembles the leopard, but has a lower and longer body, a more hairy tail, and a darker color. The spots are less regular than in the leopard. It is found throughout Central Asia, especially in Tibet and China, and extends westward and

southward beyond the Mediterranean. Although it rarely attacks man, it destroys sheep, goats, and other small domestic animals. The jaguar of South America is sometimes, but incorrectly, called ounce.

OUNCE, the twelfth part of a Troy pound, containing 480 grains. The avoirdupois pound contains 16 ounces and is equal to $437\frac{1}{2}$ grains Troy.

OURO PRETO (*ō'rōō prā'tōō*), a city of Brazil, in the state of Minas Geraes, 165 miles north of Rio de Janeiro. It is located on the slope of a mountain range and is surrounded by a rich gold-mining region. A railway connects it with Rio de Janeiro and other cities. Formerly it was the capital of the state, but the seat of government was removed to Bello Horizonte, or Minas, in 1894. Population, 1906, 13,806.

OUSE (*ōōz*), a river of England, in Yorkshire, formed by the confluence of the Ure and the Swale rivers. The length is 130 miles. It joins the Trent to form the Humber and is navigable from York to this junction, a distance of 45 miles.

OUSE, Great, a river of England, which rises in Bedfordshire, near Brackley, and flows into the Wash at King's Lynn. It is 160 miles long and is navigable about half that distance, having been improved by dredging.

OUZEL (*ōō'z'l*), or **Ousel**, the name of several birds native to Europe, most of which belong to the thrush family. The bill is slender and slightly bent upward, the wings are rounded, and the tail is very short. To this class of birds belongs the *water ouzel* of America, which is somewhat larger than the European species. See **Dipper**.

O V A M P O (*ō-vām'pō*), a native race of Africa, belonging to the Bantu people. This race occupies a region on the northern border of German Southwest Africa. In stature and features these people resemble the Kaffirs. They live in communities rather than villages and engage in raising corn, fruits, and cattle. The men shave their heads, wear sandals, and are fond of hunting. Beadwork, baskets, and various ornaments are made by the women. They are industrious, but are not highly advanced in the civilized arts of the Europeans.

OVENBIRD, the name of a group of birds found in South America and the West Indies. The common ovenbird is about six inches long, is reddish above and white below, and has a loud and shrill note. It runs rapidly or makes short flights when in search of insects. These birds nest in trees and houses, constructing their habitations of clay and twigs or straws, and are

seen generally in pairs. They are so named from their habit of building oven-shaped nests. The *water thrush* of the United States is an allied species, and its nest is roofed over with the entrance on one side. This bird is somewhat smaller, being about five inches long.

OVERSHOT WHEEL. See **Wheel**.

OWATONNA (*ō-wā-tōn'nā*), a city in Minnesota, county seat of Steele County, on the Straight River, 68 miles south of Minneapolis. It is on the Chicago and Northwestern, the Chicago, Milwaukee and Saint Paul, and the Chicago, Rock Island and Pacific railroads. The surrounding country is fertile. The principal buildings include the county courthouse, the high school, the public library, the Pillsbury Academy, the Sacred Heart Academy, and the State school for dependent children. It has three parks, well-graded streets, and a system of sanitary sewerage. Among the manufactures are flour, earthenware, and machinery. The place was settled in 1853 and incorporated in 1863. Population, 1905, 5,651; in 1910, 5,658.

OWEGO (*ō-wē'gō*), a town of New York, county seat of Tioga County, twenty miles west of Binghamton. It is on the Susquehanna River and on the Erie, the Lehigh Valley, and the Delaware, Lackawanna and Western railroads. Owego is noted as a summer resort and residential center. The surrounding country is productive, having fine farms, orchards, and dairying interests. The county courthouse, the Coburn Free Library, and the Owego Academy are among the leading buildings. It has waterworks and electric lighting. Flour, clothing, wagons, steel bridges, and machinery are among the manufactures. Owego was an Indian village at the time of the Revolution. It was incorporated in 1827. Population, 1910, 5,039.

OWENSBORO (*ō'ēnz-būr-ō*), a city of Kentucky, county seat of Daviess County, on the Ohio River, 110 miles southwest of Louisville. It is on the Illinois Central, the Louisville and Nashville, and other railroads and has regular communication by steamboats. The surrounding country is noted for its production of cereals, lumber, and minerals. It has a large trade in tobacco, live stock, lumber, and merchandise. Among the manufactures are tobacco products, spirituous liquors, cotton and woolen goods, wagons, carriages, flour, ironware, canned goods, earthenware, and machinery. The noteworthy buildings include the Owensboro Female College, the county courthouse, the Federal building, the high school, the Saint Francis Academy, and many churches. It has Hickman Park, electric street railways, systems of waterworks and sanitary sewerage, and brick

and asphalt pavements. The place was settled in 1798, when it was known as Yellow Banks, and in 1818 was named after Colonel Abraham Owen. Population, 1900, 13,189; in 1910, 16,011.

OWEN SOUND, a city of Ontario, capital of Grey County, on Georgian Bay. It is at the mouth of the Sydenham River and on the Grand Trunk and the Canadian Pacific railways, about 98 miles northwest of Toronto, and is a port of entry. The chief buildings include the high school, the townhall, and the courthouse. Among the manufactures are machinery, leather, engines, and farming implements. It has electric lighting, waterworks, and a sewerage system. Population, 1901, 8,777.

OWL, a large group of birds of prey, including fully 150 species, about forty of which inhabit North America. They are distinguished



BARN OWL.

HORNED OWL.

chiefly on account of their nocturnal habits. The different species have a short head, a circular or triangular facial disc, large eyes and ears, the outer toe reversible, and, owing to the soft plumage, a noiseless flight. Most owls are nocturnal in habit, flying about at night in search of food, their full and prominent eyes with large pupils making it quite possible to move with safety at twilight or after night. The plumage is variously colored in the different species, but it is mostly brown and yellow, and is shaded with various spots or bars. It is remarkably downy. The species which subsist by catching fish have the toes and tarsi quite bare of feathers, but the others have feathers extending to the base of the claws. Mice constitute the favorite food of owls, but they also search for other small animals and insects. The hollows of trees, crevices of rocks, old buildings, and isolated caves are favorite haunts during the day, where they build their nests and rear their young.

Owls cast up the indigestible parts of the food swallowed in the form of pellets. These castings occur principally under their roosts. They show that these birds are of service to man in destroying rats and mice. If taken young, most species may be tamed, particularly the familiar *barn owl*. When irritated, this species gives out a hissing sound while snapping its mandibles, and most species have a rather pleasant hoot. The species vary from five inches to two feet in length and occur in all parts of the habitable globe, but the barn owl has by far the greatest distribution. Among the more common species are the *brown owl*, the *long-eared owl*, and the *eagle owl*. These species are widely distributed in America and Europe. The *snowy owl* is of common occurrence in the northern part of Europe, and the

short-eared owl is of wide distribution in woody countries and in moorlands. The *screech owl* is noted for its discordant scream and is widely distributed, while the *boobook owl* is a species common to Australasia. A class known as *burrowing owls* is common to America and the West Indies. It is peculiar on account of burrowing in the ground and for frequenting the burrows of the marmot, or prairie dog. The *snowy owl* and *hawk owl* are not nocturnal in their habits. The former has remarkably snowy plumage and large size and the latter is migratory, moving southward from Canada and the northern part of the United States early in autumn.

OWOSSO (ō-wōs'sō), a city of Michigan, in Shiawassee County, on the Shiawassee River, 78 miles northwest of Detroit. It is on the Michigan Central and the Grand Trunk railroads. An abundance of water power is obtained from the Shiawassee River. It is surrounded by a fertile agricultural and dairying country. The features include the Federal post office, the high school, the public library, and many fine churches. Among the manufactures are ironware, carriages, coffins, clothing, lumber products, beet sugar, cigars, flour, and machinery. The place was settled in 1836 and incorporated in 1859. Population, 1910, 9,639.

OX, a bovine quadruped of the genus *Bos*, including the species known as the common ox, the buffalo of North America, the bison or yak of Asia, the zebu or Indian ox, the buffalo of Europe and Asia, and many others. The common ox has been known from remote antiquity. In India it still possesses a sacred character. It is one of the most useful animals to man, serving as a beast of burden and draught. The

female yields milk of abundance and much richness. It is a prolific source of animal food, while its bones, skin, hair, hoofs, horns, and, in fact, all parts are of value for divers purposes. When the name is applied to the male, it has various significations. A male animal less than a year old is designated as *bull calf*, or *ox calf*, and after that as a *bull*, if not castrated. A castrated male is called a *steer*. See **Cattle**.

OXALIC ACID (öks-äl'ík), an acid found in a number of plants, animals, and rarely in minerals. It was discovered by Scheele in 1776 in wood sorrel, to which it gives a very acid taste. In this and other plants it occurs combined with potash as binöxalate of potash. Combined with lime, it gives solidity to many lichens, and is found in the roots of rhubarb and other plants. It is obtained artificially by the oxidation of sugar or of starch by nitric acid. Oxalic acid is a corrosive poison. It is employed chiefly in calico printing, for whitening leather, and for removing stains of ink and iron rust from fabric. The compounds of oxalic acid with basis, such as binöxalate of potash, are known as *oxalates*.

OXALIS (öks'á-līs), a genus of plants which are widely distributed in the continents, including about 200 species. They are generally known as wood sorrel and belong to the geranium family. Most of the species are native to the subtropical regions on both sides of the Equator, and a few are common to the temperate parts of Europe and America. They bear flowers with five petals and ten stamens and the leaves are compound. Many species are cultivated for their foliage and pretty flowers as greenhouse plants. A species common to Mexico has a root similar to that of the parsnip, for which it is cultivated.

OXFORD (öks'fērd), a city of Mississippi, county seat of Lafayette County, on the Illinois Central Railroad, thirty miles south of Holly Springs. The surrounding country produces cotton and fruits. It has canneries, machine shops, and industries connected with cotton. Oxford is the most important educational center in the State, being the seat of the University of Mississippi, the Warren Institute, and the Woman's College (Methodist). It has well-graded streets and a municipal system of waterworks. Population, 1900, 1,825.

OXFORD, a town of Ohio, in Butler County, 38 miles northwest of Cincinnati, on the Cincinnati, Hamilton and Dayton Railroad. It is pleasantly situated in the Miami valley and is surrounded by a fertile agricultural country. Among the manufactures are agricultural imple-

ments and earthenware. Oxford is a noted educational center, being the seat of Miami University, Oxford College, and Western College. It has systems of waterworks and sanitary sewerage. The streets are well improved by grading. Population, 1900, 2,009.

OXFORD, a city of England, county seat of Oxfordshire, noted principally as the seat of the celebrated University of Oxford. It is situated at the confluence of the Cherwell and Thames rivers, fifty miles northwest of London, with which it is connected by a number of important railways. The older part of the city is located on a rectangle formed by the two rivers, but the newer portions extend over the undulating region beyond. The surrounding country is fertile and productive, but the Thames has many branches and forms a number of marshes. High Street, the leading thoroughfare, is one of the finest streets in England. Among the principal buildings are those of the university and a number of structures of historic interest. These include the Clarendon Building, in which the Clarendon press was located until 1830; the Saint Michael's Church, dating from 1070; His Majesty's Prison, on the site of an old castle; the Church of Saint Michael, with a noted Saxon tower; and the Church of Saint Peter, in the eastern part of the city. It has a number of fine statues and monuments, including Martyr's Memorial, a cross erected in 1841 to commemorate Latimer, Ridley, and Cranmer.

Oxford has considerable trade and a number of manufacturing industries, but is supported more particularly because of its educational institutions. It has systems of waterworks and sanitary sewerage, stone and macadam pavements, and several hospitals and collections of art. The place was first mentioned as Oxna-ford, probably having reference to a ford for oxen across the rivers. In 802 it contained several educational institutions and afterward became the residence of kings Alfred and Canute. William the Conqueror captured the city in 1068. In the reign of "Bloody Mary" occurred the execution of Latimer, Ridley, and Cranmer, and in the 17th century it was made the headquarters for a brief period by the Royalists. Population, 1907, 51,908.

OXFORD, University of, a celebrated institution of higher learning of England, in the city of Oxford, a Parliamentary borough and the county seat of Oxfordshire. Oxford and Cambridge universities constitute the two most important educational institutions of Great Britain, each of which embraces a number of colleges organized as distinct corporations, though

all belong to the universities proper. Oxford University is constituted of 21 colleges and two halls, the oldest, University College, dating from 1253. However, some writers think that Merton College, founded in 1264, should be considered the oldest, since it was the first to adopt a collegiate system by giving instruction in halls.

The following is a complete list of the colleges: University College, established in 1253; Merton College, 1264, but not joined to Oxford until 1274; the mother of John Baliol, King of Scotland, founded Baliol College in 1268; King Edward II. founded Oriel College in 1326; Queen's College was founded in 1340; All Souls' College, in 1347; Queen Elizabeth founded Jesus College in 1571; and the others include Exeter College, New College, Lincoln College, Magdalen College, Corpus Christi College, Christ Church College, Brasenose College, Trinity College, Saint John College, Wadham College, Worcester College, Pembroke College, Keble College, and Hertford College. Besides these are two similar institutions known as Saint Edmond Hall and Saint Mary Hall, which differ in that they are not incorporated. With the University are affiliated three colleges for women, known as Margaret Hall, Summerville Hall, and Saint Hughes Hall. Since 1884 women are admitted to the examinations, but degrees are not issued to them. Other connected institutions embrace the Radcliffe Library, the Botanical Gardens, the Bodleian Library, the Taylor Institution of Modern Languages, the Ashmolean Museum, the University Museum, the Indian Institute, and the Observatory. Three other affiliated colleges organized since 1880 are the University College, at Nottingham; David's College, Lampeter; and Firth College, Sheffield. The university proper has about 50 professorships and is attended by about 3,500 students.

Oxford University may be attended by any one who is qualified to pass the examinations, there being no restriction as to creed, birth, or age. Instruction is given largely by tutors, but there are lectures at regular intervals by the professors. The head of the university is centered in the chancellor, who is usually chosen from the nobility. The position of chancellor may be considered honorary, since the judicial and executive authority is exercised almost exclusively by the vice chancellor, who is appointed by the chancellor. The hebdomadal council, the congregation of the university, and the house of convocation are the governing bodies. All the legislative proposals originate in the hebdomadal council, which is constituted of twenty elective or official members. The congregation of the

university is constituted of professors and officials, and includes all members of the convocation resident in Oxford. In that body is vested the power to reject, amend, or confirm the proposals which originate in the hebdomadal council.

All the registered masters and doctors constitute the house of convocation. In this body is vested the power to elect two members to Parliament, transact the general business, and elect to office nearly all officials of the institution. Each college has rules of its own for the government of its students and classes, but all are subject to a general constitution. The courses are extensive and diversified, the degrees including bachelor and master of arts and bachelor and doctor of civil law, medicine, divinity, and music. The students maintain many of the usual college societies, organize games, and support various clubs. Splendid grounds and gardens are maintained in connection with the university. The libraries are among the best of Great Britain.

OXUS, or **Amu**, a river of Central Asia, now generally called Amoo Darya or Jihoon. It rises in Lake Sar-i-Kol, in the plateau between the Hindu Kush and Thian Shan Mountains, and, after a general course of about 1,275 miles toward the northwest, flows into the Aral Sea. It has a number of important tributaries, including the Panja River, one of the headstreams, and at its mouth is an extensive marshy delta about ninety miles long. Before the Christian era the Oxus flowed into the Caspian Sea, a fact recently demonstrated by exploring its former bed, the change being due to the action of water on the alluvial soil. It is navigable for about 275 miles from the Aral Sea. Vast quantities of water are drawn from its upper course for irrigation purposes. The valley of the Oxus contains many remains of ancient peoples, and the region surrounding its source is regarded by some writers as the cradle of the human race.

OXYGEN (öks'ĭ-jĕn), the most abundant and important gaseous element yet discovered, which forms by weight about one-half of the mineral, four-fifths of the vegetable, and three-fourths of the animal kingdoms. By volume it constitutes one-fifth of the atmosphere and by weight eight-ninths of water. It has neither taste nor color and is odorless. It is a little heavier than air, its density being 1.1056, is almost insoluble in water, and is the most magnetic of all the gases, though it is the least refractive. Oxygen unites with all the elements, except fluorine and bromine, forming with some elements alkalies, with others acids, and with

others neutral substances. When oxygen is so united the product is called an *oxide*. Oxides embrace the most important chemical compounds. Fire, artificial light, electricity, and electro-magnetism depend largely upon the presence of oxygen, and mechanical power derived from combustion depends upon oxidation. Animal life is dependent upon the inhalation of oxygen. With every inspiration of air this gas is carried to the lungs, whence it is passed to the different parts of the body by the blood, and in the tissues forms a union with the tissue elements. The blood deprived of its oxygen becomes the venous blood, which is returned to the lungs to be again mixed with oxygen and is sent anew into the system as the bright arterial blood. Oxygen was first discovered by Eck, a chemist of Sulzbach, Germany, in 1489, and was independently rediscovered by Priestley and Scheele in 1774. Lavoisier made experiments with it the following year and named it oxygen. It can be converted into a liquid state under the influence of great cold and high pressure.

OYSTER (ois'tēr), an edible bivalve mollusk, closely allied to the mussels. It belongs to the family *Ostrea* and includes numerous extinct and extant species. Oysters are found near the shores of salt and brackish water, where they are moored by the left shell to stones or other hard substances. They feed principally on microscopic beings and particles of organic matter which they take in from the



INSIDE VIEW OF AN OYSTER.

currents of water by the mouth at the hinge end of the shell. Although the sexes are distinct, they have the same external appearance. The spawning season occurs from May to September, when they are not caught for food, each oyster producing several thousand eggs. However, sexual connection does not take place in the adults, but the eggs ooze from the genital openings of both male and female, when they

are ripe, and the fertilization takes place by their accidental meeting in the water.

The egg produces an embryo oyster of minute size, which is inclosed in a transparent shell and is supplied with a cilia by which the little animal is able to float with perfect ease until it becomes able to fasten itself to some stable object, though in this form many thousands are consumed by fishes and other forms of animal life. It requires from three to four years for oysters to mature. They form large congregations, called *oyster beds*, at the bottom of the water, where they are caught with a kind of dredge, or iron rake, drawn by means of a sailing boat. The most important oyster beds are found where the bottom of the sea is made up of gravel and mud deposits, and where the current is not sufficiently strong to displace them from their moorings.

In the winter time oysters accumulate a deposit of protoplasm, a highly nutritious and digestible food, when they are said to be *fat*. This so-called fatty substance is consumed during the reproductive period in the summer, when the oyster is not considered nutritious. The most productive oyster fields in America are found in the inlets and coast regions of Chesapeake Bay and Long Island Sound. Baltimore is the greatest oyster market in the world, being near the oyster fisheries of Chesapeake Bay and the Atlantic. Other valuable oyster beds occur in the Gulf of Mexico, in Puget Sound, in the Strait of Juan de Fuca, and in Georgian Bay. The oysters of the Pacific coast are smaller than those of the Atlantic, but artificial culture of species taken from Chesapeake Bay has made material progress in many regions of the Pacific coast. Productive oyster fields are found in Europe and other regions. They were cultivated artificially as early as the rise of the Roman Empire. In many localities the supply has been exhausted, but oyster culture is extending continually.

A large part of the catch of oysters is placed on the market in a fresh condition, sometimes in the shell, but more generally in bulk and in cans. The entire fresh product must be kept on ice until it is consumed, since oysters soon lose their flavor when they become warm. *Cove oysters* are those which are boiled and canned, in which condition they do not require being kept on ice. The canneries are located near the places where the catch is obtained. Oysters are served in a variety of ways, but usually fresh, fried, or in stews. The oyster product of the United States averages annually 29,500,000 bushels, which is about five-sixths of the world's supply.

FEEDING. Oysters feed principally on minute plants called *diatoms* which live on the bottom or float in the water. Diatoms for their growth require fertilizing matter just as do land crops, and under natural conditions find it in more or less sufficient quantities in the water in which they live. The number of diatoms, that is the quantity of oyster food, which a given body of water will support is largely dependent upon the quantity of soluble mineral matter (fertilizer which the water contains, and if it is increased, either by natural or artificial means, the production of diatoms will also generally be increased.

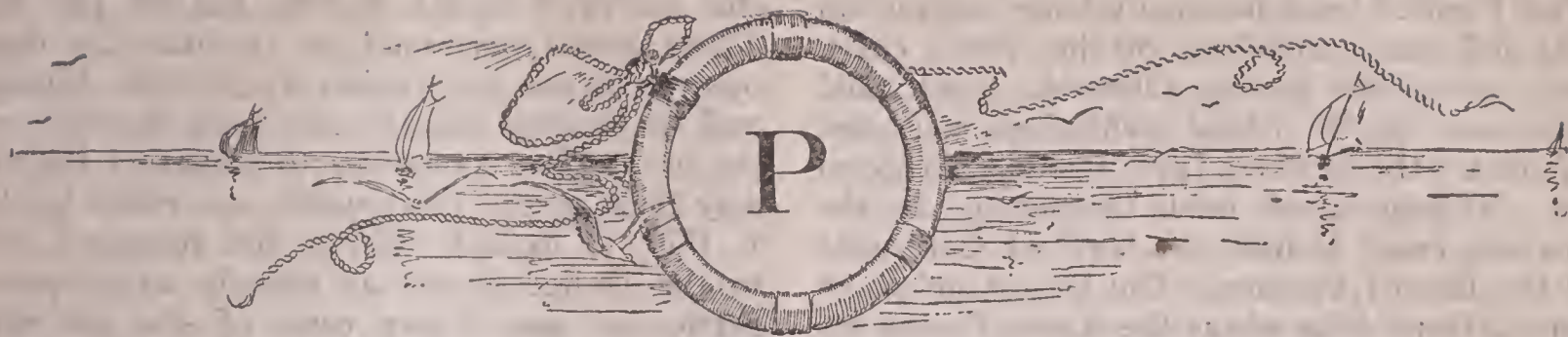
In a model pond or *claire* commercial fertilizer is introduced into the water and the oysters to be fattened are placed on trays in the canal or on the bottom of the pond. A propeller driven by a gasoline engine drives the water through the canal and supplies the currents naturally created by the tides. Suitable appliances are used in filling the *claire* with salt water. Oysters are fattened on their natural food in a comparatively short time, but the scheme of artificially fattening has not yet been made commercially profitable.

OYSTER CATCHER, a wading bird which is closely allied to the plover. It is easily known from its red feet and bill, the latter being twice as long as the head. The plumage is black and white and the wings are long and pointed. The bill is truncated at the end and has the shape of a wedge. It has no hind toe. The bird measures about sixteen inches in length. It is widely distributed in America, Europe, and other grand divisions, but the species of different regions are various, numbering about ten. Two of these are found in the northeastern part of North America. The oyster catcher inhabits seacoasts, where it feeds on small mollusks, morning worms, and minute shellfish caught at tide marks. Its cry is loud, resembling the syllables, *wheep, wheep, wheep*.

OZARK MOUNTAINS (ō'zärk), a group of hills situated principally in southwestern Missouri, but extending into northern Arkansas and the northeastern part of Oklahoma. The highest elevations do not exceed 2,000 feet. Their slopes are covered with vast forests and their mineral deposits are enormous, including lead, coal, iron, and many others. Many valleys penetrate different parts of the group, which are rich in cereals, live stock, and orchards. A continuation of the Ozark Mountains, on the south side of the Arkansas River, is known as the Ouachita Mountains.

OZOCERITE (ō-zō-sē'rīt), or **Ozokerite**, a substance resembling wax, found native in various parts of Austria and in Utah. It has a yellow, brown, or greenish color and is obtained from small veins in Tertiary rock. The ingredients consist chiefly of hydrocarbon. It is used to insulate electrical conductors, as a substitute or adulterant of beeswax, and in the manufacture of candles.

OZONE (ō'zōn), a colorless gas with a strong penetrating odor, regarded an active form or condition of oxygen. It usually is present in the atmosphere, where it apparently is formed by sparks of electricity passing into dry air. Ozone has a pungent odor like that of metal, which may be noticed after a discharge of lightning and when setting in motion an electrical machine. The oxidizing effect of ozone is much greater than that of oxygen, since two volumes of it contain three volumes of oxygen, hence it serves a very useful purpose in purifying the atmosphere by destroying impurities resulting from the decomposition of animal and vegetable matter. Ozone is manufactured in abundance at a small cost by means of electricity and is rapidly entering the arts as an oxidizing agent. It serves for maturing wine and spirits, drying and thickening oils, seasoning linoleum, sterilizing drinking water, aging wood for use in manufacturing musical instruments, and many other purposes in the arts and industries.



P

PACIFIC OCEAN

P, the twelfth consonant and sixteenth letter of the English alphabet. The form is essentially Roman, but it was derived through the Latin and Greek from the Semitic. It is classed as a mute, nonvocal, and labial, and is formed by compressing the anterior part of the lips. In many Greek derivatives the initial *p* is silent, as in *psalm*, *pneumatics*, and *pterodactyl*. It is rarely silent in or near the middle of a word. As an abbreviation, it is used in such expressions as *P. S.*, *postscript*, and *P. M.*, *post meridian*.

PACHUCA (pá-chōō'kà), a city of Mexico, capital of the state of Hidalgo, located fifty miles northeast of the City of Mexico. It has good railway connections, is surrounded by a region containing rich deposits of silver, and has manufactures of clothing, machinery, salt, metal products, and utensils. The city is in a beautiful valley between elevated mountains. Bartolomeo Medina, in 1557, discovered at this city the process by which sulphide of copper, mercury, and salt may be used in extracting ore. Population, 1906, 37,742.

PACIFIC OCEAN (pá-sif'ik), the largest of the five oceans, situated west of North and South America and east of Asia and Australia. It was so named by Magellan, the first European navigator to cross it, which name he applied because of finding it calm. The extent from north to south is 9,000 miles; width from east to west, 10,000 miles; and estimated area, 70,309,000 square miles. This vast expanse of water includes about one-half of the water surface of the earth and exceeds in extent the area of all the continents. North of it is the Bering Sea, which connects the Pacific with the Arctic Ocean through Bering Strait, and south of it is the Antarctic. It is usually divided into the North and South Pacific, owing to a shallow running almost centrally through it from east to west. The North Pacific is somewhat

the larger and has a mean depth of 15,420 feet. Its greatest depth is off the island of Guam, being 31,614 feet, or about equal to the height of the highest mountain in the world. The South Pacific has a mean depth of 14,200 feet and its greatest depth is 19,230 feet. Its bed is not only more uniform than the Atlantic, but the average depth is somewhat greater. The largest extent of exceptionally deep water is northeast of Japan, although vast regions of great depth are in the vicinity of the Ladrone Islands and in the section south of the Friendly Islands.

A region of calms exists along the Equator. The presence of a large number of islands causes the trade winds to be more irregular than those of the Atlantic, and to the north and south of them are other calm regions. An equatorial current passes northward along the eastern coast of Asia and divides in the vicinity of the Philippine Islands, where it forms northern and southern branches. The southern branch of this current returns in part to form the equatorial counter current, while the northern branch flows northeast along the Asiatic coast as the Kuro Sivo. It flows eastward at about 50° north latitude as a North Pacific current and, when near the shores of North America, it turns in a southern direction. The southern equatorial current of the Pacific is formed into a number of branches by islands in mid-ocean, and from the Australian continent it passes southward and is merged into the cold Antarctic current. From these main currents flow numerous branches in various directions, the principal ones being the current of Bering Strait and that of Cape Horn. Tides do not rise as high on the coasts of the Pacific as they do on the Atlantic for the reason that it is not characterized by bays as favorable to the rise of water to great elevations, the average tide height being about ten feet at several points

on the western coast of North America. Their greatest heights occur in the Bay of Panama, where they attain to about fourteen feet.

The Pacific Ocean has many large continental inlets and seas, particularly on the Asiatic coast, where occur the Bering, Okhotsk, Japan, and China seas. In the island archipelago southeast of Asia are the Celebes, Java, Banda, and Coral seas. The principal inlets bordering on the American coast include the Gulf of California and the Bay of Panama. The largest inflow of rivers is from Asia, where the Amur, Hoang-ho, Yang-tse-Kiang, Menam, and Mekong flow into articulated seas. Among the principal rivers of America flowing into it are the Colorado, Columbia, Sacramento, Fraser, and Yukon. No large inflow occurs in South America, since the continental watershed is situated along the Pacific coast and the drainage is principally toward the east. The Pacific has many productive islands, extending from the center toward the east. Among the principal island groups are the Hawaiian Islands, the Polynesian, the Micronesian, New Zealand, the Melanesian, the Philippines, Borneo, Celebes, the Japanese Islands, and Saghalien. The island groups near the American shore include the Aleutian, Queen Charlotte, Vancouver, Galápagos, and an archipelago along the coast of Chile. Balboa, a Spanish explorer, discovered the Pacific in 1513, when he sighted it from a mountain in the Isthmus of Panama. Magellan passed through the Strait of Magellan, whence he sailed across the Pacific from the east in 1620. Among the navigators to explore different regions in the 17th and 18th centuries are Tasman, Vancouver, Drake, Byron, Behring, Comte de La Pérouse, and Bougainville. Maclure discovered the Northwest Passage into the Arctic in 1850. Nordenskjöld, the Swedish explorer, discovered the Northeast Passage in 1874.

PACIFIC RAILROADS, the name which was first applied to a number of railway lines extending from the Missouri River to the Pacific coast, but later extended to all the transcontinental lines that cross North America. The first of these railroads was built under an act of Congress passed June 24, 1862, and approved by President Lincoln on July 1. By this act of Congress government aid was extended for the purpose of furthering the enterprise. The aid consisted of a land grant of 6,400 acres per mile, while government bonds bearing 6 per cent. for thirty years to the amount of \$16,000 per mile were issued for branch lines and for the level regions of the main line extending from Omaha to the Rocky Mountains and from the Sierra Nevadas to San Francisco. On the

other hand, the subsidy for the two mountain regions was \$48,000 per mile, and for the plateau region between the Rocky Mountains and the Sierra Nevadas it was \$32,000 per mile. These grants were made to facilitate the development of the vast region west of the Missouri and to connect the Pacific coast by rail with the east. The companies to construct the railway lines agreed to complete the roads by July 1, 1876, to extend railway and telegraph rates to the United States as cheaply as to private parties, to pay 5 per cent. of the net earnings into the treasury of the United States, to pay to the government the full amount of the principal of the bonds at their maturity, and to discharge the stipulated interest as it became due.

The railway lines built under this act are the Union Pacific, the Central Pacific, and the Kansas Pacific railroads. However, the companies were embarrassed financially at various times and in 1864 the land grant was increased to 12,800 acres per mile, making the total to all companies about 39,000,000 acres. In 1869 the Central Pacific and Union Pacific were completed. The *Crédit Mobilier* (q. v.) managed the construction and finance of the Union Pacific and became involved in a legislative scandal. Subsequently a land grant of 47,000,000 acres was given to the Northern Pacific, which has a trunk line from Saint Paul to Seattle. The office of commissioner of railroads was instituted in 1870 to supervise the accounts of the Pacific railroads. A large part of the indebtedness of these railroads was paid by the government and funded in long-time bonds at a low rate of interest.

The Pacific railroads of the United States as now organized include the Atchison, Topeka and Santa Fé, extending from Chicago to San Francisco; the Union Pacific, from Council Bluffs to San Francisco; the Northern Pacific and the Great Northern, both from Saint Paul to Seattle; and the Chicago, Milwaukee and Saint Paul, from Chicago to Seattle. Other lines, such as the Missouri Pacific and the Chicago, Rock Island and Pacific, extend a part of the distance from the Mississippi and then carry traffic through affiliated lines to the Pacific. Canada has the longest transcontinental railway of North America, the Canadian Pacific, which has a trunk line from Saint John, New Brunswick, to Vancouver, British Columbia. Another line, the Grand Trunk, extends from Portland, Me., to Port Simpson, British Columbia, with proposed lines to Dawson, in Yukon. The Canadian Northern and its connections practically constitute a transcontinental system.

PADDLEFISH, the name of a fish found in many streams of the Mississippi valley, so named from the nose being prolonged into a bony paddle-shaped appendage. The snout is used to dig in the mud in search of food. Its habits resemble those of the catfish, since it prefers to live at the bottom of sluggish streams. It has no scales. The larger species attain a length of three to five feet. The flesh is similar to that of the shark.

PADUA (păd'ŭ-à), a city of northern Italy, capital of a province of the same name, situated on a plain 23 miles west of Venice. The city occupies a picturesque site on the Bacchiglione River, which is crossed by a number of bridges. The streets in the older part are narrow, but in the newer portion they are platted according to modern plans, intersecting each other at right angles, and the buildings are mostly high. It has good railroad connections, a public school system, a chemical laboratory, an observatory, a museum of natural history, and a library of 125,000 volumes. Among the noteworthy buildings are the churches of Santa Giustina, San Giorgio, and San Antonio, a cathedral, the city buildings, and the University of Padua, an institution founded in 1221. This university has seventy professors and is attended by about 1,650 students. It has manufactures of cotton and woolen goods, clothing, machinery, porcelain, and silk textiles. Padua ranks among the earliest cities of Italy and in Roman times was known as Patavium. It was remarkably prosperous in the first century of the empire, when it had vast woolen manufactures. Attila destroyed the city in 452, but it again rose to vast commercial and educational importance in the Middle Ages, and was conquered successively by the Venetians, Austrians, French, and Germans. In 1866 it became a part of Italy. Population, 1906, 83,128.

PADUCAH (pă-dŭ'kă), a city in Kentucky, county seat of McCracken County, on the Ohio River, eighty miles southwest of Evansville, Ind. It is on the Illinois Central and the Nashville, Chattanooga and Saint Louis railroads. The notable buildings include the county courthouse, the public library, the Federal building, and the high school. Among the manufactures are flour, carriages, ships, machinery, hardware, furniture, and tobacco products. Paducah is one of the most important tobacco markets in the United States. It has a growing trade in pork, iron, corn, lumber, and merchandise. Paducah was settled in 1827, when it was platted, and was chartered as a city in 1856. It was fortified by General Grant in 1861. Population, 1900, 19,446; in 1910, 22,760.

PAGODA (pă-gō'dă), the name applied to a great variety of public buildings in Asia, particularly in India, Japan, and China. Most of these structures are places for public worship. The pagodas in China are largely towers from six to nine stories in height, such as the famous porcelain tower at Nankin, which was destroyed by insurgents in 1856. Nearly every town in China has one or more of such structures. They are octagonal in form, have open courts, and are usually constructed of brick with a covering of porcelain, giving them a singular brilliancy of effect. In India these pagodas are square edifices of great extent, the base comprising central chambers and porticoes and terminating upward in pyramids or spires. They vary from 15 to 30 feet in diameter and from 20 to nearly 400 feet in height.

PAINTING, the art of covering surfaces with pigments or variously colored substances for preservation or decoration, or with the view of representing objects in nature on a surface. As one of the fine arts, painting has for its aim the artistic representation of ideal objects or scenes, or of ideas. A mastery of this art involves a knowledge of form, design, perspective, color, and light and shade. The three general methods of painting consist of *drawing*, including pencil, crayon, charcoal, pastel, and water color work; *oil painting*, embracing work on canvas or panel; and *mural painting*, including the technical processes of fresco, distemper, and encaustic. Other species of painting include porcelain, vase, glass, terra cotta, and enamel painting. The majority of paintings are executed with oil, but there are such exceptions as *distemper*, which is done with an aqueous medium; *encaustic*, with a wax medium; and *glass* and *enamel*, with an essential oil. *Oil colors* include all those which are obtained by grinding colors with oil. *Water colors* consist of those in which glycerin and gum are utilized. Painting is designated in accordance with the subject represented, as decorative, portrait, landscape, marine, historical, genre, fruit and flower, battle, architectural, and miniature painting.

Painting as an art has come down to us from remote antiquity. Ruins dating from the 18th century B. C. indicate that paintings and sculptures decorated the walls and temples at Thebes. The prophet Ezekiel mentions the Babylonian and Chaldaean styles of painting which were adopted in Jerusalem before 598 B. C. These ancient productions were of great beauty and durability, but were largely in the form of decorations on rolls of papyrus. In many regions they were employed to decorate the walls of

temples and tombs, mummy cases, and various public buildings. Greece was the most highly developed in painting among the ancient nations. The most celebrated Greek schools of art were at Athens, Corinth, Rhodes, and Sicyon, and the renowned painters of Greece include Polygnotus, Cimon, Timanthes, and Panaenus, who lived about 400 years before the Christian era. Artistic painting was carried from Greece to Rome, where, according to Pliny, it was introduced about 650 B. C. from Corinth. However, Rome developed no great painters, the work there being executed largely by Greek artists, though there are many specimens of art that were produced by Etruscan and Byzantine masters. Italian painting developed some time after the conquest of Constantinople by the Latins, in 1204, and it was later taken to Germany, France, and Bohemia.

Oil painting was introduced at the beginning of the 15th century. It was the means of stimulating a better development of expression and brought forward masters in many of the European countries. They developed remarkable qualities for invention, elegance in color, and grace in imparting individuality of character. Leonardo da Vinci was among the early artists to develop deep shadows and enlarge upon indoor effects. Rembrandt employed extreme contrasts of light and shade, Jan Van Eyck turned attention to brilliancy and transparency of coloring, Michael Angelo surpassed all other artists of his time in grandeur of design, Guido Reni aroused interest in elevated landscape painting, and others developed skill in a largely diversified field of painting, most of whom are treated in special articles of this work. The success of researches into ancient remains has centered the works of great artists in museums, where they may be studied with helpful effect. On the other hand, the accumulated products of the last two centuries attract the attention to the works of modern times, giving students an opportunity to study the productions of many schools of painting. See Hogarth; Millet; Meissonier; Lessing; Menzel; Rossetti; Millais; West; Murillo; Whistler, etc.

PAINTINGS, Twelve Great, the paintings classed by William Whetmore Story, an American art critic, as the most celebrated in the world. These include the following works of art:

The Last Supper, Da Vinci, 1498, Santa Maria Delli Grazie, Milan.

Beatrice Cenci, Guido Reni, 1509, Barberini Palace.

The Assumption of the Virgin, Titian, 1518, Venetian Academy.

Sistine Madonna, Raphael, 1518, Dresden Gallery.

The Transfiguration, Raphael, 1519, Vatican in Rome.

The Night, Correggio, 1522, Dresden Gallery.

The Last Judgment, Michael Angelo, 1511, Sistine Chapel.

The Descent from the Cross, Volterra, 1515, Church of de' Monti, Rome.

Aurora, Guido Reni, 1609, Rospigliosi Palace, Rome.

The Descent from the Cross, Rubens, 1612, Antwerp Cathedral.

The Communion of Saint Jerome, Domenichino, 1614, Vatican, Rome.

The Immaculate Conception, Murillo, 1678, Louvre, Paris.

PAINTS, the general name of compounds used in painting, consisting chiefly of a coloring substance mixed with a liquid of such a nature that a thin film will be formed after exposure to the air. Various pigments are used in mixing paints, such as indigo, cochineal, and numerous minerals. The minerals include white lead, graphite, lampblack, ocher, vermilion, prussian blue, cadmium yellow, and many others. The vehicle used chiefly is linseed oil. It is expressed from the seed of flax and may be used either raw or boiled, but boiling gives it the advantage that it will dry quicker when exposed to air. A small quantity of turpentine is sometimes added to thin the mixture and cause it to dry more quickly when applied. Kerosene is sometimes used as a substitute for turpentine, but it is not a good ingredient.

PAISLEY (pāz'li), a city of Scotland, in Renfrewshire, on the White Cart River, about seven miles southwest of Glasgow, with which it is connected by railways. It has a number of fine streets, which intersect each other at right angles. Among the principal buildings are the Abbey Church, the Coats Memorial Baptist Church, the courthouse, the Neilson Educational Institution, the school of design, and the grammar school founded by James VI. It has a free public library and museum, a number of parks, modern municipal facilities, and several fine monuments. Among the manufactures are carpets, embroidery, soap, flour, starch, chemicals, ships, machinery, spirituous liquors, cotton and woolen goods, silk textiles, and tartan cloths. The city was founded about 1163 and in 1307 was captured by the English, who burned most of it. Paisley became a free town in 1488. The building of railways and canal improvements has added greatly to its prosperity. Population, 1907, 81,408.

PALAIS ROYAL (pā-lā' rwā-yäl'), a group

of buildings in Paris, France, on the east side of the Rue Richelieu. They include a former palace, public gardens, and several theaters and are used as a public pleasure resort. The palace was built about 1635 by Cardinal Richelieu, who transferred it to Louis XIII., and later it became the residence of the Duke of Orleans. Louis Philippe occupied it until 1830, when it became the property of the state. In the Revolution of 1848 it was greatly damaged by a mob and many of the contents were destroyed, but it was afterward restored and occupied by Prince Napoleon, the son of Jérôme Bonaparte. In 1871 it was partly destroyed by a fire which had been started by the Communists, but was again restored in 1873. At present it is one of the finest and most frequented resorts in the city. It includes the Theatre Francais, which is devoted to high comedy.

PALANQUIN (pāl-an-kēn'), or **Palankeen**, a vehicle used to convey travelers in the eastern part of Asia, especially in China and Japan. It is in the form of a litter, or box, and is carried on the shoulders of two men by means of poles. The seat is narrow, intended for only one person. Formerly conveyance was almost exclusively by the palanquin, but the construction of highways and the building of electric and steam railways have made this mode of traveling less popular.

PALATE (pāl'āt), the bony and muscular partition that separates the mouth from the nasal cavities. It consists of two parts, the hard palate and the soft palate. The *hard palate* is formed of bone and lined by mucous membrane and forms a support for the tongue in speaking and swallowing. The *soft palate* descends like an apron from the back edge of the hard palate and is composed largely of muscles. It is covered in the upper part with mucous membrane like that of the nasal passages and below, like that of the mouth. The *uvula*, an extension of the lower border of the soft palate, can close either the opening to the nasal passages or the opening from the pharynx to the mouth. On each side of the soft palate are two curved folds called the *arches*, or *pillars*, and between these, on both sides of the pharynx, are the *tonsils*, two glandular bodies. Acute sensibility is seated in the soft palate and the uvula and its arches. They administer to the special sense of taste. The soft palate has many glands that secrete mucus to lubricate the throat as a means to facilitate the passage of food.

PALATINATE (pā-lāt'ī-nāt), in German, *Pfalz*, the name of two states of the Old German Empire. They were known as Upper and

Lower Palatinate. Amberg was the capital of Upper Palatinate and Mannheim of Lower Palatinate, but the two districts were united into one government about 1620. The princes governing these possessions were long counted with the most powerful of the German Empire. In 1648 the Peace of Westphalia again separated the two states by giving Upper Palatinate to Bavaria. At the same time Lower Palatinate was made an electorate of the empire and was long held by Frederick III. and his successors. The Treaty of Paris, in 1814, gave the greater part of Lower Palatinate to Bavaria and a portion was annexed to Prussia and Hesse-Darmstadt. Other minor changes were made by the Paris Treaty of 1815. At present a portion of the region is detached from Bavaria and called Rhenish Bavaria and the remainder is classed with Bavaria proper.

PALATINE HILL (pāl'ā-tin). See **Rome**.

PALAWAN (pā-lā'wān), or **Paragua**, an island of the Philippines, situated east of the China Sea, west of Negros and Panay, and north of Borneo. It has an area of 7,575 square miles and ranks as the third in size of the islands in the Philippine Archipelago. The surface is largely mountainous, but there are extensive valleys and coast regions of fertility, and the mountain slopes are well timbered. Tobacco, rice, palms, live stock, cereals, and fruits are grown in abundance. The climate is quite moist and somewhat unhealthful. Lead, iron, copper, antimony, and granite are among the minerals. Puerto Princesa and Taytay are the chief towns. The natives are peaceful. They include only a small number of Christians. Population, 1901, 30,000.

PALENQUE (pā-lān'kā), a former city of Mexico, near the village of Santo Domingo del Palenque, in the state of Chiapas, about 75 miles northeast of San Cristobal. It dates from the period preceding the Spanish conquest and contains a number of intensely interesting ruins. These include the remains of several temples and palaces, the largest of which was 180 feet wide and 220 feet long. A group of twelve pyramids is nearly intact, the highest of these structures being about 80 feet. An arched subterranean waterway about ten feet high, seven feet wide, and 600 feet long is still in a fair state of preservation. The builders of these structures belonged to the Mayan stock.

PALEONTOLOGY (pā-lē-ōn-tōl'ō-gy), the science which treats of life upon the earth before the creation of man. It relates to the study of both plant and animal life and is based upon our knowledge of fossils. As a science it is closely related to biology, geology, and

physiography. Cuvier is generally regarded as the founder of this science, since he was the first to point out in a scientific way many organisms which are distinctly different from those living on the earth at present. His research relates specially to the fossil species of elephants and the Siberian mammoth. The progress made since that time, in 1796, has enabled geologists to classify rock formations and to divide geological time into the now generally accepted periods and systems.

PALEOZOIC ERA (pā-lē-ō-zō'ik), the division of geological time which is preceded by the Archaen and succeeded by the Mesozoic eras. It includes the Cambrian, Silurian, Devonian, Carboniferous, Permian, and Triassic. The ages of invertebrates, of coal plants, and of reptiles are embraced in the Paleozoic Era. See **Geology**.

PALERMO (pā-lēr'mō), a seaport city of Italy, on the northern shore of Sicily and on the Gulf of Palermo, 120 miles west of Messina. It was the capital of the former dominion of Sicily and is now the capital of the province of Palermo and of the island of Sicily. It is situated on a beautiful site, is connected by railways with the important towns of the island, and has a number of excellent public buildings. Among these is a Gothic cathedral, dating from the 10th century, which contains a number of statues and the monuments of Emperor Frederick II. and of King Roger, the founder of the Norman monarchy in the island. Other buildings include the churches of Saint Peter and Saint Dominic, the Palermo University, the royal palace, and the central railway station. It has extensive public libraries and gardens, the national museum, three theaters, an archbishop's palace, and colleges of medicine, arts and sciences, and industry. The harbor is commodious and is protected by a battery and a lighthouse. Among the manufactures are cotton textiles, silk and woolen goods, boots and shoes, glass, oilcloth, wine, sailing vessels, oils, machinery, chemicals, and musical instruments.

Palermo has a large trade in manufactures, fruits, perfumery, wine, silk textiles, and earthenware. It is the seat of an extensive arsenal and has large fishing interests, the latter employing about 40,000 persons. Many modern improvements have been introduced, including telephones, electric and gas lights, and a fine system of street railways. It is thought that Palermo was founded by the Phoenicians and was known to them as Panormus. When Sicily was a possession of Carthage, it became the capital. The Romans conquered it in 254 B. C., the Vandals in 440 A. D., and the Normans in 1072. Sub-

sequently it was held by the German emperors, but since 1282 its history is identified quite closely with the kingdom of Sicily. Revolts against the kings of Naples occurred at various times. These kings made it their residence from 1806 to 1815, but through the activity of Garibaldi it became free in 1860. The modern prosperity of Palermo is due principally to its vast commercial trade, fisheries, and manufactures. Population, 1907, 318,156.

PALESTINE (pāl'ēs-tīn), a city in Texas, county seat of Anderson County, 180 miles northeast of Austin, on the International and Great Northern Railroad. The surrounding country produces vast quantities of live stock, cereals, cotton, and fruits. It has the county courthouse, an opera house, a Y. M. C. A. building, a public library, and many fine schools and churches. The public utilities include waterworks, sanitary sewerage, and electric lighting. Iron ore and salt are mined in the vicinity. Among the manufactures are cotton-seed oil, flour, cigars, pottery, machinery, metal products, and utensils. It was settled in 1846 and incorporated in 1870. Population, 1910, 10,482.

PALESTINE, the Holy Land, or Canaan, a region of Asiatic Turkey, situated on the eastern shore of the Mediterranean Sea, comprising the southern part of Syria. The extent from north to south is about 145 miles; width, 80 miles, and area, 12,000 square miles. The coast line is quite uniform, the principal indentation being the Bay of Acre. Immediately south of this bay is Mount Carmel, which is the largest point of land that extends into the sea. It has an abundance of drainage toward the west into the Mediterranean and toward the east and south into the Dead Sea, although the Jordan is the principal river. Other streams of note embrace the Leontes, Kishon, Kanah, Brook Sorek, Gadara, and Jabbok. Three noteworthy lakes are within the region, including Lake Merom in the north; the Sea of Galilee, a body of water 682 feet below the Mediterranean; and the Dead Sea, a sheet of water 1,317 feet below the Mediterranean.

The central portion of Palestine is a tableland with a mean height of about 1,600 feet. In the east is the depressed valley of the Jordan, extending from north to south, and along the coast are the Maritime plains and the plains of Jericho and Esdraelon. The descent from the central plateau to the Dead Sea and the Jordan is rugged and precipitous, but toward the west it is more gradual, though there is a hilly region toward the Maritime plains, sometimes called the plains of Philistia and Sharon. The principal elevations include Jebel Jermuk,

3,935 feet; Hebron, 3,030 feet; Mount of Olives, 2,725 feet; Mount Tabor, 1,900 feet; and Mount Gerizim, 2,700 feet. The general elevation at Jerusalem is 2,610 feet. Minerals of value are found in the mountain regions, including principally ironstone, rock salt, sulphur, and asphaltum. The Jordan River and the Sea of Galilee supply an abundance of fish. Among the wild animals are the wolf, hyena, porcupine, jackal, boar, and bear, most of which are common to the mountain regions, while numerous species of birds, such as ravens, hawks, eagles, storks, vultures, nightingales, and sparrows, are abundant.

The trees native to Palestine include the walnut, oleander, olive, cedar, sycamore, palm, ash, fig, elder, pine, and carob. Fruits are cultivated in abundance, such as the orange, apricot, almond, lime, pear, quince, apple, plum, and grapes. The principal cereals include barley, wheat, rice, and maize. Sugar cane, tea, potatoes, and garden vegetables are grown extensively. Silk culture is a growing industry. Besides the domestic animals common to Europe, it has large interests in rearing the camel, ass, mule, and goat. The manufactures embrace wine, olive oil, ornaments, jewelry, clothing, utensils, and food products. Summer and winter make the two seasons of the year, the former extending from April to November, when rainfall is limited, but during the remainder of the year there is an abundance of moisture. The ground is rarely frozen, except in the mountains, and much of the surface is fertile.

Palestine was inhabited by six nations when the children of Israel invaded it, after they had sojourned forty years in the desert. These nations were the Ammonites, Canaanites, Hittites, Perizzites, Hivites, and Jebusites. At that time allotments were made to the different Hebrew tribes, though the war for possession continued at varying intervals. The government continued to be tribal, with marked distinctions, until the rise of the Judges. Later it was consolidated into a kingdom, of which Jerusalem became the capital, in the time of David. In the meantime the cities of ancient renown rose and fell at various periods, but at present there are scarcely any evidences of the important places known in history as Diospolis, Caesarea, and Antipatris. The Israelites were carried off in captivity by the Babylonians, and, when they returned, the industries again developed, though the Philistines continued to possess a part of the country. At the birth of Christ Palestine was a Roman possession. It was made up of the four provinces of Judaea, Galilee, Perea, and Samaria. Roman possession augured for its ma-

terial prosperity, since it had the effect of counteracting local contentions. However, the measures adopted for its government by Vespasian caused a decline in the material welfare. When Titus invaded the region, he destroyed the temple of Solomon and attempted to Romanize the people.

Christianity developed with considerable rapidity in the time of Constantine, when the Church of the Holy Sepulcher was built. In 606 the Saracens under Omar were severe in endeavoring to destroy the foothold of the Christian religion, fearing that it would eventually predominate. Soon after the Crusaders began to rally to the defense of Christianity. The contests of this period are among the most memorable in the world, when legions of Mohammedans poured into the contest for the defense of Moslem supremacy in the Holy Land. It was governed for many years by the Sultan of Egypt, but in 1517 the Turks made it a part of their dominion. Several railroad lines were built in the last century, when Jerusalem and other cities were connected with the Mediterranean. Extensive explorations for antiquities began to develop about 1870, when the American Palestine Exploration Society was formed. Since then valuable data have been secured by organizations from many countries, giving rise to an accumulative fund of geographical, historical, geological, and topographical knowledge of the region. It is a center of interest for Christians, Jews, and Mohammedans, since it is the cradle of their religious systems. Many widely different classes of residents populate the region. The prevailing language is Arabian. Estimated population, 710,500. See **Jews**.

PALI (pā'lê), the name of the literary language of the Buddhists, now represented chiefly in Ceylon, Siam, Burma, and Cambodia. It is closely allied to Sanskrit, showing about the same relationship to that language as Italian does to Latin. Europeans began to study Pali about the middle of the last century. In Siam and Ceylon the law books are in the vernacular, but in Burma the law is in the Pali, although it is accompanied by a Burmese glossary.

PALIMPSEST (pāl'imp-sĕst), an ancient parchment or other writing material written upon twice, the original writing having been erased to fit it for a subsequent record. The fact that such parchments were produced may be attributed to the Saracen conquest of Egypt, on account of which the supply of writing material became limited. The consequent exaggerated price made it necessary for many of the Greeks and Romans to restore by scraping or washing the materials which had formerly

been used for writing purposes. In this way it was possible to render them capable of being utilized a second time. The erasure was made either with pumice stone and an edged implement, or by washing with a sponge, but in most cases the erasure was imperfect, owing to the fact that inks had been used which could not be easily removed. Many of the palimpsest parchments have been of double value, since the newer writing has been used and the older has in many cases been restored by the use of chemical reagents. Restoration is possible by infusion of gall, acids, or oil, these substances acting upon certain traces of the material of ink remaining in the parchment. Among the writings restored in this way are large fragments of the "Iliad" of Homer, the "Republic" of Cicero, the "Institutes" of Caius, the "Origines" of Isidorus, and portions of the histories of Siculus, Diodorus, Polybius, Appianus, and Dionysius of Halicarnassus. Among the most successful students of these documents are Niebuhr and Cardinal Angelo Mai (1782-1854).

PALISADES (pāl-ī-sādz'), the name applied to the columns of rock which extend along the western side of the Hudson River, extending a distance of nearly twenty miles, from Weehawken, N. J., to Haverstraw, N. Y. The escarpment is formed of trap rock, which, while in a molten state, was forced by volcanic action upward between the layers of sandstone and shale. The Palisades vary from 200 to about 550 feet, reaching their greatest height at Indian Head, directly opposite Hastings. The cliffs are everywhere abrupt and admit of passage to the river at only a very few points.

PALLADIUM (pāl-lā'dī-ŭm), an image of Pallas or Minerva, which is said to have been brought to earth by Jupiter and placed near the city of Troy. It was reputed to be associated with favorable omens and, according to tradition, Troy could never be taken while the image remained in the city. The Greeks commissioned Ulysses and Diomedes to secure it, and later it was carried to Italy by Aeneas. Several cities of Europe claim to have possessed it, including Athens, Rome, and Lavinium.

PALLADIUM, a metal discovered by Wollaston in 1803. It is found native in small quantities with gold and platinum. This metal is grayish white and somewhat resembles platinum in color and luster. It is both ductile and malleable, and is harder and more fusible than platinum. Only small quantities being obtained, it is not employed extensively for useful purposes. Dentists employ it in some instances as a substitute for gold in filling

teeth. It is used to some extent for beams in delicate balances and various parts of scientific instruments.

PALLAS, a small planet that has a position between Mars and Jupiter. It was discovered at Bremen by Olbers (q. v.) in 1802. The orbit is inclined to the ecliptic more than that of any other planet. The revolution around the sun occurs in 4.61 years. Estimates place the diameter at 300 miles. It was so named from Peter Simon Pallas, an eminent traveler and naturalist, who was born at Berlin, Germany, Sept. 22, 1741; died there Sept. 8, 1811.

PALMA (pāl'mā), a city of Spain, on the southwestern coast of the island of Majorca, on Palma Bay, 132 miles south of Barcelona. The city is pleasantly situated, has a fine harbor, and is connected by railway with the principal trade centers of the island. Among the manufactures are cordage, woolen and silk goods, clothing, machinery, and utensils. Many of the buildings are of the Moorish style of architecture. The streets are regularly platted, intersecting each other at right angles. It contains a Gothic cathedral, an exchange, a governor's palace, three colleges, and a number of fine educational institutions. The city has a fine public library, a museum, several parks, and a number of modern municipal improvements. It has an extensive foreign and domestic trade. Population, 1906, 64,739.

PALMAS (pāl'mās), a cape on the western coast of Africa, forming the southern extremity of Liberia. It has a substantial lighthouse.

PALMER (pā'mēr), a town of Massachusetts, in Hampden County, on the Chicopee River, fifteen miles northeast of Springfield. It is on the Boston and Albany and the Vermont Central railroads and has electric railway facilities. The chief buildings include the public library, the high school, and a number of churches. Among the manufactures are wire, yarn, tickings, duck and flannel, woolen goods, and machinery. The surrounding country is agricultural, producing cereals, fruits, and dairy products. Palmer has waterworks, electric lights, and other municipal improvements. It has a growing trade in merchandise. Palmer was settled in 1716 and incorporated in 1775. Population, 1905, 7,755; in 1910, 8,610.

PALMETTO (pāl-mēt'tō), a class of palms which are indigenous to the United States. They are found abundantly in the Carolinas, Florida, Georgia, and some sections of California. These trees include a number of allied species, some of which are widely distributed in the West Indies. The stem usually is rough with the bases of the old leafstalk turned

upward. The common palmetto attains a height of from thirty to fifty feet. The leaves are from six to ten feet long, and are terminal from a single bud. Palmetto wood is very durable under water. It is not attacked by the ship worm and serves a valuable purpose for piles and wharves. The leaves are woven into hats, and the buds of some species are eaten as a vegetable.

PALMISTRY (pāl'mis-trĭ), or **Chiromancy**, the art by which some profess to be able to read, from the *palm* the character and tem-

perament of others and to discover past events and make predictions as to the future.

This practice is based upon the lines and marks of the palm of the hand, usually the left, and some take into account the shape of the hand.

Palmistry was regarded a science worthy of approbation by Aristotle. It was practiced by Emperor Augustus of Rome. The records of the

Brahmans in



PALMISTRY.

AA, head line; B, triangle indicating heart; C, mount of Venus; D, mount of Jupiter; E, mount of Saturn; F, mount of the sun (Apollo); G, mount of Mercury; aa, life line; bb, line of nature; cc, abdomen; dd, liver and stomach; ee, the rascette; ff, secondary life line; g, line of honor; hh, line of affection; ii, marriage line; m, discrimination.

India prove that it is of great antiquity. A Brahman caste called Joshi makes use of certain marks and features of the face and body in connection with those of the palm of the hand, and in a manual of palmistry published many centuries ago the art is fully outlined by illustrations and descriptions.

Among the prominent features of the palm on which the interpretation is based is included a curve from the basal joint of the forefinger round the thumb as far as the wrist joint, called the *line of life*. When this is deeply colored and variously marked by connected furrows, it is said to indicate a long and happy

life. Fortune is indicated by a clear and unbroken line from the forefinger to the little finger, called the *line of fortune*, and the state of health is estimated by a line running across



PALMETTO.

the hand, called the *line of health*. The prominent characteristics indicating traits of character include the fleshy projection at the base of the forefinger, called the *mount of Venus*; at the base of the thumb, the *mount of Jupiter*; of the middle finger, the *mount of Saturn*; of the ring finger, the *mount of the sun*; and of the little finger, the *mount of Mercury*. In like manner certain marks or eminences indicate other heavenly bodies. With each of these are associated the qualities common to the respective planets, which are said to be possessed by the individual. The mounts may be modified in their signification by other signs or lines, but they are said to indicate various traits.

Jupiter, when well developed, indicates ambition and pride; *Venus*, melody and love; *Saturn*, fatality; the *sun*, riches; and *Mercury*, science and wit. Those professing a knowledge of and belief in palmistry have striven to make it an exact science by detailing with claims of exactness every mark and indication of prominence, but the art has been consigned to obscurity by practically all students of educational and scientific arts.

PALM OIL (päm), a thick substance obtained from the fruit of several species of palms, but chiefly from the *oil palm*, a tree native to the western part of Africa. This tree has large pinnate leaves that grow in tufts and attains a height of thirty feet. The fruit is nearly two inches long and about an inch in diameter. The oil is obtained from the covering. It has a deep orange color when it is fresh and the odor resembles that of violets. The oil has the consistency of butter at a low temperature. The natives use it as an article of food, but it must be served when fresh, otherwise it develops a somewhat strong taste. Palm oil is used in making candles and for lubricating purposes. The oil palm is grown to some extent in South America, where it has been naturalized.

PALMS, an order of endogenous trees, occurring principally in tropical countries. They are characterized by tall and slender stems, which gradually diminish in size upward. Some of the species are of low growth, though most of them attain to a great height, often from 150 to 190 feet. The stem is without branches and at the top is a crown of large leaves. The largest leaves are borne by the fan-leafed palm. Others bear fern-shaped and pinnate leaves. The pinnate leaves of some species often measure thirty feet in length and from three to eight feet in width. Stems measuring from three to five feet in diameter are not rare. Humboldt placed the number of species at 600 and asserted that not a single species is found in which some good property does not exist. At present the entire group is classified into 130 genera and about 1,200 species.

Among the products of value derived from palms is the food secured from the stems when young. The *cabbage palm* yields an edible terminal bud and the *cocoa*, *date*, and other species supply valuable fruit. A kind known as *sugar palm* yields a brown sugar and a sweetish sap from which a beverage is made. The *sago palm* is the source of the sago of commerce, the *wax palm* produces a juice from which wax is made, and the *fan palm* is valued for its foliage, which serves in the manufacture of fans and other useful articles. A tree known as the *doum palm* is native to Egypt. It has a trunk with two or more branches, and produces a fruit about the size of an apple, which tastes somewhat like gingerbread and is eaten by the natives. The wood of many species is valuable for its strength, and the bark serves in making cordage. Palm trees are found in abundance in South America, the West Indies, the East Indies, and the tropical regions of Asia and Af-

rica. The fruit of many species is acrid and some yield a kernel from which vegetable ivory is prepared, resembling somewhat the coquilla nut. See **Cocanut**; **Date**; **Palmetto**, etc.

PALM SUNDAY, the Sunday before Easter, being the last Sunday in Lent and the first in



COCOANUT PALM.

A, Branch with flowers; B, male flower; C, female flower, D, fruit with the shell opened.

Holy Week. It was so named in commemoration of Christ's entry into Jerusalem, when palm branches were strewn before Him. The feast of palms was observed in the East as early as the 5th century, and later it became an occurrence of the Roman and Greek Catholic churches. It is the practice in these churches

for the priest to bless the palm branches carried by worshipers, and as they pass out festival hymns are sung. When the participants return home, the branches are preserved and their ashes are used in celebrating Ash Wednesday.

PALMYRA (pāl-mī'ra), a city of ancient Syria, located 145 miles northeast of Damascus, where its ruins are still to be seen in an oasis. Solomon is thought to have founded the city in the 10th century B. C., and in his time it became an important stronghold of the Hebrew kingdom. The immediate vicinity of the city consists of a fertile and well-watered tract of land abounding in palm trees, but surrounding it at a distance are either sandy tracts or barren mountains. It continued to develop importance throughout the period of ancient history. In the early part of the 3d century A. D. it became the center of an empire under Odenathus, which included both Syria and Mesopotamia. Emperor Aurelian, of Rome, conquered it in 275, and the Saracens destroyed it in 744, but its ruin was completed by Tamerlane in 1400. The site is at present occupied by an Arabian village called Tedmor. Many interesting ruins have been found here by modern explorers, among them the remains of a temple of Baal, a number of monuments, and numerous relics bearing inscriptions in the Aramaic language. Among the recent discoveries are many Corinthian columns and tomb towers. The latter date from a period immediately preceding the Roman conquest and have inscriptions in the Syriac.

PALO ALTO (pā'lō ä'l'tō), a town of California, in Santa Clara County, on the Southern Pacific Railroad, 32 miles southeast of San Francisco. The surrounding country is agricultural and fruit growing, yielding large quantities of cereals, fruits, and grasses. It has a fine climate and a beautiful location. The town is noted chiefly as the seat of the Leland Stanford Junior University (q. v.). It has well-graded streets, systems of waterworks and electric lighting, and a Roman Catholic theological seminary. Population, 1900, 1,658.

PALO ALTO, a Spanish term meaning tall timber, the name applied to the first important battle of the Mexican War. It occurred in the forests about eight miles northeast of Matamoros, on May 8, 1846. The Americans under General Taylor had an army of 2,300 and the Mexicans under General Arista had about 6,000. This battle covered a period of five hours and the Mexicans were defeated, but they retreated in fairly good order. The Americans lost seven killed and forty wounded, and the Mexican

loss in killed was about one hundred. General Arista retreated to Reseca de la Palma, where he was defeated a few days later.

PALPITATION (pāl-pī-tā'shūn), the name applied to unusually forceful pulsations of the heart, causing a troublesome and unpleasant sensation. It frequently arises from sudden emotion and stomachial and other disorders, but may be due to organic disease of the heart. Diseases of the stomach have a double effect upon the heart, in that they influence through the nervous system by reflex action and exercise pressure in case of flatulence. Stimulants, such as coffee, tobacco, and alcoholic liquors, when used excessively, are prolific causes of palpitation of the heart. Careful dieting, regularity in meals, and wholesome rest should accompany the treatment, which depends largely upon the direct cause.

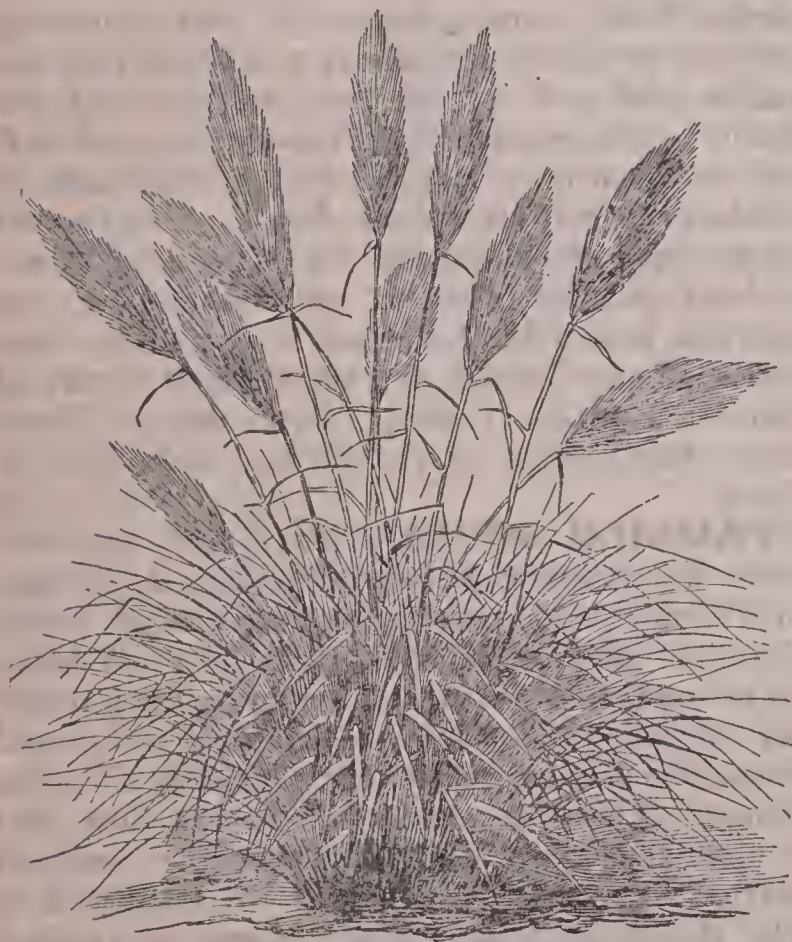
PAMIR (pā-mēr'), an elevated mountain region of Asia, situated principally in the southern part of Turkestan, formed by a union of the extremities of the Himalaya, Hindu-Kush, and Thian Shan Mountains. The region includes 30,000 square miles. It has a general altitude of 13,000 feet above sea level, this elevation giving it renown as the "roof of the world." The region has great extremes of heat and cold, with a rainfall barely sufficient to produce vegetation for the herds of cattle and sheep pastured there by the Kirghiz herders. Animal and bird life is quite abundant, and caravan routes have crossed it for many centuries. Lake Sarikol and other small sheets of water are in the region. A number of rivers have their source in the Pamir, including the Oxus.

PAMLICO SOUND (pām'lī-kō), an inlet from the Atlantic Ocean, extending a distance of 75 miles along the eastern coast of North Carolina, having a width of from 15 to 25 miles. It is separated from the Atlantic by a number of long and narrow islands of sand and is connected with Albemarle Sound by Croatan Sound. The Neuse and Tar rivers flow into it. A large part is shallow, but the southern portion has a general depth of twenty feet. The shores are mostly low. It may be reached by vessels from the ocean through Hatteras and Ocracoke inlets. In many places are tracts covered by bulrushes and other aquatic plants. Bird and fish life is abundant.

PAMPAS (pām'pās), a name applied to the vast open, treeless plains in the region of South America which lie south of the Amazon, but situated principally in Argentina, Bolivia, and Paraguay. The pampas of Argentina are the most extensive and cover a vast region in the

central part, including about 1,000,000 square miles. It rises in the form of terraces from the Atlantic to the Andes. The character of these plains with regard to climate and vegetation is diversified, some parts forming fertile tracts and others being excellent grazing land, while a portion is barren and sandy. In the pampas are many lakes and swamps, including Lake Chiquita, in the center of Argentina. Vast herds of cattle, horses, and sheep are kept on the pampas. Large tribes of Indians and wild horses and cattle are still numerous in some sections. Many species of grasses are abundant, supplying fine pasturage and native plants suitable for hay.

PAMPAS GRASS, a tall, ornamental reed-like grass native to the pampas of South America, but now cultivated for ornamental purposes in many countries of America and Europe. It has long, narrow, and rigid leaves, much crowded at the base, naked culms with large spikes of whitish flowers, and male and female organs on separate stalks. Usually the leaves attain a length of from three to six feet



PAMPAS GRASS.

and the flower stems are from eight to twelve feet high. The flower plumes are used for decorative purposes by florists. Several species have been described, differing mainly in the flowers, which are purple, yellow, or variegated with white. Pampas grass is grown commercially in California, where it was introduced in 1880.

PAMPHLET (pām'flēt), a small booklet or circular, consisting of several leaves fastened together by stitching. Printed pamphlets were distributed extensively in the reign of Henry VII. and other sovereigns of England, especially in the time of the struggle between the Protestants and Catholics. Those who prepared and published such printed matter were known as *pamphleteers*. It was a convenient and effective way of placing religious teachings into the hands of the people, especially at a time when newspapers and magazines were not published extensively. Such English writers as Defoe, Swift, and William Prynne added greatly to literature by the publication of pamphlets. Germany had a large number of pamphleteers, including Luther, Erasmus, and Melancton, who issued many pamphlets to disseminate and promote their religious views.

PAN, the Grecian god of fertility, who presided over all rural occupations and was the special patron of shepherds and huntsmen. He was regarded the son of Hermes and Callisto. At birth he had small horns sprouting from his forehead, pointed ears, a goat's beard, and the tail and feet of a goat. The name of Pan was given to him because as a youth he delighted his associates with many antics and his peculiar and grotesque form. The Greeks looked upon him as possessing the power of prophecy and skill in music, and regarded him the tail and feet of a goat. The name of Pan Milk and honey were usually offered to him in sacrificial worship, but rams, lambs, and cows were more commonly sacrificed. The Romans had a divinity called Faunus, whom they identified with the Greek Pan, and ascribed to him the gift of prophecy, protection against wolves, fertilization of the soil, and the instigation of bad dreams and evil apparitions. The satyrs were his attendants. Pan is celebrated in literature, being mentioned by Schiller, Milton, Rabelais, and Mrs. Browning.

PANA (pā'nā), a city of Illinois, in Christian County, 42 miles southeast of Springfield. It is on the Illinois Central, the Baltimore and Ohio Southwestern, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. The surrounding country contains deposits of coal and fertile soil. Among the manufactures are flour, cigars, tobacco products, and machinery. It has a public library, waterworks, sanitary sewerage, and several fine school and church buildings. The place has a considerable trade in grain, minerals, and merchandise. It was settled in 1853 and chartered as a city in 1870. *Population, 1900, 5,530; in 1910, 6,055.

PANAMA (pān-ā-mā'), a seaport city and

the capital of Panama, on the southern coast of the Isthmus of Panama, connected with Colon, a city on the Caribbean Sea, by railway. It is finely situated at the head of the Bay of Panama, on which it has a secure harbor. The houses are mostly of stone, built in the Spanish style. Among the noteworthy buildings are the general hospital, the Jesuit College, the cathedral, several public schools, and a number of convents. The surrounding country is devoted largely to agriculture and stock raising. Shells, pearls, gold dust, and many species of fish are obtained in the vicinity.

The prosperity of Panama dates from 1855, when its railroad connection with Colon, about 48 miles distant, was completed. Since then a large amount of freight has been transported across the isthmus instead of shipping by way of Cape Horn. It suffered much from disastrous fires in 1864 and 1874. Population, 1908, 31,248.

PANAMA, a republic of Central America, consisting almost entirely of the Isthmus of Panama. It is bounded on the north by the Caribbean Sea, east by Colombia, south by the Pacific, and west by Costa Rica. At the narrowest place it is 30 miles wide, but the greatest width is 118 miles, and the length from east to west is 420 miles. The area is 31,570 square miles.

DESCRIPTION. The greater part of the surface consists of low mountains and hills, ranging from 200 to 1,500 feet above the sea, and a large part is covered with dense forests. Although the chains and ridges are more or less systematic, they are distributed very irregularly. Near the border of Costa Rica, not far from the Pacific shore, are highlands of a lofty character, such as Pico Blanco and Chiriqui, both over 11,000 feet high. No well-defined watershed characterizes the country, but the drainage is divided almost equally between the two oceans. Deep valleys have been cut almost to the level of the sea, in which the drainage is carried by short and somewhat rapid streams.

The climate is healthful and agreeable in the highlands, but it is unfavorable to those who are not acclimated in the lower districts and valleys. Much of the soil is fertile and the rainfall is abundant. Between December and April the entire country is influenced by the northeast trades, which are replaced by southeasterly winds the remainder of the year. The annual temperature is about 79° , but is somewhat higher on the Atlantic than on the Pacific coast, owing to the warm waters of the Caribbean. The temperature seldom falls be-

low 60° , but is lower on the highlands, and the highest registration is from 95° to 102° .

RESOURCES. The country has deposits of gold, iron, copper, salt, coal, building stone, and commercial clays, but mining has not been developed materially. Primeval forests still cover a large part of the surface, yielding indigo, rubber, lumber, and caoutchouc. Jungles, sedges, wild plantain, and grasses are abundant. The pearl fisheries are valuable, especially at the Pearl Islands and in the Gulf of Panama.

INDUSTRIES. Farming is the principal occupation. About 85,500 acres are under cultivation, of which nearly one-half is devoted to growing fruit, especially the banana and the cocoanut. Coffee, sugar cane, rice, corn, yams, and sweet potatoes are grown profitably. The



Map to show the Panama Canal and the Panama double-track Railroad.

country has large interests in cattle, horses, mules, swine, sheep, and goats. Large quantities of salt are produced, but this enterprise is leased to private persons as a government monopoly. Other manufactures include pipe tobacco, cigars, earthenware, hats, and clothing.

COMMERCE AND TRANSPORTATION. The larger part of the trade is with the United States. Among the exports are hides, bananas, India rubber, lumber, and cabinet woods. Cotton goods, breadstuffs, boots and shoes, and machinery are imported. Commercial relations of considerable importance are maintained with Germany, Great Britain, and France. A railway line extends across the country from the Atlantic to the Pacific, having a length of 47 miles. This line connects Panama and Colon, consists of a double track, and is owned and operated by the government of the United

States. Other railways are operated from the coast to plantations a short distance inland. In general the highways are not well constructed, but good macadamized roads are maintained near the larger towns.

GOVERNMENT. The country is governed under a constitution which was adopted in 1904. It vests the chief executive authority in a president, who is elected for four years and cannot serve two terms in succession. The chamber of deputies consists of 32 members, elected for four years according to the number of inhabitants. Each of the seven provinces has a governor, who is appointed by the president. The gold balboa, equal to \$1.00 in the money of Canada and the United States, is the monetary unit. Silver coins, known as pesos, equal to fifty cents, are in general circulation.

Although the larger towns have elementary and secondary schools, education is not well advanced. The capital has two normal schools, a school of commerce, and two high schools for boys and girls. A number of students are educated in Europe at the expense of the government, being fitted to become instructors of higher courses, after which they are employed in the institutions as teachers on a salary. The government has a well-defined policy of teaching the leading industries, such as fruit growing, hat making, and agriculture.

INHABITANTS. The inhabitants consist largely of mixed races, comprising Spanish, Indians, and Negroes. Temporary immigrants from the United States, Germany, and Spain are quite numerous. A large number of Chinese laborers are employed. Panama, on the Pacific coast, is the capital and largest city. Colon, or Aspinwall, Montijo, Agua Dulce, and Puerto Mudis are commercial centers. Population, 1908, 401,680.

HISTORY. The territory comprised in Panama was a part of the Spanish colony in South America until 1821, when the inhabitants proclaimed their independence and became incorporated with the then powerful republic of Colombia, which country had embraced the presidency of Quito, the viceroyalty of New Granada, and the Dominion of Venezuela.

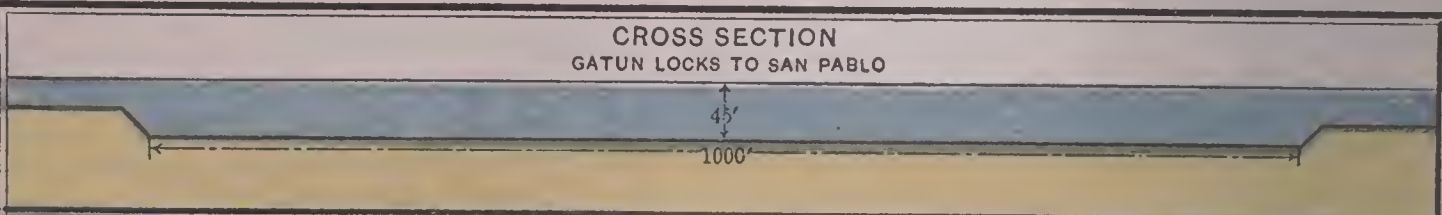
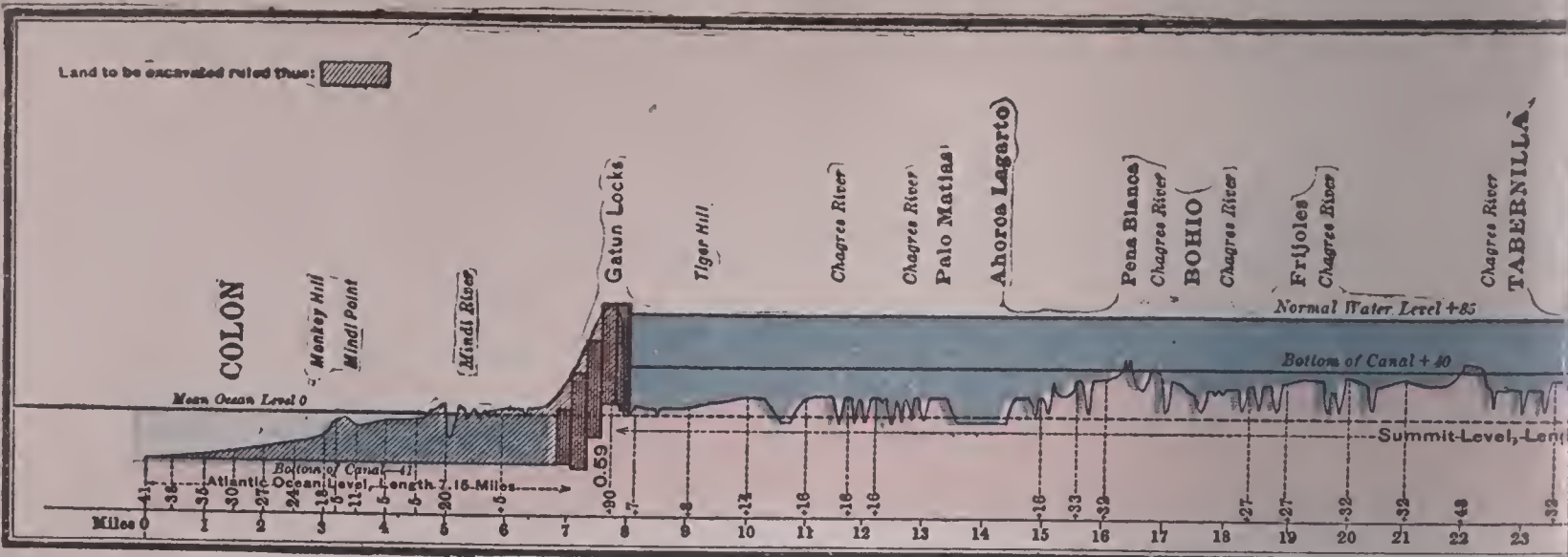
The object of declaring independence of the government of Spain was to improve administrative conditions, hence the republic of Colombia was founded in a region that formerly comprised all of the territory of Northern South America. This republic was bounded on the south by Brazil and Peru and on the east by Guiana. In 1831, when the great republic of Colombia was dissolved, the territory was divided and in its stead were established the

three republics of Venezuela, Ecuador, and New Granada.

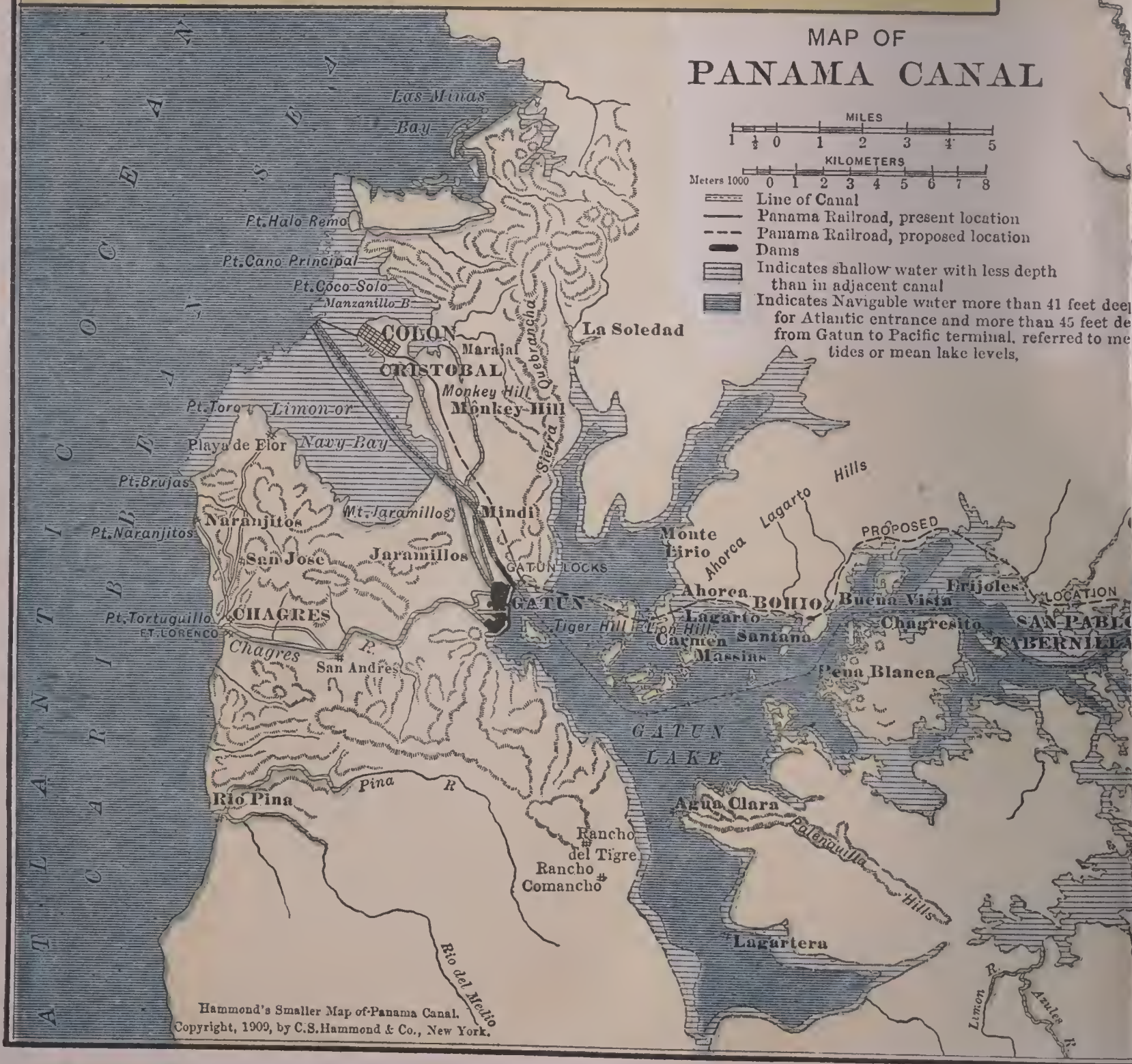
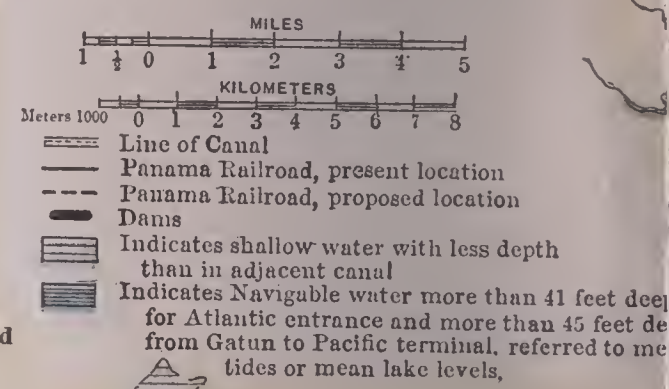
At that time the Isthmus of Panama was incorporated as a part of New Granada, and in 1832 a constitution was adopted which established a system of centralized government. The greater number of the provinces of New Granada engaged in a civil war in 1841, denounced the constitution, and instead of the centralized government proclaimed a federation of states, giving the several divisions larger power in local government. At that time the provinces of Panama and Veragua, which then comprised the Isthmus of Panama, proclaimed independence and erected a sovereign state. A convention was called on March 18, 1841, when the territory embraced in the isthmus was organized as the Republic of Panama, and it was declared to be the intention of the people never again to allow the republic to be incorporated with New Granada under the constitution that centralized the government in the nation at the expense of individual states. However, the congress of New Granada began to favor a form of federal organization and the state of Panama was again united with the mother republic. This system of government was carried on successfully until the Civil War of 1885, when the congress and president of Colombia substituted an absolute central government in its place, assuming that such a change was to the interest of the perpetuity of the nation.

The territory embraced in the Republic of Panama includes practically all of the region that will be benefited locally by the construction of the Panama Canal, hence its inhabitants were firm in their support of this canal project. Both the president and congress of Colombia favored granting a right of way across the isthmus, but they decided to profit by asking for an unusually large concession in the payment of money. When the Congress of the United States, in 1903, formulated the Panama Canal Treaty, it was rejected by the government of Colombia, and this course on the part of the South American republic brought about a revolution in Panama. The revolutionists set up a new republic, which was recognized by the United States on Nov. 7, 1903. Manuel Amador was elected president at a special election in Panama, and the congress of that country ratified the Panama Canal Treaty on Dec. 2, 1903. Don Jose Domingo de Obaldia was elected president in 1908.

PANAMA, Isthmus of, a narrow neck of land which connects North and South America, separating the Atlantic Ocean from the Pa-



MAP OF PANAMA CANAL

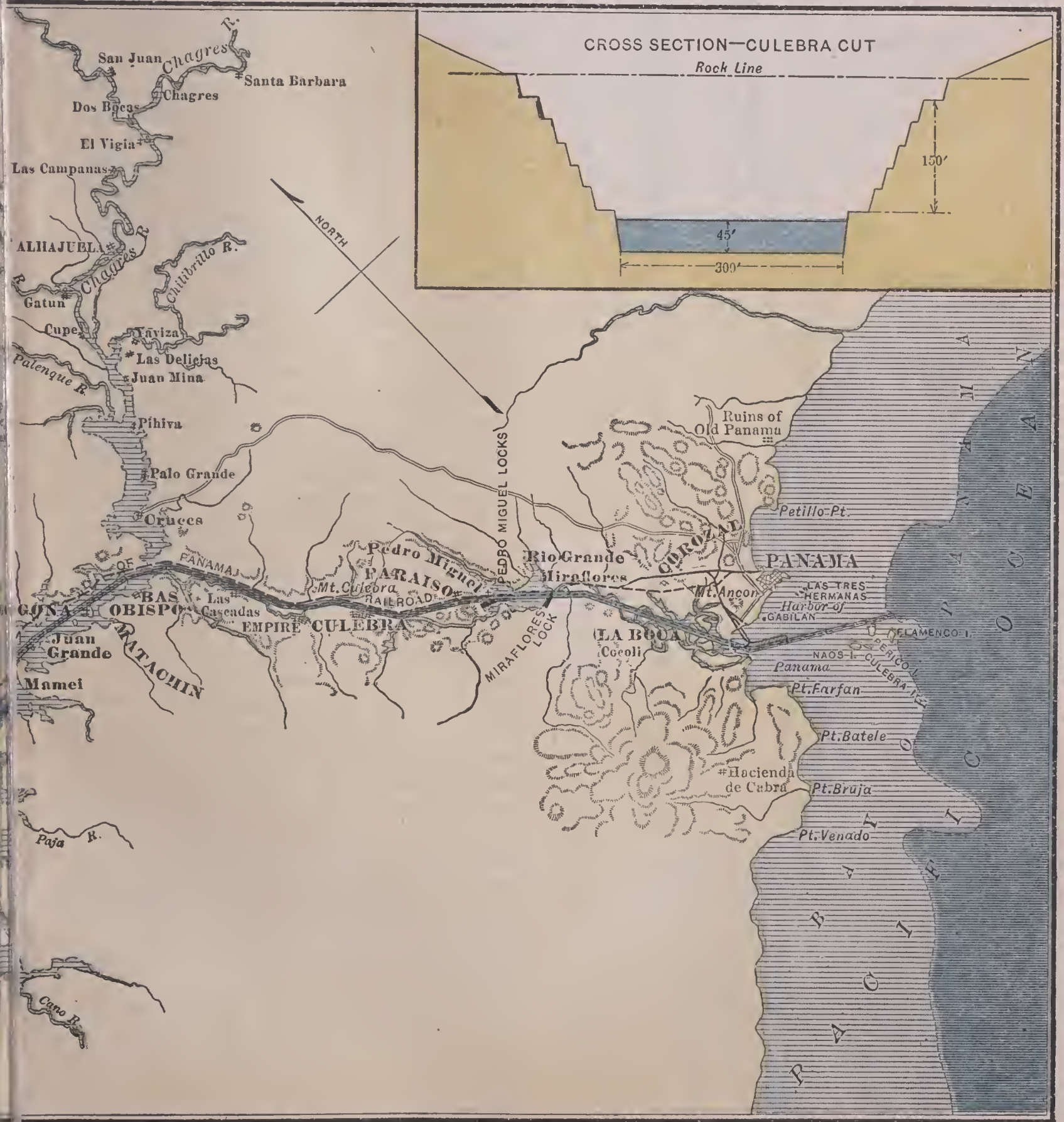
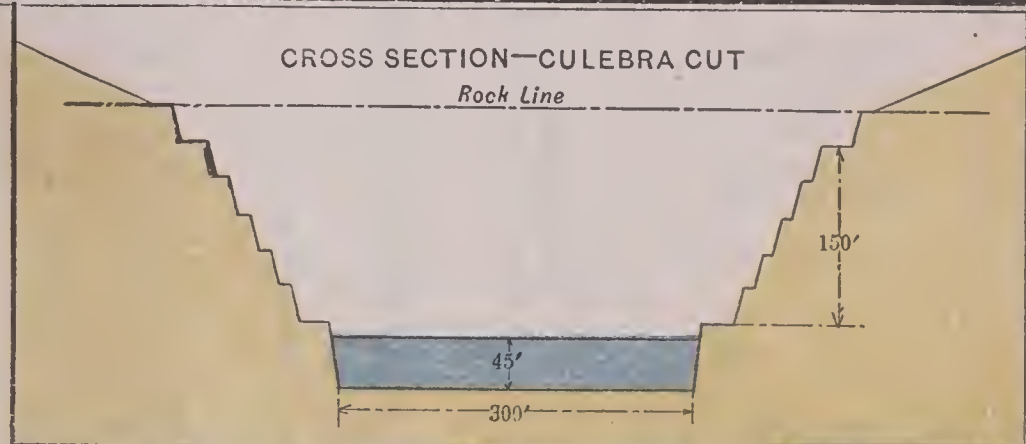
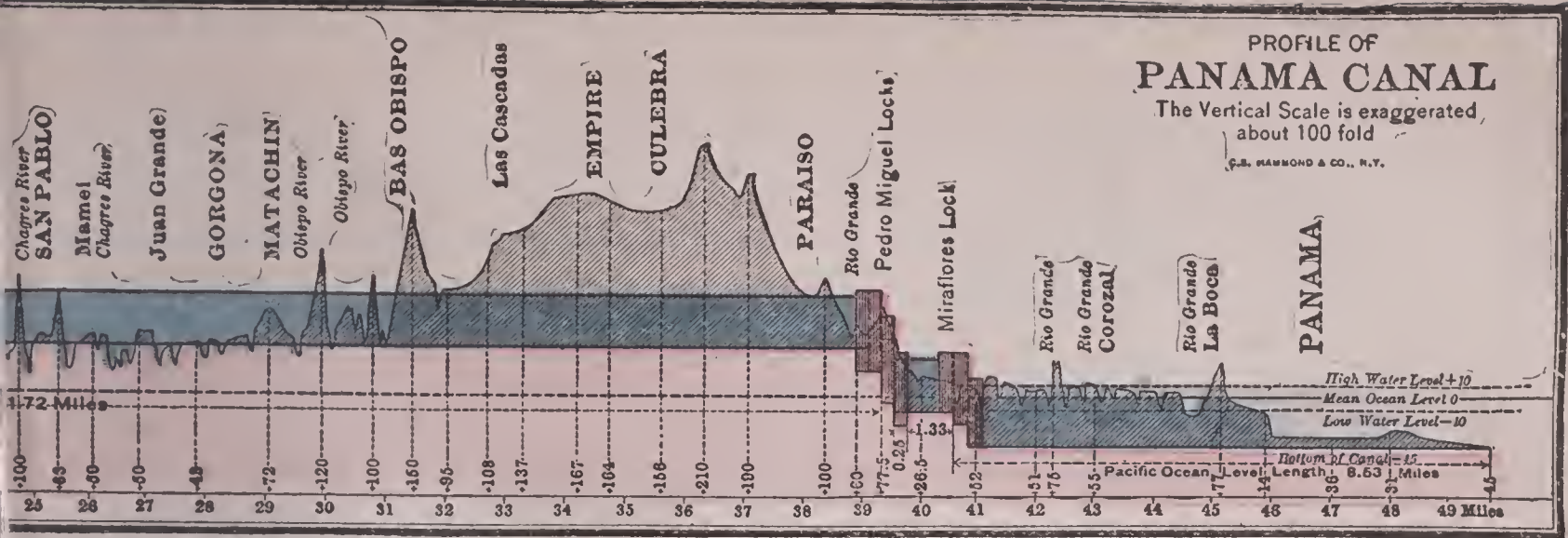


Hammond's Smaller Map of Panama Canal.
Copyright, 1909, by C.S. Hammond & Co., New York.

PROFILE OF PANAMA CANAL

The Vertical Scale is exaggerated, about 100 fold

C.S. HAMMOND & CO., N.Y.

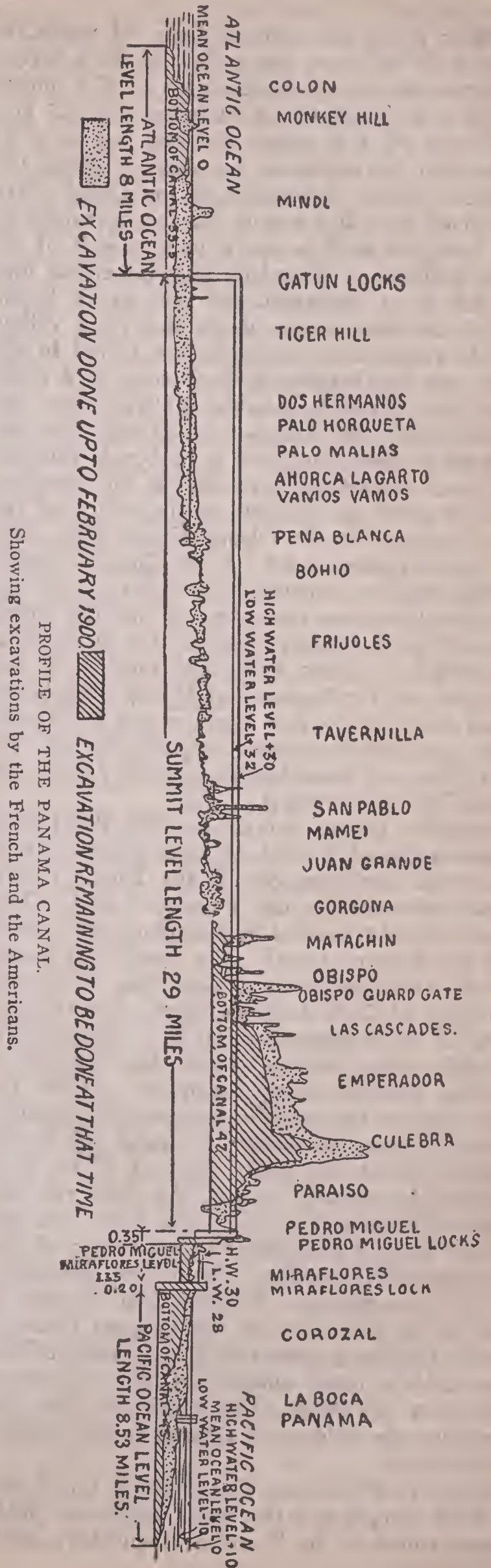


cific Ocean. It is from 30 to 65 miles wide, and the principal part of it is included in the republic of Panama, formerly a division of Colombia, which has an area of 31,570 square miles. A range of mountains, which rises to altitudes of 11,000 feet in the western part, traverses the isthmus. It has many small rivers that afford excellent drainage. The isthmus is crossed by the Panama Railroad and the Panama Canal.

PANAMA CANAL, an Isthmian canal in Central America, extending from Colón, on the Atlantic, to Panama, on the Pacific, a distance of about 47 miles. The canal properly begins in the Bay of Limón, a mile northwest of the city of Colón, with a channel 500 feet in width and 41 feet in depth at mean tide, running due south to the shore line of the Bay of Limón, at the mouth of the Mindi River. This distance is a little less than five miles. Then the canal passes through low and swampy ground in a southerly direction three miles to Gatun, the width of this stretch being 500 feet and the depth, 35.5 feet. Vessels entering the canal from the Atlantic side proceed at sea level for a distance of eight miles to Gatun, where a twin flight of three locks lifts them to the summit, 85 feet above the sea. For the next 23 miles navigation is on the artificial Lake Gatun, to the Obispo Guard Gate. Six miles farther is the continental divide, pierced by the so-called *Culebra Cut*, the excavation of which is the heaviest on the entire line. The original surface at this point ranged from 334 to 600 feet above sea level.

Descent to the Pacific is begun by the Pedro Miguel Locks, by which Sosa Lake is reached. This body of water, as well as Lake Gatun, is an artificial lake, the surface of which is 55 feet above the sea and which affords navigation for several miles with very little excavation. Sea level is reached through the Miraflores Lock, two locks in flight at the Pacific terminus of the canal line. The distance from deep water in the Caribbean Sea to deep water in the Pacific is about 50 feet.

The locks are in duplicate and are constructed of such size as to permit the passage of the largest ship afloat. They were designed to accommodate ships which are 800 feet long and have a beam of 88 feet. These dimensions are approached only by the largest vessels in actual use, such as the *Lusitania* and the *Kronprinzessin Cecile*. Larger vessels than these can enter only a few of the harbors of the world and it is probable that a great many years will elapse before vessels of this size are at all common in any but fast passenger service.



Gatun Lake, an artificial body of water, is formed by damming the valley of the Chagres River at Gatun. It has an area of 171 square miles, a total length of 30 miles, and an elevation of 85 feet above the sea, but only 23 miles will be navigated by ships crossing the isthmus. By it the waters of the Chagres are stored to furnish a supply for the operation of the locks, as well as for a long stretch of inland navigation. The lake likewise enters into service as a reservoir for the great floods which at times sweep down the river valley, which waters of these floods are stored in the lake, and the surplus is discharged at a moderate rate through suitable spillways into the river below. The dam is 135 feet high, one and a quarter miles long, and a half mile thick at the base. Sosa Lake is formed by the construction of other small dams in the valley of the Rio Grande. At the Obispo Guard Gate, near the northernmost point of the Chagres valley, a dam may be constructed in future years for additional storage of water. From the Miraflores Lock to the curve in the Bay of Panama, a distance of four miles, the channel is 300 feet wide at the bottom and 45 feet deep below mean tide. Colón and Panama, on the Caribbean and Pacific coasts, respectively, are the only cities of considerable size at present on the route of the canal.

PANAMA CANAL ZONE. In 1904 the United States acquired a tract of land which extends from the Caribbean Sea to the Pacific Ocean, being tributary to the Panama Canal. This possession is traversed by the Panama Railroad and the Panama Canal. The area is 474 square miles. It is under the government of the Department of Civil Administration. For the purpose of local administration it is divided into administrative districts, which have charge of certain administrative functions. Much has been done to improve the sanitation by drainage and enforcing a system of rules of health. This vigorous action on the part of the government has greatly reduced the death rate and prevented the spread of yellow fever and malaria. Several hospitals and a number of elementary and secondary schools are maintained by the government. Another improvement of note is the rebuilding of the Panama Railroad, which has been converted into a double-track line, and a large amount of new equipment has been provided. The traffic on this line continues to yield good returns to the government.

UTILITY OF CANAL. The Panama Canal may well be considered the most important public improvement in the Western Hemisphere, prob-

ably in the world. It will ultimately surpass the anticipation of those who were its most devoted advocates, since it will open an ocean route of travel of much greater importance than the Suez Canal. Although it will have strong competition in many transcontinental railway lines, the greater utility will consist of furnishing a direct route from ocean to ocean for a vast interoceanic trade. Considered from a national point of view, as regards both Canada and the United States, it will permit the passage of a large traffic between the coasts of the Atlantic and the Pacific.

HISTORY. The region traversed by the Panama Canal was first explored by the Spaniards in 1527. Although an isthmian canal had been considered possible for more than three centuries, the majority of advocates favored the Nicaraguan route, thereby utilizing Lake Nicaragua. Von Humboldt first suggested the Panama Canal in 1803. The railroad across the isthmus from Colón to Panama was completed in 1855. De Lesseps formed the Panama Canal Company in 1879 and began work two years later, but the enterprise failed in 1888. A new French canal company was formed in 1894, but De Lesseps died the same year, which forced an abandonment of active operations. In 1901 the Hay-Pauncefote Treaty was signed, which was soon after ratified both by Great Britain and the United States.

The United States purchased the French holdings in the canal in 1903, paying \$40,000,000, and negotiations were conducted in the meantime with the view of concluding a treaty with Colombia. In the same year, owing to the dilatory action on the part of the Colombian government, a revolution occurred in Panama, which resulted in the organization of the Republic of Panama. That country concluded a treaty with the United States, ratifying it in 1904, in which year the canal property was transferred to the United States. The first work consisted of sanitating the isthmus, providing suitable quarters for the employees, and establishing and equipping hospitals. Active operation in excavating began early in 1905, for which purpose the most modern and substantial machinery was put into service. The French expended a total of \$200,000,000 and completed less than one-third of the work, the principal excavations being shown in the profile. However, the United States authorities did not utilize all of their excavations, since the construction of the Gatun Dam changes the original plan very materially. Estimates now place the completion of the entire work at about 1915 or 1918.

PANAMA CONGRESS, a meeting of the

delegates from the nations of America at the city of Panama in June, 1826, to consider questions of general interest. Simon Bolivar, president of Colombia, advocated the formation of a confederacy of the American states, and in 1823 invited the governments of Chile, Mexico, Peru, and other countries to empower delegates with authority to take such action. This effort having failed through a lack of coöperation, he issued a second circular and sent it to all the republics of Spanish-America and the United States. The purposes, as announced in advance, were to consider the slave trade, the establishments of republics in Cuba and Porto Rico, the recognition of the new republic of Haiti, and other topics of common interest. President Adams accepted the invitation, but it precipitated an extended debate in Congress, although Richard C. Anderson and John Sergeant were finally appointed as envoys extraordinary. The congress met on June 22, 1826, and, after holding ten sessions, agreed upon a treaty of perpetual alliance against Spain. It adjourned to meet at Tacubaya, Mexico, the following year, but the meeting was never held. The United States was not represented at the meeting at Panama, since Anderson died en route and Sergeant was delayed and did not reach Panama until after the congress had adjourned.

PAN-AMERICAN CONGRESS, a conference of representatives from the republics of America, which convened at Washington on Oct. 2, 1889, for the purpose of formulating plans for furthering American trade and establishing an American customs union. The plan of holding a Pan-American congress was originated by Henry Clay, but nothing definite was done until James G. Blaine agitated such an enterprise. The nations entitled to representation included the republics of the United States, Mexico, Central and South America, Santo Domingo, and Haiti. An adjournment was taken immediately after convening for the purpose of visiting different sections of the United States before commencing work. The congress began its deliberations on Nov. 19 of the same year and continued in session for five months, adjourning April 19, 1890. Among the different recommendations for commercial reforms suggested for adoption by the various governments are included reciprocity treaties by all the countries, a uniform commercial coinage, a uniform system of weights and measures, and a general plan of legalizing documents. The projects discussed without definite recommendation include the passage of uniform laws authorizing patents and copyrights, subsidies to steamship companies, extradition treaties, and the estab-

lishment of an international bank. The Bureau of American Republics was established at the suggestion of this convention.

The second Pan-American Congress was held at the City of Mexico from Oct. 22, 1901, until Jan. 31, 1902. It followed the general plan of the previous congress and in addition recommended a plan for international arbitration, the connection of North and South America by railway, and uniformity in the adoption of a standard money. The third Pan-American Congress met at Rio de Janeiro, Brazil, in July and August, 1906, at which the nations of both continents were well represented. It discussed the Draco Doctrine, which is to the effect that the nations of Europe are not to be permitted to collect debts from the countries of South America by forcible means. This question was referred to the Hague Peace Conference. The United States was represented by Elihu Root, then Secretary of State.

PANAY (pà-nī'), an island of the Philippines, located near the center of the archipelago, separated from Mindoro by the Mindoro Sea. It ranks fifth in size among the Philippines, having an area of 4,752 square miles, exclusive of the dependent islands and islets. The eastern and northeastern coasts have many small bays and sounds, but the other shores are indented by few inlets. Guimaras, located between Panay and Negros, is the largest dependent island, having an area of 243 square miles. The surface is mountainous, some of the peaks exceeding 5,000 feet, but the coasts and valleys are highly fertile. Many streams supply the drainage, including the Panay River in the north, the Cidián in the west, and the Jalaur in the southeast. Fine forests are abundant and the climate is favorable and healthful.

Agriculture is the chief occupation and sugar, rice, copra, and live stock are the principal products. Indigo, coffee, cotton, tobacco, pepper, and fruits are grown. Carabaos, horses, and sheep comprise the leading kinds of live stock. Mining has not been developed extensively, but the island has deposits of coal, iron, gold, gypsum, and marble. The manufactures consist chiefly of clothing and fabric, and these as well as raw cotton, tobacco, rice, and spices are exported. A number of insurrections against the authority of the United States took place after the Spanish War, and the island was not fully pacified until the surrender of General Delgado in 1901. The inhabitants are mostly Visayans, but include a small number of Mundos and Negritos. For local government the island is divided into three political districts, those of Iloilo, Cápiz, and Antique. Iloilo is

one of the principal ports and was occupied and garrisoned by the United States during the war with Spain. Population, 1901, 801,887.

PANCREAS (păn'krê-ās), a gland in the human body, located back of the stomach, extending across the posterior wall of the abdomen. It varies from six to eight inches in length, is about an inch and one-half wide, and has an average thickness of about an inch. In the adult it weighs about three ounces. The pancreas communicates with the intestines by a small duct, through which its secretion, called the *pancreatic juice*, enters into the duodenum. This secretion is colorless, viscid, and remarkable for acting upon all the principles of the food. It converts starch into grape sugar, proteids into peptones, and fat into a soap or emulsion. The pancreas is found in all birds, reptiles, mammals, and some fishes. It is subject to few diseases, but ailments and wounds are usually fatal.

PANCREATIN (păn'krê-à-tîn), a digestive ferment used extensively in medicine. It is extracted from the pancreas of swine that are killed about six hours after a full meal, at which time that organ is highly active. The color of the extract is yellowish and it has a peculiar odor and taste. It contains four pancreatic ferments: *amylopsin*, which converts starches into sugar; *trypsin*, a digester of proteids; *steapsin*, which splits up and emulsifies fat; and a *milk-curdling ferment*. Pancreatin is the most useful of the digestive ferments administered by physicians, since it has the property of peptonizing foods.

PANDA (păn'dà), a carnivorous quadruped found in the Himalayas and in northern India. It is about the size of a large cat and belongs to the raccoon family. It has long, reddish-brown fur and a long, ringed tail. The food consists of birds, large insects, and small quadrupeds, which it catches by frequenting trees, where it dwells chiefly. The fur is considered of value commercially. These animals agree in many respects with the civets and have been classed with them by some writers. The natives call them *wah*, from the cry.

PANDORA (păn-dō'rà), an individual mentioned by Hesiod in Greek mythology as the first woman. It is related that she was formed out of clay by Vulcan at the request of Jupiter, who designed her for the purpose of punishing Prometheus, because the latter had stolen fire from heaven and brought it to earth. The gods immediately vied in making her presents. Mercury bestowed on her a smooth and persuasive tongue, the Graces made her fascinating, Minerva gifted her with the possession of feminine

accomplishments, and Aphrodite gave her beauty and the art of pleasing. She was named Pandora because she possessed all gifts necessary to make her charming and irresistible. The gift from Jupiter was a box filled with unconquerable evils, which was intended for Prometheus, but his brother, Epimetheus, became charmed by Pandora's beauty and accepted it as a present. On opening the box all the ills and diseases that now afflict mankind escaped. However, hope lay at the bottom, and before it could escape Pandora hastily closed the lid. It is due to her that hope is preserved to man as a never-failing solace. Although many ills confront him in every walk of life, hope springs eternal in the human breast.

PANIC (păn'ik), a commercial crisis, such as may result from excessive speculative enterprises, unusual and harmful legislation in relation to finances and industries, or an extensive failure of crops. A panic is attended by overpowering alarm in financial and commercial circles. In that case a sudden run commences on the banks, the prices of securities fall, and other abnormal commercial conditions ensue. Among the panics of most note in Europe since 1750 are the following: The panic of Holland in 1773, which was attended by failures exceeding \$50,000,000; the panic of England in 1793, resulting from the French War, when the government issued \$25,000,000 exchequer bills; the panic of England in 1825 and 1826, resulting from speculations in the colonies, when 770 banks failed, and many families were required to live on bran; and the panic of England in 1847, owing to excessive railroad speculation, when the failures amounted to \$100,000,000 and the rate of discount was 13 per cent. The financial crash in Australia, in 1892, had an unusually depressive effect upon trade.

The most noteworthy panics of the United States begin with that of 1819, which resulted from speculation that followed the War of 1812. In 1837 a panic was caused by a number of years of extraordinary speculation, when a large amount of business was transacted on the credit system under an inflated currency, and with an increase of population and a reduction of the volume of money per capita debtors were unable to meet their obligations. At that period State banks were established, from which currency was issued that later depreciated in value, which afterward became known as *wild-cat money*, and the mode of doing business was called *wild-cat banking*. The panic of 1873 resulted from another period of inflation of the currency during the Civil War and from legislation partially destroying the monetary

functions of silver. In 1893 a widespread panic occurred, in which strikes, runs on banks, and other business disturbances were common. This panic is generally assigned to a variety of causes, including poor crops, unsound financial legislation, and the unwholesome effect on the American markets because of a large production of crops in other continents.

The panic of 1907 was due to several causes, none of which would by itself have produced widespread depression. A concerted line of prosecutions of illegal combinations of corporations in the administration of President Roosevelt is generally assigned as a prolific cause. Other causes include the distrust aroused by anti-trust legislation, an inelastic currency, a reduction in the standard of value by an increased production of gold, unusual speculation, and legislation to limit the rates charged by railroads. The failures in business in 1907 were reported at 12,045, involving liabilities of \$126,504,515. Canada had 1,287 failures in five years, ending in 1907, with a commercial loss of \$13,221,259.

PANORAMA (păn-ō-ră'mă), the representation of a landscape as seen from one point, either in a painting or a photograph. The chief difference between a painting and a panorama is that the former aims at artistic effect and presents only part of the landscape, while the latter gives an entire view as seen from one position. A famous panorama of the siege of Paris during the Franco-German War was exhibited in 1875. Another noted production of this kind is the panorama of the Battle of Gettysburg, completed in 1888 and exhibited a number of years in New York City. Productions of this kind are numerous at present and may be seen in many art galleries.

PANSY (păn'zÿ). See **Violet**.

PANTHEISM (păn'thê-iz'm), a form of religious philosophy that holds God and the universe to be identical, which regards mind and matter as the manifestations of one universal being. It assumes the identity of cause and effect. Accordingly, a conception of the Deity is obtained by reasoning in relation to the individual and the objects that surround him. Pantheism had many adherents among the philosophers of Greece, including Anaximander, Pythagoras, and Xenophanes. It is still widely accepted by many of the educated Brahmans and enters largely into the religious thought of Egypt, Persia, Hindustan, and other countries, in all of which religious systems prevail that partake of pantheistic forms. Christians generally identify pantheism with atheism. Spinoza is the most noted modern representative

of this dogma, and his writings, though largely misunderstood, give marked evidences that he held to many of the main tenets of pantheism.

PANTHEON (păn-thē'ōn), a name applied to several important temples dedicated to the purposes of religious worship, as the Pantheon at Rome and the Pantheon in Paris. The *Pantheon at Rome* was built by Agrippa, son-in-law of Augustus, about 27 B. C., and was dedicated to Mars in memory of the victory obtained by Augustus over Antony and Cleopatra. Emperor Phocas gave it to Pope Boniface IV. in 609 A. D., who dedicated it to the virgin and holy martyrs, and Gregory IV. dedicated it to all the saints in 830. This structure has a circular form, is 188 feet in diameter and 212 feet high, and has a dome extending 36 feet above the upper cornice. It is now known as the Church of Santa Maria Rotonda. Within its walls many famous men have been buried. The *Pantheon in Paris* dates from 1761. It is a beautiful structure and for some time has been known as the Church of Saint G enevi eve. In it are buried many men of eminence, among them Voltaire, Lagrange, Lannes, and Rousseau.

PANTHER (păn'th er), an animal of the leopard family, but exceeding the leopard in strength and size. The body is nearly six feet long without the tail, and the height at the shoulder is three feet. The general color is yellow, with a number of rings and spots on the sides. Like the leopard, it is a carnivorous mammal, feeding on birds and small quadrupeds. The puma of America is known as a panther, and the cougar of North America and the jaguar of South America are designated as such by some writers.

PANTOMIME (păn't o-m im), an entertainment or theatrical performance in which the action is represented by gesticulation, without the use of words. Actors who presented performances of this kind were common in ancient Greece and Rome, but the art of presenting pantomimic entertainments reached its greatest perfection in the latter country, especially in the time of Augustus. In dress and manner of action the Roman performer very closely resembled the modern ballet dancer, regulating his movement by the accompaniment of the flute or some other musical instrument. Every part of the body was used in acting, except the face, which was covered by a mask suitable to express the action of the piece. At first only one actor took part in the performance at the time, but later several acted together, and subsequently women were permitted to take part in the performances. The pantomimic exhibitions were characterized as licentious by the early

Christian writers and for some time fell into disuse, but they were later revived in a more refined and cultured form and applied to Christmas and other entertainments.

PAPAL STATES, the name of a territory in the central part of Italy, before that country was unified to form the present kingdom, sometimes called the States of the Church. These states extended from the Adriatic to the Mediterranean. They were bounded on the south by Naples and on the west and north by Modena, Tuscany, and Austria. They comprised an area of 16,000 square miles and a population of 3,124,668. The temporal government was under the Pope, who had both his spiritual and temporal capital at Rome. Several revolutions broke out in the Papal States during the early part of the 19th century, in which France and Austria became involved, and in 1848 the Pope fled to Gaeta in disguise. France restored him the following year, while Austria protected his legations until 1859, and French soldiers garrisoned the capital until 1870. Victor Emmanuel, King of Italy, had already extended his territory by annexations, and the Papal States now voted to join his dominion. Since then the Pope has not exercised temporal authority, except within the limits of the Vatican. Believing that the Papacy should not be subject to any temporal ruler, he has not set foot outside of these limits since 1870.

PAPAW (pà-pà'), a tree native to tropical America, allied to the passion flower family, now cultivated extensively in tropical countries. It has a remarkably tapering stem crowned by a tuft of leaves on long footstalks, with the flowers below, and grows to a height of from fifteen to twenty feet. The wood is soft and of little value in manufacture, but its fruit, consisting of a dingy orange-colored product about the size of a small melon, is eaten raw, cooked, or pickled. The rind of the fruit is thick and fleshy, and its rather tender skin is yellow when quite ripe. The fleshy part, which contains two rows of large, flat seeds, is soft and sweeter than that of the banana. Medical properties are obtained from the fruit and rind, while the juice of the leaves and fruit is used in rendering meat tender. This class comprises about twenty species, including both trees and shrubs, and all are native to tropical America.

PAPER, a material made by chemical and mechanical processes from vegetable fiber, straw, rags, wood, bark, and other substances, and used for wrapping, writing, printing, and many other purposes. The ancients did not make paper like that manufactured at present, but instead prepared a product from papyrus, a reed native

to Egypt, securing from the inner bark the principal writing material that served various purposes for many centuries among the nations bordering on the Mediterranean. The name paper was derived from *papyrus*, but the ancient product was very much unlike the paper now used. It was prepared by laying strips of the inner bark of the papyrus plant so they would lap over each other, and these were united to each other by pressure, the juice of the plant supplying the necessary amount of mucilaginous matter to hold the parts together. At present over 400 different materials are employed in making paper, but the best product is obtained from esparto grass and rags. However, trimmings and paper which is already written or printed on are used extensively for remanufacturing.

It is thought that the manufacture of paper similar to the kinds now used dates from the 2d century B. C., when the Chinese produced an excellent quality from vegetable fibers, especially cotton. The manufacture of paper from vegetable fibers was introduced in the western portions of Asia several centuries later, and its manufacture in Europe was first instituted in Spain by the Moors about 1154. Soon after the enterprise of making paper developed in France, Germany, and Italy, and by the 14th century it had grown into an important industry. The use of vegetable fibers in paper making declined considerably in the 16th century, for the reason that it was discovered that cotton and linen rags are excellent materials for making a fine product. Immediately many persons found employment in gathering old material of this character for the factories. The invention of printing and the publication of large editions of a multiplicity of books and periodicals increased the consumption rapidly. Subsequently the demand was enhanced by the use of paper for hangings, wrappings, and various other purposes. This circumstance caused much energy to be devoted to the selection and employment of a large number of substances that offered to supply cheaply and abundantly the popular demand. In 1772 a German paper manufacturer named Schaffers published a catalogue containing specimens and prices of paper made from 65 different vegetable substances.

The process of manufacturing paper depends largely upon the kind of material used. Within recent years vast machinery has been perfected by which the product is not only improved, but the output has been greatly enlarged. Three general classes of paper are recognized, including wrapping paper, printing paper, and writing paper. *Wrapping* paper was originally made of

jute, hemp, old rope, and other substances. These materials are still used extensively, but the manila wrapping paper of commerce is now obtained largely from wood. *Printing* paper is divided into *book* papers and *news* papers and is made largely of ground wood. *Writing* paper comprises the grades which are used in all classes of writing and for bookkeeping. Writing papers of all kinds are known in the trade as *flat* papers, since they are generally unfolded. Other classes of papers include coated papers, wall paper, and tissue paper. All good grades of paper contain the *water mark*, which is impressed upon the web at each revolution of the dandy roll, on which the design is placed.

Formerly the staple grades of writing and printing paper were made of rags and esparto. At present the printing paper is made largely of wood pulp, with which a certain per cent. of cotton waste and rags may be added to give it strength. The best grade of writing and printing paper is still made from rags, whether by hand or machine. The process of manufacture differs somewhat according to the kind of material used, though in all grades it is necessary to prepare the substances by cleaning them of all the dust and dirt, and separating them according to the kind of product wanted. They are next reduced to a pulp, which is cleansed and bleached, and afterward is sized by depositing on the fibers a slightly mucilaginous composition, when a coloring matter is added. This mass is subjected to beating, after which it is run through a strainer into the chests of the paper machine. From this chest it flows through an orifice and is spread in the form of a thin film on a mechanical contrivance that rapidly absorbs moisture, and, when it is sufficiently dried, passes between a series of rollers that gradually tighten until it is reduced to the desired thickness. The last of the rollers are sufficiently heated by steam to take out a large part of the remaining moisture and give it a glossy appearance. It is then wound upon large rollers to be marketed, or is cut into different sizes as desired.

Machine-made paper consists of a continuous sheet. Newspapers of large circulation use webs of great length for printing, and these are not cut until after the paper has been printed. This is also the case with much of the wrapping paper, but the hand-made and the kinds used for general purposes is usually slit into smaller sheets. William Rittinghuysen established the first paper manufactory in America, in 1690, on a tract of land now included in Philadelphia. Wood pulp and wood fibers were first introduced by an American manufacturer about 1854, and as

a result the price of paper was greatly reduced. However, the vast increase in the consumption of paper and the limit of the supply of timber have caused the value to be enhanced materially. At present paper and wood pulp are used for many different purposes, including collars, articles of dress, car wheels, boats, water tanks and pails, and others quite similar, the processes of manufacture differing according to the purpose for which the product is designed.

The United States produces more paper than any other country in the world. In 1908 the total output was 3,096,696 tons. Other countries producing large quantities include Canada, France, Austria, and Italy. Among the states having large paper manufactories are Massachusetts, Connecticut, Pennsylvania, New York, Ohio, Minnesota, Kentucky, and New Jersey. Canada exports vast quantities of paper, wood pulp, and pulp logs. Ontario, Quebec, and British Columbia have extensive paper producing industries.

PAPER HANGINGS, or **Wall Paper**, a class of ornamental papers manufactured to decorate the walls and ceilings of private and public buildings, which are generally attached by pasting. Paper of this class was first manufactured in China, but it is now used extensively in all the civilized nations. The designs are printed mostly by machines, corresponding to the methods by which calicos are printed. A grade of paper having a velvety surface is called *flock paper*, and is made by fastening shearings of woolen cloths to the paper by means of varnish. The finest grades of paper are hand-painted, though these are rarely used except in the most expensive buildings. Some of the colors used in making paper hangings are highly poisonous and many are made of mineral substances.

PAPHOS (pā'phos), or **Papho**, the name of two ancient cities on the island of Cyprus, both probably founded by the Phoenicians. Old Paphos, now *Kuklia*, is located about a mile from the southwestern coast and is mentioned in the poems of Homer. New Paphos, the modern *Baffo*, is seven miles inland and was the capital of the island during Roman occupation. In this place Saint Paul struck Elymas, the sorcerer, with blindness and preached to Sergius, the proconsul, an account of which is found in the Acts of the Apostles.

PAPIER-MACHÉ (pā-pyā'-mā-shā'), a material made from pulp paper, or from pulp containing an admixture of size oil, resin, paste, or other sizing substances. It is produced to some extent from sheets of paper glued and pressed together. Many widely different meth-

ods are employed in making this product, but the most common species are prepared by pulping any kind or several kinds of paper into a mass of doughy consistency. To this earthy matters are added, such as sulphate of iron, glue, and quicksilver, to resist the action of water. It may be rendered fireproof to a considerable extent by adding a sulphate of soda and borax. Papier-maché is used for many purposes in the industries. In Europe pipes and snuff boxes are made of it. This material enters to a considerable extent into the manufacture of trays and lacquered boxes, especially in Persia and Turkey, and is variously used for tableware, desk furniture, and interior architectural ornaments. Other objects made of it include cigar boxes, tubes for drinking lemonade and other cold drinks, water pails, rims for bicycles, car wheels, utensils, doors, and matrices for stereotyping newspapers and books.

PAPILLAE (pá-píl'lē), the minute conical processes of the body that project from the true skin into the epidermis. They are vascular and nervous in their character. The sense of touch is exercised chiefly by the papillae of the skin, and the sense of taste is dependent upon the papillae of the tongue. Each single papilla projects above the skin or membranes. It may be divided or single, or may have a secretory function.

PAPUA (páp'oo-à). See **New Guinea**.

PAPYRUS (pá-pī'rūs), a genus of rushlike plants of the sedge family, growing in marshy places from rootstalks. The stem grows to a height of from six to fifteen feet. It is naked, except near the root, and at the top is a bunch of leaves formed much like an umbrella. The flowers occur on scaly spikelets and are surrounded by long bracts, and the seeds are three-cornered. In former times the papyrus plant was cultivated to a considerable extent in Lower Egypt, but it is now of rare occurrence in that region. At present it is found extensively in Syria, tropical Africa, and southern Italy. The ancients used it in preparing writing material as early as 2000 B. C. Many written rolls made of this product are still intact, some of the papyri extant dating from the sixth Egyptian dynasty. The preservation from remote centuries is due principally to the manner in which

it is prepared and to the peculiarly dry climate of Egypt.

Writings on papyri do not constitute bound books, but form extensive rolls made by pasting together different parts of the inner bark of the papyrus plant with a gummy substance under pressure, and they were often thickened by pasting several layers together. The writing was done with a pen made of reed, and with an oil and charcoal ink. Papyrus newly prepared has a whitish color and may be rolled with ease, but later it assumes a brownish tinge



PAPYRUS SWAMPS IN EGYPT.

and is quite easily broken. Many thousands of ancient writings committed to these papyrus rolls have been deciphered, and from some of them much information of historical value has been obtained. Different species of the plant are now of value in supplying materials for the manufacture of cordage, sandals, boats, sailcloth, wearing apparel, and utensils. A fine class of mats is made from a species common to India, and several inventors have used the fibers obtained from others in paper making.

PARÁ (pá-rä'), or **Belem**, a city in Northern Brazil, capital of the state of Pará, on the estuary of the Pará River, near the Bay of Guajara. It has a fine harbor, though its location is about 75 miles from the mouth of the river. The river channel is twenty miles wide at the city and sufficiently deep to admit vessels of the

largest size. Among the improvements are paved streets, waterworks, a botanical garden, a college, and a number of public schools. The principal buildings include the palace, the cathedral, and several fine churches. It has a vast export trade in India rubber, cotton, coffee, sugar, tobacco, cocoa, live stock, hides, and lumber. The manufactures include utensils, clothing, machinery, earthenware, and toys. It has imports of flour, cutlery, hardware, and cotton and woolen goods. The climate is healthful and the tropical atmosphere is tempered by sea breezes. In 1835 it was the seat of a revolution. The larger commercial progress of Pará dates from 1848. A large majority of the people are of Portuguese descent. Population, 1908, 98,647.

PARABLE (pär'ä-b'1), a short narrative intended to illustrate some principle in moral or religious teaching. Both the Talmud of the Jews and the Bible contain many parables. The story of the ewe lamb, told by Nathan to David, is a familiar parable of the Old Testament. Jesus taught his disciples and the multitude by the narration of parables, such as those of the Good Samaritan, the Talents, the Tares, the Ten Virgins, the Prodigal Son, the Mustard Seed, and the Rich Man and Lazarus.

PARACHUTE (pär'ä-shüt), an umbrella-shaped apparatus used chiefly by aëronauts in descending from balloons. It is constructed after the plan of an umbrella and is carried upward with the balloon in a closed condition, but when the aëronaut starts to descend it expands at the top, thus serving to moderate the velocity of the descent. Parachutes were first used in 1617. Since then many have been manufactured and successfully employed in descending great heights attained by balloons, and for descending precipitous mountains. However, they are not to be depended upon absolutely. In order to use a parachute successfully it is necessary to ascend a sufficient distance in order that it may open sufficiently and limit the descent to a safe velocity before the aëronaut reaches the surface.

PARADISE (pär'ä-dis), a word used by ancient writers to designate the hunting and pleasure parks of the Persian kings. Later it came to be applied by the Hebrews to the Garden of Eden, hence to signify the abstract idea of perfect felicity and heavenly blessedness. The later Jews applied the word to express the happiness of the righteous in a future state, in which sense it is used at present. Christians generally regard the celestial paradise as identical with heaven. It is in this sense that Christ spoke to the penitent thief upon the cross; "To-

day shalt thou be with me in paradise," Luke xxiii., 43. *Koran Gannah*, the paradise of the Mohammedans, is a place where the followers of the prophet are received after death.

PARAFFIN (pär'äf-fīn), a substance obtained by destructive distillation of bituminous shale, wood, coal, peat, and lignite. More recently it has been derived from petroleum and other liquid oils. It consists of a mixture of several hydrocarbons, has a waxy composition, and when pure is colorless and translucent. It has neither taste nor smell. Paraffin is manufactured extensively. The process includes heating bituminous shale in an iron retort for the purpose of condensing the tarry ingredients. These are next distilled and treated with chemicals, such as soda and acids, and afterward are distilled a second time. After the product is cooled, it is submitted to pressure for the purpose of separating the heavy oily substances that contain the paraffin and the latter is purified with naphtha, which is removed from it by pressure after cooling. Candles are made from refined paraffin, but with some grades a quantity of wax is mixed. The heavier oils obtained in distillation serve for lubricating machinery and the lighter are used in illuminating. Paraffin products are useful in water proofing, and serve as a protecting agency against atmospheric decomposition. To withstand the influence of the atmosphere, the obelisk in Central Park, New York City, was coated with paraffin in 1885.

PARAGUAY (pä-rä-gwī'), a river of South America, rises in the state of Matto Grosso, Brazil, and, after a general course of 1,750 miles toward the south, joins the Paraná at Corrientes. The valley of the Paraguay has extensive forests and much fertile land. In its upper course occurs the Marsh of Xarayes, a large region of southeastern Brazil, which in the rainy season forms an expanse of water fully 200 miles from north to south. The principal tributaries of the Paraguay include the Vermejo, Apa, Tacuari, Cuyabá, Jaura, and Pilcomayo. It is navigable to Cuyabá and forms a water course of much value to Paraguay and Brazil. Among the cities on its banks are Asunción, Tres Bocas, San Pedro, and Concepción.

PARAGUAY, a republic of South America, surrounded by Bolivia, Brazil, and Argentina. It is located entirely inland and is bisected by the Tropic of Capricorn. The eastern boundary is formed chiefly by the Paraná, which separates the southeastern part from Brazil, and the western border is formed almost entirely by the Paraguay and Pilcomayo rivers, which form

the natural boundary between it and Argentina. The length from north to south is about 375 miles, which is practically the same as its extent from east to west, though the general outline is irregular. It has an area of 97,722 square miles.

DESCRIPTION. The entire country lies in the basins of the Paraguay and Paraná rivers, and the general altitude is about 300 feet above sea level. A plateau extends through the eastern part, crossing the border from Brazil, but the hills and ridges are not higher than 1,600 feet. Large tracts of morasses and lagoons characterize the southern part, which has dense growths of semitropical vegetation. In the western part are low ridges that extend into the country from the Andes, but the surface is best described as a grassy plain.

The drainage is toward the south. Through the central part flows the Paraguay, which forms the southwestern border, and near Asunción it receives the Pilcomayo. The Aquidaban, a confluence of the Paraguay, drains the northeastern part. All of the southern section is tributary to the Paraná. The only lake of note is Ypoa and this is a body of shallow water.

The climate is hot during the summer, but refreshing breezes sweep across the country from the southeast. In winter, extending from May to August, the temperature ranges from 40° to 86°. The greatest summer heat occurs in January, when the thermometer registers 98° to 104°. Two seasons characterize the climate, the period of hot and the time of spring-like weather, the former extending from December to February and the latter making up the balance of the year. Rainfall is abundant, an average of 46 inches, and is confined chiefly to the growing period from August to November. The climate is healthful and favorable to Europeans.

RESOURCES. Vast forests skirt most of the hilly portion. Along the Paraná and Paraguay are occasional tracts of almost impenetrable timber, though some of the lowlands are treeless plains. The forests yield a large variety of excellent timber, including many species that are useful for cabinet and carpenter work. The timber products include gums, dyestuffs, tan bark, vegetable oils, and India rubber. Groves of bananas, orange trees, and yatais palms are abundant. Many wild animals are common to the plains and woods, such as the tapir, marten, deer, alligator, and lion or puma. Birds of song and fine plumage are abundant and the wading birds are well represented.

Minerals are not as abundant as in some of the more elevated countries of South Amer-

ica, and comparatively little has been done to develop the mining resources. Valuable deposits of copper and iron are known to exist. The coal and oil fields are extensive. Marble and granite are abundant in the north, and large deposits of clays are distributed throughout the country.

INDUSTRIES. Agriculture is the principal industry. The soil is noted for productiveness and fertility, but the cultivated area does not exceed 500,000 acres. Paraguay tea, or *yerba mate*, is grown in large quantities and much of the product is exported to other countries of South America. It is gathered from the wild shrub, or from the cultivated plant, and is used as a beverage as tea or coffee. Maize is the principal cereal, but considerable interests are vested in the cultivation of rice, wheat, and oats. Sugar cane, cotton, tobacco, coffee, and fruits are abundant. The orange is native to Paraguay and the product is used partly to fatten swine, but large exportations of this and other fruits are made. Cattle greatly exceed in number and value all other live stock and the herds are grown chiefly for meat. Other domestic animals include horses, swine, mules, sheep, goats, and poultry.

Manufacturing has not been developed to a considerable extent, but foreign capital is being invested in various industries under encouragement by the government. Rum is made from sugar cane juice and the country has several hundred distilleries for making spirits of different kinds. Sugar and cigars are produced in large quantities and tanning is receiving attention. Lumber products are quite numerous, especially furniture and farming utensils. Other manufactures include soap, clothing, brick, flour, matches, leather, and earthenware.

Communication is limited largely to navigation on the Paraná and Paraguay rivers, by which commerce has an outlet through the Rio de la Plata to the Atlantic. A railway extends from Brazil to Asunción and a number of branches have been built, but the total lines do not exceed 300 miles. The imports are somewhat less than the exports, and foreign trade is largely with Great Britain and Germany. Textiles and machinery make up the principal imports. The exports include fruits, leather, hides, live stock, quebracho logs, lumber, and ostrich feathers.

GOVERNMENT. The present constitution was ratified by a popular convention in 1870. It vests the executive authority in a president, who is elected by popular vote for four years and cannot be reelected to succeed himself.

In the exercise of his functions he is aided by the five cabinet officers of foreign affairs, war, finance, worship and justice, and the interior, all of whom are responsible to the legislature. The legislative authority is vested in a congress of two houses, a senate and a chamber of deputies, and the members of both are chosen by popular vote in districts, the senators for six and the deputies for four years. A supreme court is the highest judicial tribunal and subordinate to it are the inferior and magistrates' courts. Local government is administered in districts known as *departments*, which are subdivided into *cantons*.

EDUCATION. School attendance is nominally compulsory, but illiteracy among the adult population is about twenty per cent. The schools are supported by state and local taxation and a part of the public funds is used to maintain private schools. Near Asunción is an agricultural school and model farm. The national university is located at Asunción, at which about 250 students are in attendance. Roman Catholicism is the state religion, but religious worship is free to all classes. A number of libraries, scientific and educational associations, and parochial and denominational schools are maintained.

INHABITANTS. Encouragement is given to immigrants by the government, which has been the means of establishing several agricultural colonies. The foreign population consists chiefly of Italians, Germans, French, and Spaniards. Asunción, on the Paraguay, is the capital and largest city. Other cities include Villa Rica, Concepción, Carapegua, Paraguari, Villa del Pilar, and San Pedro. In 1905 the country had a population of 631,347, including 50,000 Indians.

HISTORY. The history of Paraguay begins with 1515, when it was explored by Juan Diaz de Solis. The first settlement was made at Asunción by a colony under De Mendoza in 1535. It was originally a possession of Spain and a government by Spanish Jesuits was established in 1608, but they were expelled in 1758 by a force from Brazil, which was supported by dissatisfied residents. Independence from Spain was secured in 1810 and the following year a consul was elected. The title of the chief executive was changed to dictator in 1814, which continued to be the official title until 1844, when Don Carlos Antonio Lopez secured an election as president for ten years. In the early administration of this official commercial intercourse was made free to all nations. He remained the president until his death, in 1862. His son, Don Francisco, succeeded him and

took steps to conclude commercial treaties with the United States, Brazil, France, Germany, England, and other countries. A war with Brazil began in 1864, which terminated in 1870 by the death of the president. A more liberal constitution was adopted in the same year. Asunción was the seat of an international agricultural exposition in 1907.

PARALLAX (pär'al-läks), the apparent displacement of a heavenly body due to a change in position of the observer. The angle subtended at the body by the line adjoining the two stations is the measurement of the parallax. The displacement is greatest in the horizon, where it is termed *horizontal parallax*. *Annual parallax* is the variation of a star's place by being observed from opposite points of the earth's orbit. This is so extremely small, notwithstanding the great length of the base line, that it was long difficult to determine the extent of it, or even that it existed. Tycho Brahe considered the apparent absence of stellar parallax to be fatal to the theory of Copernicus, that the earth has an orbital motion. Galileo demonstrated the problem by observing two stars of different magnitudes situated near each other, and this method has been used successfully by modern observers. Astronomers now measure, by the aid of trigonometry, the distance of the heavenly bodies from the earth, since the angle of the parallax depends upon the distance of the body from the observer.

PARALLELOGRAM OF FORCES (pär'al-läl'ö-gräm), a term applied in physics to a parallelogram, two of whose adjacent sides represent in magnitude and direction two vector quantities, as forces or accelerations. The diagonal of the parallelogram drawn from their junction represents the resultant of the two forces.

PARALYSIS (pä-räl'i-sis), or **Palsy**, the partial or total loss of motion or sensation, due to an interruption or destruction of the nervous influence necessary to those acts. It may affect only certain parts of the body, as in certain limbs, or may extend to all the organs. Paralysis sometimes affects the nerves of the special senses, causing blindness, deafness, the loss of smell, or the loss of taste. The loss of the sense of touch or feeling, known as *anaesthesia*, is rare, but it is sometimes partial in connection with the loss of motion. Apoplexy, or paralytic stroke, which is a common form of paralysis, often results in a partial or total loss of motion on one side of the body, especially in the limbs and the muscles of the face and tongue. It may be due to pressure upon a

nerve center caused by a clot of blood in the brain, or to certain mineral poisons, such as preparations of lead and arsenic. In general, paralysis may be said to be a symptom rather than a disease. Diseases of the brain and spinal marrow produce the most numerous and severe cases of paralysis.

PARAMARIBO (pär-ä-mär'ī-bō), the capital of Dutch Guiana, on the Surinam River, about twelve miles from the Atlantic Ocean. It is regularly platted, the streets intersecting each other at right angles, has an extensive harbor, and is the principal commercial center of the possession. The chief buildings include a governor's palace, several fine churches, a number of schools, and a college. It has many fine gardens and parks and the streets are covered with shell sand. The climate is moist and somewhat unhealthful. Among the principal manufactures are sugar, clothing, rum, molasses, chemicals, and textiles. The trade of Dutch Guiana is centered entirely at this place. Population, 1907, 35,508.

PARANÁ (pä-rä-nä'), a river of South America, the next in size to the Amazon, having a length of 2,500 miles and a basin of 1,240,000 square miles. The source is in the southern part of Brazil, where it is formed by the junction of the Paranaíba and Rio Grande rivers. It has a general course toward the southwest until it is joined by the Paraguay, near Corrientes, where it makes a bold curve and flows west of south to Santa Fé, where it assumes a southeasterly course, and near the southwestern corner of Uruguay it enters the estuary of the La Plata. The Paraguay is its principal tributary. Other tributaries include the Salado, Tiete, Mogy, Ivahy, Iguassú, and Paranapanema. The Paraná River exceeds in size all the rivers of America except the Amazon and the Mississippi, and is larger than any of the great rivers of Europe. Near the entrance of the Iguassú are rapids, extending about 100 miles, but it is navigable for more than 700 miles, and thus forms an important course for navigation. In its valley are vast forests of deciduous trees. The fisheries are productive, yielding many species of fin and shell fishes.

PARAPET (pär'ä-pët). See **Fortification**.

PARASITES (pär'ä-sīts), a term applied to forms of life which subsist on other living organisms. Animal parasites attach themselves to the exterior or interior portions of other animals, where they feed and take from them nutritious substances already assimilated in a large measure. Some forms of parasitic animals secure nothing more than an abode, while true parasites feed upon and live from the substance

of the animals which they infest, such as hydrachnids, tapeworms, flukes, body lice, and bird lice. Parasitic plants subsist and receive nourishment from other plants, but the list includes a number that subsist on animal tissues, these being generally called *entophytes*. On the other hand, *epiphytes* are different from parasitical plants in that they subsist merely on decayed particles of the bark and other parts that do not constitute a portion of the living plant. The most important parasitical plants include the small fungi, such as smut, rust, and brand. The mistletoe and a number of other plants that have evergreen leaves are among the larger forms of this class. Other forms having scales instead of leaves include the broom rape and dodder.

PARASITIC DISEASES (pär-ä-sīt'ík), a subdivision in the classification of diseases, which are produced by parasitic plants or animals. The organisms which give rise to these ailments are low in the scale of life and find lodgement in some tissue or organ, or in some cases upon the surface of the body. Ringworm is caused by a vegetable parasite, while the trichina, the tapeworm, and the louse are parasitic animals that produce diseases or a diseased condition.

PARCHMENT (pärch'ment), a material for writing, obtained from the hide of a sheep, she goat, young calf, or some other animal having a thin skin. The ancients prepared writing material of this class as early as 500 years B. C. In the time of Herodotus it formed an important material in book making. Parchment is prepared by removing the hairs from the skin, after which it is stretched over a frame for the purpose of removing the fleshy parts by scraping, care being taken to have it entirely free from wrinkles. It is next reduced to about one-half its former thickness by rubbing with slacked lime and a pumice stone. Transparency and toughness are secured by placing it for a short time in a solution of sulphuric acid. Drumheads are made from wolf skins and sieves from the skins of goats. Vellum is a fine parchment made from the skins of kids and calves. A substance known as *paper parchment* was invented in 1847. It is used for legal and other documents, especially for some kinds of maps and diplomas.

PARDON, an act of grace by which the chief executive of a municipality or state remits the penalty for a crime. Reprieves, commutations, and pardons are in most cases granted only by the governor of a province or state, or some official equivalent to that officer, such as the lieutenant governor in the provinces of Canada.

A *reprimand* is the postponement of the execution of a sentence, and a *commutation* is a change from the penalty inflicted to something less severe. Pardons are either absolute or conditional and in the latter case they are usually dependent upon the future conduct of the person pardoned. In some states it is necessary to have the concurrence of one branch of the legislature, while in others the whole subject is referred to a board of pardons, of which the governor is an *ex-officio* member.

PARENT AND CHILD. See **Infant.**

PARHELION (pär-hēl'yŭn), a mock sun which appears in the form of a bright light, sometimes near the sun and sometimes opposite to it. It is tinged with colors like the rainbow and is due to certain modifications which light undergoes when coming in contact with small particles of moisture, such as drops of rain or crystals of ice. In some cases several mock suns appear at the same time, known as *parahelia*, which are connected by halo or a white circle. See **Halo.**

PARIA (pä'rê-à), **Gulf of**, a body of water in South America, on the coast of Venezuela, extending inland from the Atlantic Ocean. It is 40 miles wide by 100 miles long. The Paria Peninsula separates it from the Caribbean Sea, while the island of Trinidad lies between it and the Atlantic. Columbus explored the vicinity in 1498. A branch of the delta of the Orinoco flows into the gulf.

PARIS (pär'is), a city of Illinois, county seat of Edgar County, 170 miles south of Chicago, on the Vandalia Line and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. In its vicinity is a fertile agricultural and dairying country, which contains deposits of bituminous coal. The noteworthy buildings include the county courthouse, the high school, and many fine residences. Among the manufactures are ironware, machinery, carriages, flour, and utensils. Paris has good municipal facilities, including waterworks and sanitary sewerage. The place was platted in 1825 and incorporated in 1849. Population, 1900, 6,195; in 1910, 7,664.

PARIS, a city in Texas, county seat of Lamar County, 98 miles northeast of Dallas, on the Texas Midland, the Texas and Pacific, the Atchison, Topeka and Santa Fé and other railroads. It is surrounded by a fertile farming, fruit-growing, and stock-raising country. The principal buildings include the post office, the county courthouse, the high school, the public hospital, and many churches. Among the manufactures are machinery, canned goods, flour, artificial ice, furniture, wagons, cotton products, and farming implements. The general facilities in-

clude pavements, electric lighting, waterworks, and sanitary sewerage. It was settled in 1841 and was chartered as a city in 1889. Population, 1900, 9,358; in 1910, 11,269.

PARIS, the capital and metropolis of France, in the department of Seine. It occupies a fine site on the Seine River, 108 miles from its entrance into the English Channel. The larger part of the city is on a level plain, about 200 feet above the sea, and is surrounded by low hills that rise fully 200 feet above the common level. The river has a course of eight miles in the city and is connected in various directions with canals, thus affording a fine system of navigation. Many important railway lines enter the city, providing transportation facilities to all parts of Europe and giving Paris the advantage of being the most noted railroad center of France. Lines of electric railways afford access to all urban and many suburban points, and connected with these are interurban lines that communicate with the leading cities of northern France. Near the borders of Paris are the beautiful suburbs of Boulogne, Neuilly, Vincennes, Gentilly, Pantin, Aubervilliers, Charanton, and a number of others. On the western border is Fontainebleau, noted for its fine palace and art collections. A large part of the traffic within the more thickly settled business section of the city is carried by an underground railway, one of the most extensive and finest equipped in the world.

FORTIFICATIONS, BRIDGES, ETC. A line of fortification 22 miles in length surrounds the city, and outside of it are forts arranged in two main lines. The outer wall is strongly fortified, but may be entered by a number of gates. The Seine is from 425 to 525 feet wide. It incloses within the city three islands, known as La Cité, Cygnes, and Saint-Louis, and embankments and quays protect the city from inundations. These embankments provide excellent boulevards, but the improvement known as the *Boulevard* forms an irregular arc on the north side of the Seine, extending from Place de la Madeleine to Place de la Bastille. Many beautiful bridges cross the river, including a number that have been used in traffic from 300 to 400 years. A number of these bridges have historical significance, having been built at intervals by the kings and other chief executives of France. Groups of trees and parkways adorn many of the bridges and quays, thus affording both convenience and pleasure to the populace.

CONSTRUCTION, UTILITIES, AND PARKS. Most of the houses in Paris are built of white calcareous stone and the usual height is from five to seven stories, each floor being arranged in

compartments for separate tenement dwellings. The older part of the city is grouped largely in the vicinity of the Ile de la Cité, which contains the Cathedral of Notre Dame. Here the streets are irregular and narrow, but in the newer part they are wide, regular, and well paved. Public lighting with gas and electricity is general in all parts of the city. The pavements are well constructed of stone, macadam, and asphalt. Many electric railways and tramway lines connect the central part of the city with the suburbs. An adequate supply of water is secured from the Seine and Marne rivers, from artesian wells, and the Ourcq Canal. Paris has a larger number of beautiful parks than any other city in the world. The principal ones include Place Vendome, in which is located a column and statue of Napoleon I.; Place des Vosges, containing the statue of Louis XIII.; Place du Carrousel; Place de la Republique, with the republic statue; Place de la Bastille, containing the column in commemoration of July, 1830; Place de Rivoli, containing the equestrian statue of Joan of Arc; Place de Chatelet, containing the column commemorative of the Italian campaign of 1796; Place Moncey, with a monument to commemorate the defense of Paris in 1814; Place de l'Etoile, with the arch of triumph; and Place de la Concorde, a large and beautiful public square.

MONUMENTS AND GARDENS. Paris as a whole is rich in statues and monuments, which collectively represent the most important events of French history, including both the grandeur of its victories in battle and the achievements in the arts of peace. It has numerous public gardens laid out with more than the usual taste and they are cared for with remarkable skill. The Gardens of Tuileries are within the city, where may be seen statues and fountains of great beauty, and the Luxembourg Gardens are in front of the palace and contain a great variety of rare plants and a number of conservatories. Other fine public gardens include the Jardin des Plantes, the Buttes-Chaumont Gardens, and many others. Père la Chaise is a celebrated cemetery, covering 107 acres, and contains many splendid monuments and tombs. The ancient quarries known as the Catacombs lie under a region in the southern part of the city. Many buildings of historical value were destroyed by the Commune in 1871, but they were replaced with much care soon after the war.

SCHOOLS AND LIBRARIES. The educational institutions of Paris take high rank among those of modern Europe. Kindergarten, elementary, and grammar schools are maintained in all parts of the city. Besides these, the city has a fine

system of colleges and other institutions of higher learning. The Academy of the Sorbonne ranks among the most noted of the higher institutions. Other institutions include the University of Paris, a famous center of learning established in the 13th century, the College of France, the École Polytechnique, the École des Beaux Arts, and the schools of Saint Louis, Charlemagne, Descartes, Corneille, De Vanves, Fontanes, and many others. It has a vast number of splendid hospitals, excellent zoölogical and botanical gardens, museums of natural history, lecture rooms, and various professional, scientific, and religious institutions. The most noteworthy library is the Bibliotheque Nationale, which contains 2,295,000 volumes of printed books, 3,000,000 pamphlets, 200,000 manuscripts, and 6,500 portfolios of engravings. Other noted libraries are connected with the universities, colleges, public schools, and other institutions. Many learned societies have their seat in Paris, including the celebrated Institute of France. The theaters are classed among the finest in the world, including such renowned institutions as the Opera Comique, the Theatre Dramatiques, the Theatre Francais, the Folies Dramatique, and the Odeon. It has valuable collections of works of science, fine arts, and history, and a splendid museum of artillery.

PUBLIC BUILDINGS. Paris has a large number of magnificent public buildings and palaces. The Louvre is occupied by a museum and is on a site that was formerly the seat of a castle built in the 13th century. The palaces include the Tuileries, a splendid structure partly destroyed by the Commune, but subsequently restored, the Palais Royale, the Palais du Luxembourg, the Palais de Justice, the Palais de la Elysee, and the residence of the president. Other noted buildings include the Cathedral of Notre Dame, founded in the 12th century, the Hôtel des Invalides, a retreat for disabled soldiers, which contains the burial place of Napoleon I., the Hôtel de Ville, the Tribunal de Commerce, and the Eiffel Tower. The last mentioned is the highest building in the world. It is constructed of iron lattice work, 984 feet high. Paris has many beautiful churches of historical interest, including the Pantheon, the Madeleine, the l'Oratoire, and the Saint Vincent de Paul. Others of special interest include Saint Germain des Pres, an ancient structure dating from 1163; the Sainte Chapelle, built by Saint Louis in 1245, in which he placed several relics brought from the Holy Land; and the Sacred Heart, on the heights of Montmartre.

INDUSTRIES. The manufactures include a large variety of commodities, such as cotton

and woolen goods, carriages, lace, embroidery, scientific instruments, artificial flowers, silk textiles, leather products, sugar, chemicals, tobacco, clothing, machinery, engines, and utensils. Paris is noted for its production of a vast variety of ornamental commodities, including jewelry, combs, fine handkerchiefs, perfumery, and many others. The tobacco factories are chiefly in the hands of the general government, as well as large interests in printing, dyeing, knitting, and weaving. Many books and periodicals are published regularly. Paris is the financial center of France and one of the most important of Europe. It has long held a high rank as a center of fashion. As a wholesaling and jobbing center it holds the first place among the cities of France. It has a large trade in merchandise, fruits, clothing, cereals, and spirituous liquors.

GOVERNMENT. Paris is divided into twenty districts, or *arrondissements*, for the purpose of administering its government. The chief executive, known as the prefect of the Seine, is appointed by the federal authorities of France. Each district has four members of the municipal council, which is composed of eighty members, and these are chosen by a direct vote of the people. A mayor and two assistant councilors are the chief executive officers of each district. The assessment of property, collection of taxes, granting of licenses and privileges, administration of the schools and libraries, and other duties pertaining to the government of the city are administered in the districts, subject to review and revision by the municipal council. All parts of the city are kept unusually clean from filth. It has an efficient fire brigade and a system of policing. The public utilities are largely owned and operated by the city, including the waterworks, markets, slaughterhouses, cattle yards, drainage system, and a number of the cemeteries. Much care is exercised to protect public health and to keep the city well lighted and as free from smoke as possible. Few large cities have as fine a cab service and none is better supervised with a view of protecting life against the dangers of congested streets. Conveyance by automobiles is nowhere more extensive, but the speed limit is carefully enforced, except in the wider and longer boulevards.

POPULATION. Although Paris is visited by many tourists at all seasons of the year, only about ten per cent. of the people are of foreign birth. A large majority are Roman Catholic, or nominally supporters of that faith, the Protestants numbering only 525,000 and the Jews 25,000. Rapid growth in the number of in-

habitants dates from the early part of the 19th century, when the manufacturing and industrial enterprises attracted a large influx of people. Though the city is much smaller than London, its density to the square mile is nearly twice as large. In 1817 it had 714,000 inhabitants, and in 1851 it had 1,053,000. Population, 1906, 2,763,393.

HISTORY. The first historical information obtainable in relation to Paris indicates that its ancient site was confined to an island in the Seine, on which a tribe of Gauls, known as the *Parisii*, had their principal seat. These people occupied themselves in rude agriculture and fishing in the Seine. The city was afterward named from this tribe. The Romans under Caesar conquered the *Parisii* and their island town became known as *Lutetia*. In 53 B. C. it became an important Roman seat of influence and later was strongly fortified by the Romans. Julian was stationed here in 360 A. D., when he was summoned as emperor by the soldiers, and shortly after the place was named Paris. The Franks conquered it about 508, when it was made the seat of government by Clovis. It ceased to be the capital in the time of Charlemagne, but Hugh Capet established a dynasty, in 987, and converted the capital of the duchy of France into the capital of the kingdom, and since then it has remained the seat of government. From that time the population increased without intermission.

In the time of Philip Augustus, in 1200, Paris became the seat of a university, which for many years flourished as the most famous in Christendom, and the city ranked second only to Constantinople. Robert de Sorbon, a priest, founded the celebrated Sorbonne in 1253, which aided in attracting many students to Paris. A pestilence and famine spread desolation in the reign of Charles VII., in 1437-38, but with the ascension of Louis XI. prosperity returned and vast improvements were instituted. Henry IV. and Louis XIV. graded many of the streets, constructing much of the boulevard improvements still remaining. They established educational institutions and systems of drainage, sewerage, waterworks, and pavements. The Bastille fell in 1789. Shortly after the ascension of Napoleon vast sums of money were spent in building arches, bridges, public squares, and gardens.

Napoleon III. did more than any other sovereign to improve Paris and modernize it by straightening and widening its streets and establishing a system of lighting. He caused the institution of public squares, fountains, zoölogical and botanical gardens, and many splendid

monuments. These improvements were followed by the International Exhibition of 1867, when Paris ranked among the finest cities in the world. A vast army of Germans laid siege to the city at the time of the Franco-German War, in 1870-71, but exercised care in preserving the institutions of value and beauty. The destruction resulting from this war is to be attributed to the Commune, under whose influence many fine monuments and buildings were destroyed, but these have been restored with marked care, and many other excellent improvements have been effected. The most noteworthy include the opening of new thoroughfares, the establishment of the Champs de Mars, in which the Eiffel Tower is situated, and the building of electric railway lines. Paris has been the seat of the finest international exhibitions, the most noteworthy being held in 1855, 1867, 1878, 1889, and 1900. The exhibition of 1889 was instituted to commemorate the centenary of the French Revolution and was attended by 25,000,000 persons, while the great exposition of 1900, intended for a universal exhibit of works of art, science, mining, and agriculture, was attended by 50,120,540 people.

PARIS, Treaties of, a number of important treaties made at Paris, France. The Peace of Paris concluded on Feb. 10, 1763, ceded all the possessions east of the Louisiana Territory, Canada, and Nova Scotia from France to Great Britain. The treaty of Feb. 6, 1778, was made between the United States and France. By its terms the latter country recognized the independence of the thirteen colonies. The so-called First Peace of Paris, having reference to Napoleon I., was concluded on April 11, 1814, and by its terms Napoleon was banished to Elba. The so-called Second Treaty of Paris followed the return of Napoleon from Elba and his 100 days of empire. It was concluded in 1815. This treaty reduced the territorial limits of France and provided for its occupation by a foreign army. The Declaration of Paris, ratified on March 30, 1856, concluded the Crimean War and made provision in regard to the goods of non-combatants confiscated during the time of war. The treaty that concluded terms of peace between Spain and the United States was signed in Paris on Dec. 10, 1898, and provided for the relinquishment by Spain of the islands of Cuba, Porto Rico, and the Philippines, the United States paying \$20,000,000.

PARIS, University of, an educational institution of higher learning in Paris, France, one of the most celebrated universities in the world. It is the outgrowth of several schools that rose to prominence in the 12th century, when thou-

sands of students and scholars came to Paris from many countries of Europe. Extended difficulties arose between the students and citizens of Paris in 1229, when many of those in attendance left France to attend universities in England and Germany, but Pope Gregory IX. came to the relief of the institution in 1231, when the attendance greatly increased. By the 15th century it rose to much prominence in university work and both princes and popes vied to gain friends among its masters. When France became involved in civil and foreign wars, the institution began to decline, and it was further injured by the establishment of many professional and literary schools throughout Europe. Napoleon reorganized it shortly after the revolution, when it was known as the Facultés de Paris, but its present name was assumed in 1896.

At present the university comprises seven faculties. These are the council of the university, the Protestant theological faculty, the law faculty, the medical faculty (which embraces the Dupuytren Museum), the faculties of science and letters at the Sorbonne, and the school of pharmacy. The library contains 475,500 volumes. In 1908 it had an attendance of 12,250.

PARK CITY, a city of Utah, in Summit County, thirty miles southeast of Salt Lake City. It is on the Union Pacific and the Rio Grande and Western railways and is surrounded by a rich silver-mining district. The industries include quartz mills, machine shops, and brick-yards. It has several fine schools and churches. Population, 1900, 3,759.

PARKERSBURG, a city in West Virginia, county seat of Wood County, on the Ohio River, 98 miles southwest of Wheeling. It is on the Baltimore and Ohio, the Ohio River Line, and other railroads. The surrounding country contains extensive deposits of petroleum and produces cereals, grasses, tobacco, and fruits. It has two large bridges, one across the Ohio and one across the Kanawha, which joins the Ohio within the city. The principal buildings include the county courthouse, the Washington High School, the Federal building, the public library, and the Academy of the Visitation. Other features are the public park and the Blennerhasset Island, where Harman Blennerhasset lived. Among the manufactures are machinery, furniture, lumber products, chemicals, ironware, refined oil, boilers, and hardware. The city has a system of public lighting, substantial pavements, waterworks, and other municipal facilities. It was settled in 1773 and incorporated in 1820. Population, 1900, 11,703; in 1910, 17,842.

PARLEMENT (pär'le-mənt), the name applied to a number of local bodies in France before the Revolution, of which the Parlement of Paris was the most celebrated. These bodies originated from similar tribunals of the Frankish kings and their functions were judicial rather than legislative, although they exercised a modified form of both legislative and administrative power. In general the parlements opposed the kings of France, hence Louis XV. abolished the Parlement of Paris. Later, in 1790, these bodies were abolished and superseded by the National Assembly.

PARLIAMENT (pär'li-mənt), the supreme legislature of the United Kingdom of Great Britain and Ireland, consisting of the *House of Lords* and the *House of Commons*. The name was first applied in France to signify a general assembly of the state about the middle of the 12th century, under Louis VII., but the body itself originated from the ancient Teutonic system of popular representation in government. After the Norman conquest, in 1066, the national assembly was transformed into a selected royal council dominated by the king, but the lost powers were regained from time to time, and in 1215 it became recognized in the Magna Charta as the supreme legislative body of the kingdom. However, the present legislative body of Great Britain properly dates from 1265, when two knights from each shire and 21 burgesses, or citizens, from the boroughs, or cities, were summoned by the king to meet at Westminster. The next year, in the reign of Henry III., the name *Parliament* was applied to it, and in the middle of the 14th century, in the reign of Edward III., the separation of the two houses into lords and commons occurred. It may be said that no Parliament existed between 1461 and the middle of the reign of Henry VIII., that being the period when the long struggle between the Stuarts and the Parliament occurred, which terminated in a long civil war and the execution of Charles I. Under William III. full powers were again restored to Parliament and since 1716 its legal period of duration has been seven years. In 1801 the Irish Parliament was dissolved by the Act of Union, when it was provided that Ireland should have 28 members in the House of Lords, to serve for life, and 100 members in the House of Commons, to be elected.

Parliament is convened by the sovereign, who appoints the time and opens the proceedings by the delivery of an address, either personally or by deputy. The Parliament at present is composed properly of three bodies, the *lords spiritual*, the *lords temporal* and the *commons*. The

lords spiritual constitute the clergy and originally sat in both houses, but in modern times their representation is wholly in the House of Lords. Besides the clergy, the House of Lords is made up of peers created by the crown and hereditary peerage. The number of peers in 1907 was 616. This body is presided over by the chancellor, who is the keeper of the great seal. The right to originate bills to provide revenues is denied the Lords; in this respect it is similar to the American Senate. The House of Commons has 670 members, of whom 490 represent counties and boroughs and five universities in England and Wales; 70, counties and boroughs and two universities of Scotland; and 101, counties and boroughs and two universities of Ireland.

The House of Commons selects its own speaker from its membership. Members of neither house receive a salary. Each house can adjourn for a short time, but neither can be terminated except by the sovereign, and each may form its own rules. A quorum in the lower house is made up of forty members, while the upper house has no prescribed quorum. The sovereign has the right to approve or veto a bill, but the right of veto is rarely exercised. The legislative authority extends to all the colonies and possessions. A dissolution is caused by a ministerial crisis, when a new body is elected by appealing to the people. The powers of Parliament are numerous, being influential to a large extent over the sovereign. It can destroy any ministry and alter the succession to the throne, a course taken by it in several instances, and it has also changed the national religion.

The American colonies seriously questioned the right of Parliament to legislate for them. James Otis in 1761 asserted that Parliament did not have the right to tax the colonies for the reason that they were not given representation in that body. A general protest was made against the stamp act in 1765, and shortly after the Revolutionary party took the position that Parliament had no right whatever to legislate for the colonies. The Parliament of 1768-74 was noted for its opposition to popular rights both in England and America and by its policy greatly hastened the Revolution. The Massachusetts Charter Act, Boston Port Act, Quartering Act, and Quebec Act were among the most objectionable. They operated to mold the spirit that finally caused American independence. For the Parliament of Canada see **Canada**, subhead GOVERNMENT.

PARLIAMENTARY LAW, the rules of procedure recognized as the basis of government

in deliberative assemblies. These rules, as the name implies, were derived from the practice of the English Parliament, but they have been gradually modified in practice to adapt them to the needs of various bodies and organizations. The purpose is to govern these assemblies in the transaction of business, and to permit the free and orderly discussion of questions before them for consideration. Unless otherwise provided, a *majority* of any assembly constitutes a *quorum* for the transaction of business, but a smaller number may meet and adjourn from time to time until the attendance of a sufficient number can be obtained. The presiding officer is charged with the duty of preserving order and enforcing the rules and order of business. In most cases he must be a member of the body over which he presides and as such is entitled to a vote, but officers who are not members, such as mayors who preside over town or city councils, usually have no vote unless there is a tie, when he may cast the deciding vote.

All business brought before a deliberative assembly must be introduced by a *motion*, or *resolution*, and no motion is considered complete unless it is supported by a *second*. Even a resolution requires the support of a motion and a second, this being necessary to show that it is supported by more than one member. The chairman, after hearing the motion and the second, states it in full, after which the subject under consideration is open for *discussion*, but the maker of the motion usually has the right to speak first. No other question can be considered while the motion is before the assembly, and the discussion must be relevant to the subject under consideration. Usually the time each member may speak is limited and no one can speak more than once, unless upon consent of a majority. After concluding the discussion, the presiding officer calls for the *vote*, which may be by voice, those favoring the motion voting *aye* and those opposing it, *no*. In some cases a record is made by calling the *roll*, while in others the decision is by a rising vote or by ballot.

A number of *subsidiary motions* are permitted while a motion regularly made and seconded is being considered, and these take precedence of all others, being designed to postpone the discussion or suppress further consideration of the question. These include a motion *to lay the motion on the table*, which cannot be debated and is intended to postpone action until some future time, when it may be taken up by the assembly. When the *previous question* is requested, all debate is stopped and a vote is immediately taken, but its adoption requires a vote

equal to two-thirds of the body. A motion to refer to a committee, or to postpone action until a certain time, is in order in the regular course of business. While a motion may be amended, it is not permitted to amend the amendment, but a motion to substitute some other motion is permissible. Another means of preventing or delaying action is to move that the motion be *postponed indefinitely*. An objection to the proceedings, a motion to suspend the rules, and an appeal from the decision of the presiding officer are questions that must be disposed of immediately. Privileged questions, such as motions to adjourn, to fix a time for adjournment, to determine the rights of the assembly or its members, and to require that the proceedings be conducted according to the regular order of business, take precedence over any other question. Where an assembly regrets any action that it has taken, the vote may be *reconsidered*, when the *original question* is before the assembly and must be disposed of before any other motion can be made. If it is too late to reconsider the vote, a majority can *rescind* it, which is equivalent to reconsideration.

PARMA (pär'mà), a city of northern Italy, capital of the province of Parma, on the Parma River, 71 miles southeast of Milan. It is beautifully situated in a fertile region of the Lombard plain, about 12 miles south of the Po, has railroad connections with other trade centers, and is noted for its excellent public buildings. Among them is a fine cathedral, the Church of San Giovanni, the Church of La Steccata, the ducal palaces, and the Baptistery. It has a fine public school system, a noted university, several colleges and museums, and a public library of 300,000 volumes. Among the manufactures are cotton and woolen goods, silk textiles, clothing, paper, earthenware, soap, and wearing apparel. Parma was founded by the Etruscans and in 183 B. C. became a Roman possession. It was the residence of Petrarch from 1341 to 1342. Population, 1906, 51,403.

PARNAHIBA (pär-nà-ē'ba), a river in northeastern Brazil. It rises near the boundary of the province of Goyaz and, after a course of 800 miles toward the northeast, flows by a delta into the Atlantic Ocean. It has a number of large tributaries and at several places in its course are cataracts. The basin is a highly fertile region and much of its course is navigable.

PARNASSUS (pär-näs'süs), a snowcapped mountain range of Greece, in Phocis, 64 miles northwest of Athens. The highest peak is Mount Lycorea (now Liakoura); height, 8,075 feet. It rises over the town of Delphi in two

prominent peaks and is celebrated in history as the seat of Apollo and the Muses. The oracle of Delphi and the fountain of Castalia were situated on its southern slope, and the worship of Bacchus was celebrated on its highest peak. In Mount Lycorea was the Corycian cave, sacred to Pan and the Muses.

PARODY (pär'ō-dy'), a composition in prose or verse, intended to turn a serious composition into humor or ridicule. While it preserves the form and style, it either substitutes for the original an entirely different composition, or alters the construction so as to convey a ludicrous sense. This style of writing is very ancient and was probably invented by the Greeks, at least the oldest parody is said to be Homer's "Battle of the Frogs and Mice." The following stanza from a well known parody on Longfellow's "A Psalm of Life" will serve as an example:

"Life is short, and youth is fleeting,
And our hearts, though stout and brave,
Still, like muffled drums, are beating,
Wedding marches to the grave."

PAROS (pā'rōs), or **Paro**, an island in the Greek Archipelago, one of the Cyclades, situated west of Naxos, from which it is separated by a channel about five miles wide. The island is fourteen miles long and nine miles wide. It has a mountainous surface. Mount Saint Elias, its highest peak, is 2,535 feet above sea level. The coast regions and valleys are fertile. The products consist of cotton, honey, wax, vegetables, fruits, poultry, and sheep. It is famous for its marble and contains many valuable antiquities. The Cretans first colonized it, but it was annexed subsequently by the Persians, and here Miltiades received his fatal wound after the Battle of Marathon. Naussa, on the north coast, is the principal seaport and Parikia, on the west coast, is the largest town, having a population of 2,250. The island has a population of 7,825.

PARRAKEET (pär'ra-kēt), or **Paroquet**, the name of a group of parrots, distributed more or less widely in all the continents. They have a long tail and a moderate bill, and walk more easily upon the ground than the common parrot. This class of birds is found in large numbers in Australia and New Zealand, where the *crested parrakeet* is admired for its elegant form and beautiful yellow plumage. The common parrakeet of North America extends from North Carolina to Central America and sometimes moves northward as a summer visitor. These birds are noisy and tame, hence fall an easy prey to their enemies.

PARROT (pär'rüt), a genus of tropical birds classed with the climbers. The genus includes many beautiful species, most of them being distinguished by their brilliant and gaudy plumage. They have a hooked bill and live



GRAY PARROT.

largely in trees, in which the bill aids them in climbing. On the ground they are peculiarly awkward. The food consists mostly of seeds and fruits, but some species feed on the tender parts of plants and bulbs. In size they vary from the *love birds*, a species not larger than sparrows, to the *great macaw*, which is fully three feet in length. They are seen principally in flocks, build their nests in trees, and attain to a great age, often from 50 to 75 years. The voice is coarse and harsh, and they can be taught to imitate speech with peculiar exactness. Though docile and affectionate when domesticated, they show an irritable temper when aggravated. The *gray parrot* is a native of West Africa and develops a high degree of skill in imitating the human voice. The *Carolina parrot* is native to the United States and the *green parrot* is found in South Africa. Other species include the *cockatoo*, *lory*, *parrakeet*, and *lorikeet*. See **Cockatoo**; **Parrakeet**.

PARSEES (pär'sēz), **Fire Worshipers**, or **Guebres**, the name by which the modern followers of Zoroaster are known. Their religion is founded upon the dogma that there are two primeval causes of the real and intellectual world—the *Vohu Mano*, or Reality, and the *Akem Mano*, or Nonreality—while their moral philosophy is based on the trinity of Thought,

Word, and Deed. From the theory of the two primeval causes of reality and nonreality developed, after the time of Zoroaster, the supposition that there are two gods to be worshiped, one of good and the other of evil. That the soul is immortal was one of the principal tenets long before that belief came to be general among the Semites, and they had a conception of future reward and punishment much in advance of the Hebrews. The good deity is known as Ormuzd, or Ahurâ-Mazda, whose symbol is fire, and on this account they hold a flaming fire in great reverence. Their religion spread rapidly throughout Asia. At the time Alexander the Great invaded Asia their priests numbered fully 40,000 and their sacred book, the Zend-Avesta, was widely circulated. The Persians under Artaxerxes looked with favor on the religion of Ormuzd mainly to secure the influence of the Parsees. It flourished until in 651 A. D., when the Persians were defeated near Ecbatana by Caliph Omar, after which they suffered greatly under the extensive persecutions of the Mohammedans.

Many of the Parsees fled to India in the early part of the 8th century, where fully nine-tenths of the followers of that religion now reside. Among the peculiarities are included the custom of not eating any food cooked by a person of a different religion. Their food is largely vegetable; their worship is in fire temples, in which altars are maintained and the sacred fires are burning continually; and they recognize only their own caste and creed in contracting marriage. They do not bury their dead, but expose them on a so-called *temple of silence*, where vultures devour the flesh and the bones fall through a grating into a pit below. These towers are about 25 feet high, and the corpse is placed on the grate through a door at the side of a wall that surrounds the upper portion. The Parsees are considered the most hospitable and industrious class of India, and a large per cent. of the business is at present in their hands. The latest estimates place the number of adherents to their faith in India at 73,250. Persia has 8,500 Parsees. They are notably eager to secure an education for their children in the public schools and other institutions.

PARSLEY (pârs'li), a hardy biennial plant native to Europe, with pinnate leaves and fleshy roots. It is grown extensively in gardens for flavoring soups and garnishing meats and has been naturalized in all the continents. The species with curled leaflets is preferred for flavoring and the roots as well as the leaves are used for that purpose. A species known as *Hamburg parsley* has a root similar to that of

the carrot or parsnip, and is grown in some parts of Europe and America as a substitute for these vegetables.

PARSNIP (pârs'nîp), a plant found native in Western Europe, but now grown for its root both for table use and for cattle. The root has a sweet taste and nutritious qualities, the flowers are yellowish, and the stem is furrowed and bears smooth leaves. If planted in a moderately moist and fertile soil, this plant will spread rapidly and become troublesome as a weed, but it is larger and more palatable when cultivated. Soil that inclines to sand rather than to loam produces the most highly flavored roots. In a moderately temperate climate the cultivated plants may be left in the ground during the winter, as the roots are not injured by freezing, and when wintered in this way they are suitable for use early in the spring. However, it is best to dig them in autumn in the colder sections, keeping them for use in a cool and dry cellar. The roots of some species are recommended as food for milch cows, since they contain a high per cent. of saccharine substances.

PARSONS, a city of Kansas, in Labette County, on the Big Labette River, 135 miles south by west of Kansas City. It is on the Saint Louis and San Francisco and the Missouri, Kansas and Texas railroads and is surrounded by a fertile farming country, which produces cereals, grasses, and fruits. The noteworthy buildings include the high school, the State insane hospital, the Rasbach Hotel, the Masonic Temple, the Y. M. C. A. building, and many fine churches. It has extensive machine shops and railroad offices. Among the manufactures are furniture, plows, ironware, flour, edged tools, and utensils. Coal and natural gas are obtained in the vicinity. It was platted in 1871 and incorporated the same year. Population, 1905, 10,789; in 1910, 12,463.

PARSONS' CASE, a celebrated cause at law won by Patrick Henry in the court of Hanover County, Virginia, in November, 1763. It involved the constitutionality of the so-called Option Law, or Penny Act, passed by that State in 1758. This law compelled each parish minister to receive the value of 16,000 pounds of tobacco, which had been fixed as the salary of a clergyman, in paper money of the colony. At that time the colonial money was greatly depreciated, hence the law worked an injustice in that it compelled the ministers to accept much less than the market value of the tobacco. An appeal was taken by the clergy, but the crown vetoed the law. Rev. James Maury, a clergyman, sued for damages and retained

Patrick Henry as counsel. He made an eloquent plea to the jury and obtained one penny as damages for the plaintiff. The early success of Henry was based largely upon this case, but the conservative element in the colony looked upon his remarks at the trial as treasonable.

PARTHENON (pär'thē-nŏn), a noted temple of Greece, situated on the Acropolis at Athens. The ruins of this structure indicate that it constituted a splendid specimen of architecture. It was dedicated to Athene, the goddess of wisdom and armed resistance, and in it was a world-renowned statue by Phidias, which ranked second only to that of Zeus by the same eminent artist. This statue was 39 feet high and was composed of ivory and gold. The majestic beauty of its architecture constituted the chief attraction of the temple, although Greece had many other similar buildings of interest. The Parthenon was built in the Doric style of Pentelic marble. Originally it had eight columns on each front, 46 in all, of which 32 still remain. The structure had a length of 228 feet, was 101 feet wide, and was 64 feet in height. The Christians used it as a church for many years, but later it became a Moslem house of worship. It remained in good condition until 1687, when the Turks used it as a magazine, and an accidental explosion of a quantity of powder brought it to its present state of ruin. Specimens of sculpture from the Parthenon have been taken to the museums of many countries.

PARTHIA (pär'thī-à), an ancient empire in the region of Asia which lies southeast of the Caspian Sea, formed of part of the territory now included in Persia. Originally it was a small country, inhabited by the Parthians, but later its boundaries were extended to include the greater part of the modern Kohistan, Khorassan, and the Great Salt desert. The Parthians were of Scythian descent, if their own tradition is to be relied upon, but some modern writers connect them with the Iranians. At an early date they were made subject to the Persians, and in the expedition against Greece they constituted a part of the army of Xerxes. Alexander the Great united Parthia and Hyrcania into one satrapy, but in 250 B. C. they became independent, when they extended their dominion to the Indus and the Persian Gulf. The Romans under Crassus invaded their territory in 53 B. C., but they were completely defeated and their leader was slain. However, they defeated the Romans under Antony. Later their country was invaded by the Persians and in 228 A. D. it became a part of the new Persian Empire.

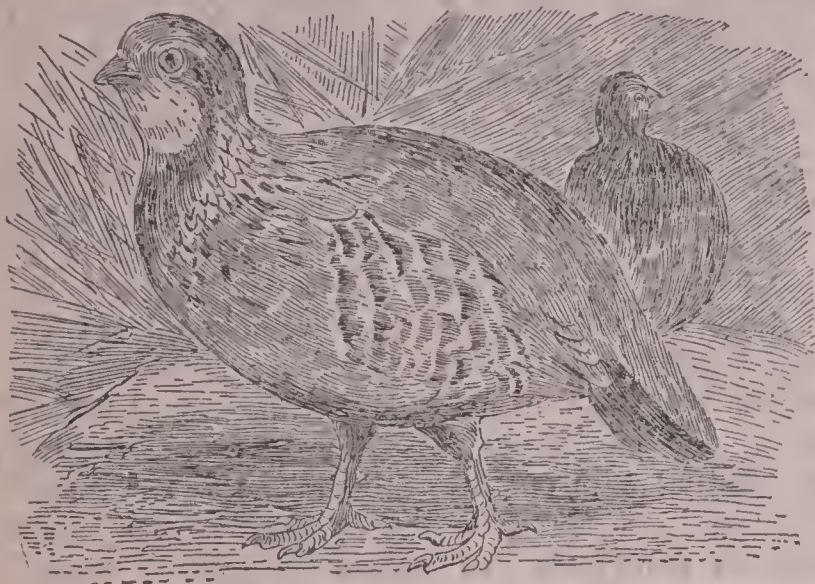
PARTIES, Political. See **Political Parties.**

PARTNERSHIP (pärt'nēr-shĭp), an association of two or more persons for the purpose of combining their labor and capital in the conduct of business, with the agreement to divide the profits and share the losses in certain proportions. It may be confined to a specific purpose or a single transaction, but when not so *limited* it is said to be a *general partnership*. Usually a written contract is the basis of a partnership, but it may be founded upon an oral agreement or even established by implication, meaning that the acts of the parties concerned are such as to lead others to the belief that they are in partnership. A partnership may be for an indefinite time, or it may be limited by a written contract or agreement, and in some cases it is stipulated under what conditions a member may withdraw, or the entire association may dissolve by mutual consent or otherwise. The members who are active in the conduct of the business as principals are known as *real* or *ostensible* partners, while the terms *nominal*, *dormant*, or *silent* are used to designate those who are not actually interested in the business, or are passively concerned, either permitting their names to be used as an aid in the business or furnishing some financial assistance without giving their time to the management of the partnership.

The greater share of business conducted by companies is managed by corporations instead of mere partnership organizations, since the law in most cases is such that the liability under the former is looked upon as the more equitable. In a partnership each member is liable for the full indebtedness of the firm, and this liability extends alike to real and nominal members during the period in which the association to which they belong is in business. However, this liability extends only to matters of business that relate strictly to the partnership. Each partner is limited by the agreement in the transaction of business, but may bind the firm to the discharge of large obligations, and each individual member as well as the partnership are liable to the extent of the liability incurred. Even if the acts of a partner are fraudulent as regards the others, the general rule is that parties transacting business with the firm are fully protected. An action at law is usually against the individual partners, but in some instances, as in many of the states, the name of the firm as well as that of the partners appears in the cause. If the partnership is dissolved by mutual consent or otherwise, the rule is to first pay the general

creditors, then each partner the amount due to him from the firm, and then each member the proportion of capital invested. Finally the balance is distributed to the partners in proportion as the profits are divided.

PARTRIDGE (pär'trij), a genus of birds of the grouse family. It includes a number of widely different species of game birds, many



RED-LEGGED PARTRIDGE.

of which are distributed more or less in all of the continents. In color the *common partridge* is ash-gray with markings of brown and black. The body is round and stout and measures about twelve inches in length. Its wings and tail are short, the bill is heavy, and the tarsi and toes are naked. The flight is rapid for a short distance, but it is not able to endure movement on the wing in extended flight. Ants are the favorite food of young partridges and adults feed mostly on larger insects, seeds, and the cereals of cultivated fields. The young remain with the parents in a convoy until late in the fall, and toward winter packs are formed by the union of convoys. The parents exercise much care in protecting their brood by allowing them to escape into thickets, while the adults attract the attention of the hunter.

The *spruce partridge*, or *Canadian grouse*, has a length of sixteen inches. In this species the male is nearly black, with grey and tawny markings, and the female is brown with grey and black. It is most abundant in New England and the southeastern part of Canada. Other familiar species include the *Arabian partridge* of Western Asia, the *African partridge*, the *Indian partridge* of Southern Asia, the *Greek partridge* of Southern Europe, and the *red-legged partridge*, or *French partridge*, of Western Europe. The *ruffed grouse* of the United States is known as a partridge in some localities. All species are hunted for

their flesh, which is a pleasant and nutritious food.

PARTRIDGE BERRY, a small trailing, evergreen herb of the madder family, largely distributed in North America. It has round-ovate, opposite leaves of a dark-green color and white flowers in pairs. It produces a scarlet double berry. The berries are relished by birds. Many species of birds are frequently seen gathering them from the vines in the winter time. A related species common to North America is known as *wintergreen*. The partridge berry is not favored as an edible food, its fruit being almost tasteless.

PARTS OF SPEECH, the term applied to the different classes into which the words of a language are divided, the division being based entirely upon the meaning and use that words have in a sentence. The English language has nine parts of speech, in case we consider the participle and the interjection as separate classes. These embrace noun, adjective, pronoun, verb, participle, adverb, preposition, conjunction, and interjection. A *noun* is the name of anything; an *adjective* is a word used to limit or qualify the meaning of a noun; a *pronoun* is a word used in place of a noun; a *verb* is a word used to express action, being, or state; a *participle* is derived from a verb, partaking of the properties of an adjective, a verb, or a noun; an *adverb* modifies the meaning of a verb, adjective, or participle; a *preposition* expresses relation between its object and some other word; a *conjunction* connects words, sentences, or parts of sentences; and an *interjection* denotes some sudden or strong emotion. Most grammarians regard the three articles, *a*, *an*, and *the*, essentially as adjectives and do not class the interjection as a distinct part of speech. *Parsing* consists of naming the part of speech, telling its properties, pointing out its relation to other words, and giving the rule for its construction.

PASADENA (päs-ä-dē'nä), a city of California, in Los Angeles County, nine miles northeast of Los Angeles, on the Atchison, Topeka and Santa Fé, the Southern Pacific, and other railroads. It is surrounded by a fertile agricultural and fruit-growing region, which yields cereals, grasses, and fruits. Electric railways furnish communication with Los Angeles and other cities. It is noted as one of the most popular health resorts of the Pacific coast, having a fine climate and a beautiful location. The principle buildings include the public library, the high school, the Throop Polytechnic Institute, the Academy of Science, and the Green, Raymond, Maryland,

and La Pintoresea hotels. Among the manufactures are flour, cigars, wine, clothing, canned fruits, wire, earthenware, and utensils. It has many fine gardens and parks. The place was settled by the Spaniards in 1772, but its larger growth dates from 1874. It was incorporated in 1886. Population, 1900, 9,117; in 1910, 30,291.

PASHA (pā-shā'), or **Bashaw**, a military title borne by princes and high civic officials in Turkey. This title was formerly bestowed only on princes of royal descent, but now it is conferred upon governors of provinces, military commanders, and others rendering extraordinary service to the nation. Three grades are recognized—pashas of one, two, and three horse tails, so called from the ensigns formerly borne before them as standards when they appeared in public. The first includes governors of minor provinces and brigadier generals; the second, generals of divisions; and the third, viziers and corps commanders. In many respects the office of pasha is quite like that of the ancient Persian satraps. Turkish pashas formerly governed with absolute sway, but now their powers are limited by councils and courts.

PASSAIC (pās-sā'ik), a city of New Jersey, in Passaic County, on the Passaic River, twelve miles northwest of New York City and four miles southeast of Paterson. It is on the Erie, the Lackawanna, and the New York, Susquehanna, and Western railroads. The place is beautifully located on elevated ground, affording a fine view over the surrounding country. Among the chief buildings are the Reid Memorial Library, the city hall, the Federal post office, and many fine schools and churches. It has a number of public parks, a system of sanitary sewerage, and pavements of stone, macadam, and asphalt. The manufactures include cotton and woolen goods, chemicals, India rubber, shoddy, machinery, whips, and utensils. The Passaic River rises in Morris County, and, after a tortuous course of about 100 miles, flows into Newark Bay. It affords an abundance of water power and is navigable for a short distance. At Paterson it has a fall of about fifty feet. Passaic was settled about 1679, but was not incorporated until 1873. Population, 1905, 37,837; in 1910, 54,773.

PASSAMAQUODDY BAY (pās-ā-mā-kwōd'dī), an inlet from the Bay of Fundy, which forms a part of the boundary between Maine and New Brunswick. It receives the water from the Saint Croix and other rivers. The bay is eight miles wide at the entrance and fourteen miles long. Within its confines

are several islands. It has a number of fine harbors and valuable fisheries. The tides affect it considerably, rising about 25 feet.

PASSENGER PIGEON. See **Pigeon**.

PASSION FLOWER, a genus of twining plants, so named from the fanciful resemblance of certain parts of the flower to the objects associated with the crucifixion. The rays of the corona are regarded as representing the crown of thorns; the stigmas, the nails; and the anthers, the wounds. About 200 species are known, many of which are cultivated because of their flowering qualities and for their admirable adaptability for covering arbors and trellises. Most of the species are native to the southern part of the United States, tropical America, and the West Indies. The commonly cultivated species is from Brazil and is a shrubby climber. It has palmate leaves and bears large flowers of a bluish color on the outside and purple and white within. The passion flower native to the United States has three-lobed leaves, bears large flowers, and yields an edible berry of a pale yellow color, about the size of a small apple. Medical properties are secured from the roots, flowers, and leaves of some species.

PASSION PLAYS. See **Miracle Play**; **Ober-Ammergau**.

PASSOVER (pās'ō-vēr), the principal Jewish festival, instituted to commemorate the event of the Lord's smiting the first born among Egyptians and passing over the houses of the children of Israel. It is related in Exodus that the blood of the paschal lamb was sprinkled on the two side posts and the upper doorpost, and the flesh of the lamb was eaten with unleavened bread and bitter herbs before morning. All the houses in Egypt not so protected were visited that night by Jehovah to slay the firstborn, and the emancipated Jews departed from Egypt the same night. The feast was instituted as an annual one, occurring during the full moon of the month of Nisan, corresponding to March, and included a term of seven days. At present the Passover Feast is celebrated by the Jews, but no lamb is sacrificed. Instead, the meal partakes of the nature of a family feast, in which the shoulder of a lamb is eaten, leaven is put away, prayers and songs are indulged in, and other ceremonies are observed.

PASSPORT (pās'pōrt), an official document issued to a person from his own government for protection and license to travel. A passport certifies to the citizenship of the individual holding it and requests foreign governments to grant safe and free passage within

their territory. There are many advantages in possessing a document of this character in case of accident or mishap to a traveler, but within late years they are infrequently insisted upon during times of peace. In the United States passports for foreign travel are issued by the Department of State, but a citizen of the Union can obtain one from the legation of the United States in the country in which he may be, or from a consul where no diplomatic representative is located. In Canada they are obtained from the Secretary of State, at Ottawa, on identification and the payment of a fee of \$4.00. Passports are not necessary in the United States, Canada, and England, although they are desirable. Germany requires foreigners who desire to reside for a short time in the large cities to be supplied with passports, while they are required in Russia and Turkey. In all the Turkish dominions, including Palestine and Egypt, they must be certified to by a Turkish consular officer before being valid within Turkish territory, but for convenience they may be certified to at New York before sailing.

PASTORAL POETRY, the name applied to poetry which relates largely to rustic life. Though concerned largely with topics related to rural scenes, it conveys the interests and emotions of the poet and the society which he frequents rather than the locality. The literature classed as pastoral poetry includes plays, idyls, eclogues, and romances, in which shepherds and other country folks have prominent mention. Theocritus, one of the earliest pastoral poets, treats in an artistic way the habits of life in Syracuse in his "Idyls." In these writings he made use of pastoral dialogues as a veil for his own sentiments and those of other persons in the society with which he was associated. The pastoral idea is largely represented in the literature of Rome, especially in the "Eclogues" of Virgil. Recent literature is not rich in the treatment of pastoral subjects, or with poetry which belongs to this class, but it is well represented in the writings belonging to the middle and modern periods of European authors. To this class belong Goethe's "Hermann and Dorothea," Spenser's "Shepherd's Calendar," Shakespeare's "As You Like It," and Fletcher's "Faithful Shepherdess."

PATAGONIA (păt-à-gō'nĭ-à), the name generally applied to the most southern region of South America, lying south of the Negro River. It is bounded on the east by the Atlantic, south by the Strait of Magellan, and west by the Pacific. The total area is estimated at 322,550 square miles, of which 16,050 square

miles are included in the islands along the southern and western coasts. A treaty made in 1881 divided the region between Chile and Argentina, the former securing 62,930 square miles and the latter 259,620 square miles. The extensive archipelago of the Tierra del Fuego Islands is separated from the mainland by a coast frontage of 365 miles on the Strait of Magellan. With it are included many rocky peninsulas.

The eastern part belongs to the vast steppe-like plains extending along the Atlantic, which rise abruptly in successive terraces. The soil is more or less stony and the vegetation consists of herbage and thorny brushwood. Rainfall is very scant in some regions. Many salt marshes and lakes are situated in the west central part. The drainage is principally by the Negro, Chico, Deseado, and Chubut rivers, all of which have a course toward the east and flow into the Atlantic. Among the animals are the puma, guanaco, birds of song, and water fowl. Otters, fish, shellfish, seals, and sea elephants are found along the coasts. The western part is mountainous and rugged, including an extension of the Andean system. Forests are abundant in this section. The prevailing winds are from the west. As a whole, the winters are extremely cold, and the summers are moderately warm. The mineral deposits are similar to those common to Chile.

Patagonia is inhabited principally by Indians, who subsist mainly on the chase and by herding small droves of cattle on the pastoral lands. They belong to the Tehuelches, or Patagonian Indians, and consist of two tribes, known as the Northern and Southern. These Indians are decreasing rapidly in number. In the summer season they are seen on the plains in charge of herds of cattle and fishing along the coast, while in the winter time they seek refuge in the forests and mountains toward the west. Colonies have been established by both Argentina and Chile, and the latter country supports a penal settlement within the region.

The region was first sighted by the Spaniards under Magellan in 1520 and was explored by De Isla in 1535. Spanish settlements were founded as early as 1580, but these settlers and others located subsequently left the region to settle farther north, where the climate is less severe and the inducements for extensive investments are more encouraging. A Welsh colony was founded at the mouth of the Chubut in 1865, but it proved unsuccessful. The settlements that do exist were established almost exclusively by people from regions located far-

ther north in South America. It is probable that large tracts will remain unpopulated for centuries.

PATAPSCO (pà-täps'kô), a river in Maryland, which rises near the boundary line of Pennsylvania and, after a course of eighty miles toward the southeast, flows into Chesapeake Bay, fourteen miles south of Baltimore. It supplies an abundance of water power and is navigable to Baltimore for large vessels. The valley of the Patapsco is fertile and its fisheries are productive.

PATCHOULI (pà-chōō'li), a plant native to Southern Asia, especially to India and the East Indies. It is cultivated for its heavy brown oil, called *Patchouli*, which is obtained by distillation. This product is used for perfumery and for keeping moths and other insects from linen and woolen goods. The mattresses and shawls imported from Asiatic countries derive their peculiar odor from the oil of this plant.

PATENT, a government grant to an inventor, whereby he secures for a limited time the exclusive right to make, use, and sell any new machine, process, or composition of matter, or any new and useful improvement. Nearly all civilized nations encourage and protect inventive skill and industry by granting patents, and some even go so far as to grant exclusive privileges for generations to the producers of new additions to mechanics, arts, and literature. It is specially provided in the Constitution of the United States that Congress shall have power "to promote the progress of science and useful arts, by securing for a limited time to authors and inventors the exclusive rights to their respective writings and their respective discoveries." The first patent law was inspired by Thomas Jefferson and passed by Congress in 1790. At present fully 45,000 applications for patents are made annually and about one-half fail to secure an issue.

The patents issued in different years since the enactment of the first patent law in the United States take numerical rank as follows:

1790.....	3	1855.....	2,013
1795.....	12	1860.....	4,819
1800.....	41	1865.....	6,616
1805.....	57	1870.....	13,321
1810.....	223	1875.....	14,837
1815.....	171	1880.....	13,947
1820.....	155	1885.....	24,233
1825.....	204	1890.....	26,292
1830.....	544	1895.....	22,057
1835.....	757	1900.....	30,934
1840.....	473	1905.....	30,399
1845.....	503	1907.....	36,620
1850.....	993		

The laws of the United States formerly discriminated against foreign applicants, when a residence of one year was required, and the

fee for foreigners was fixed at from \$300 to \$600, but in 1861 all discrimination was repealed, except that against aliens coming from countries discriminating against citizens of the United States. In 1836 Congress appropriated \$108,000 to construct the present patent office, and in December of the same year a destructive fire destroyed practically all the contents of the patent office. In the same year the patent law was revised and improved in many respects. However, a general revision of the statutes occurred in 1870. In 1877 another destructive fire occurred, doing damage to the amount of \$60,000.

To obtain letters patent a distinct specification must be made by the applicant, giving a full and complete description of his invention. Drawings and models must be made in all cases where such are possible, and these must be deposited with the Commissioner of Patents. The fee to be paid by the patentee is \$35, of which \$15 must accompany the application, and the balance of \$30 must be paid on an issuance of the patent. The fee of \$15 remitted with the application is retained for making search through the patent office to ascertain whether there is not some conflicting patent already in existence, and it is not returned in case letters patent are refused. Patents are issued for a term of seventeen years and cannot be renewed.

The patent office belongs to the Department of the Interior and the commissioner is appointed by the President, subject to confirmation by the Senate. Information on this subject is sent free of charge by mail to any one requesting the patent office to do so. Pamphlets treating of rules of practice in the United States patent office, patent laws, and laws relating to the registration of trade-marks and labels are among the publications issued for free distribution.

The patent office in Canada is a branch of the Department of Agriculture, the Minister of Agriculture being the Commissioner of Patents. It is required that the construction or manufacture be carried on in Canada, beginning within two years from the issue of the patent, as otherwise it becomes void. The patent is granted for eighteen years, but the applicant may secure one for only eight or twelve years, if he chooses, and have it extended to the full term afterward by paying the remainder of the fee. The fee for six years is \$20; for twelve years, \$40; for eighteen years, \$60. In Germany the fee is \$5 and \$7.50 before issuing the patent; in Australia, \$20; in France, \$20; in Great Britain, \$25; and in Russia, \$75.

PATERSON (păt'ēr-sūn), a city of New Jersey, county seat of Passaic County, on the Passaic River, popularly called the "Lyons of America." It is fifteen miles northwest of New York City, on the Morris Canal, and has communication by the Erie, the Lackawanna, and the New York, Susquehanna and Western railroads. Several electric lines extend from the city to various points within the State. It occupies a site of nine square miles, located largely in a curve of the river, which has a fall of fifty feet at one place and a descent of twenty feet a short distance below the falls, affording extensive water power. The river is spanned by several bridges and the streets are broad and well paved, chiefly with stone and macadam.

The city has many fine public buildings, including the post office, the city hall, and the county courthouse. It has a public library with 38,500 volumes. Two city parks, known as the East Side and the West Side parks, furnish outdoor recreation. It has several hospitals, charitable institutions, and many public school buildings. A fine soldiers' monument occupies an elevated site. Many of the business blocks are large and constructed of stone and steel. It has gas and electric lighting, public waterworks, surface and sewer drainage, and well-organized police and fire departments.

Paterson is noted for its extensive manufactures of silk goods, which are produced in larger quantities than in any other city in America. Large interests are vested in bridge building, the production of iron and steel, and in building locomotives and engines. Other manufactures include linen thread, paper, cotton and woolen goods, velvet and braid, flour and meal, and general machinery. The place was founded in 1791 by a society of manufacturers, in which Alexander Hamilton was interested. It was incorporated as a city in 1851, after which it grew rapidly in wealth and commercial influence. Population, 1905, 111,549; in 1910, 125,600.

PATMOS (păt'mös), or **Patmo**, an island in the eastern part of the Grecian Archipelago, 25 miles south of Samos, belonging to the Sporades group. It is about ten miles long and six miles wide and bears evidences of having a volcanic origin. The surface is rocky and barren. Rude agriculture is carried on in a few localities, but the inhabitants engage more largely in fishing. The island is noted for the exile of the Apostle John. It was on this island that he saw the visions contained in the Book of Revelation. John the Divine built a monastery on an elevated mountain in 1088,

near which is the small town of Patmos. The island belongs to Turkey, but it is inhabited almost exclusively by Greeks. Population, 1908, 4,063.

PATNA (păt'nä), a city of India, in the Bengal district, on the Ganges River, 285 miles northwest of Calcutta. It is conveniently located along the river and has extensive railroad and steamboat connections with other trade emporiums. Among the manufactures are clothing, utensils, tobacco products, earthenware, toys, linen goods, and wax candles. The city has a large export trade in opium, merchandise, cotton, tobacco, salt, oil seeds, and fruits. Many of the streets are narrow and in the older portion they are tortuous and illy supervised. In the newer parts the streets are wide and regular and contain a number of modern municipal facilities, including electric lighting and rapid transit. The principal buildings include a Roman Catholic cathedral, the Nabob's palace, a Mohammedan college, Patna College, a number of mosques and tombs, and several educational and benevolent institutions. It is thought that the city was founded about 600 B. C. In 419 B. C. it became the capital of Bahar. Occupation by the British caused an uprising in 1763. At present it ranks among the most important trade centers of Southern Asia. Population, 1906, 136,406.

PATRAS (pä'träs), a seaport city of Greece, capitol of the nomarchy of Achaia, on the Gulf of Patras. It is located in a fertile plain, about 12 miles southwest of Lepanto, and near it is the site of an ancient acropolis. The streets are wide and well paved, and the city has electric and gas lighting, sewerage, and waterworks. A breakwater protects the harbor, which is the seat of a large trade in wine, currants, and fruits. Patras is an ancient city and was formerly the chief commercial center of the Peloponnesus. Population, 1906, 42,380.

PATRIARCH (pä'trī-ärk), a term applied originally to the progenitors of early tribes of mankind, specially to the antediluvians named in the Bible and to the early Hebrews, including Abraham, Isaac, and Jacob. After the destruction of Jerusalem, the term became the title of the principal officer of the Sanhedrim, in which executive authority was vested over the Jews of Syria and Persia. In the 5th century it came to be applied to the bishops of Alexandria, Antioch, and Rome. The patriarch of Constantinople became superior to those of Alexandria and Antioch at the time that city was made the seat of the empire, while the patriarch of Rome became the su-

preme pontiff of the west. Later a division resulted in the Latin church on account of conflicting authority between the patriarch and the pontiff of Rome, which gave rise to the Roman and Greek churches. The primate of the Greek Church in the Ottoman Empire at present is the patriarch of Constantinople, whose title is ecumenical or general patriarch.

PATRICIANS (pá-trish'anz). See **Plebeians**.

PATRONS OF HUSBANDRY. See **Grange**.

PATROONS (pá-trōonz'), the name of a class of Dutch settlers in the colony of New Netherlands, afterward New York, who enjoyed certain manorial rights to their lands. These rights were granted to promote colonization in America. They gave the proprietor, who was known as the *patroon*, the absolute title to a tract of land extending a distance of eight miles on both sides of a navigable stream, or sixteen miles if on one side, the tract extending inland as far as the country might be developed. The colonists were bound to the wealthy grantees for a certain number of years, hence the estate gave rise to a kind of feudal system. Changes were made from time to time, owing to contentions between the patroons and the colonies, but traces of the system remained until 1847, when the relations between tenant and landlord were modified as a result of the antirent agitation.

PAU (pō), a city of France, capital of the department of Basses-Pyrénées, 103 miles south of Bordeaux. It is located on the Gave de Pau, which is crossed by a number of bridges. Several steam railways and electric lines furnish communication to many points in France. The chief buildings include the palace of justice, a museum, and two Gothic churches, those of Saint Martin and of Saint James. The public library has 55,000 volumes. Henry IV. resided for some time in a castle near the city, in the 14th century, and the site is now occupied by interesting and imposing buildings. It has manufactures of linen and cotton textiles, machinery, and wine and is a center of trade in grain and live stock. Many tourists visit here during the winter. Population, 1906, 35,044.

PAULISTS (pāl'ists), or **Paulist Fathers**, a missionary society of priests in the Roman Catholic church. It was founded in 1858 by Rev. Isaac Thomas Hecker as the Congregation of Missionary Priests of Saint Paul the Apostle. The headquarters are in New York City, where the society maintains a magnificent

church and carries on publication work. Churches are maintained in many cities of the United States, and the missionary work is largely among those who do not profess the Catholic religion. The *Catholic World*, a monthly periodical, is the official organ of the society.

PAUPERISM (pā'pēr-iz'm). See **Poor-Laws**.

PAVEMENT (pāv'ment), the name applied to any covering of stone, brick, wood, asphalt, or cement for walks, roads, and floors of houses. It is used most extensively for improving the streets and highways in or near towns and cities, especially where the natural surface is of a constituency that will render it easily displaced by hoofs, wheels, and the elements. The material which is employed is of a durable character, especially where much heavy traffic is carried. The floors of many public buildings, such as cathedrals and structures occupied by the government, are paved with durable materials of an ornamental design.

The history of pavement is as ancient as that of civilization. It is related that Babylon had paved streets fully 2,000 years before the Christian era. Many streets of Rome were paved with layers of stone; usually two, the lower one laid in mortar or cement, and the upper of stone with a smooth surface. A few of the Roman pavements are still intact and small portions are said to be suitable for use. The vertical edges of stone blocks used in ancient times were cut so as to fit closely, and they were laid upon a solid foundation, usually constructed of lava stone. Paving was not employed extensively during the Middle Ages, but after the 12th century it again received much attention, and at present all well-kept streets in the towns and cities have pavements.

Pavements constructed of stone are the most durable, and this is the material used most extensively in the main business thoroughfares of the large cities. The surface is first cut down to a uniform level, after which a foundation of concrete is built. The stone used chiefly is granite and is cut into rectangular blocks, the vertical edges fitting closely. The blocks are set carefully upon the foundation, the purpose being to obtain smoothness and uniformity in the surface. Many of the outlying streets, especially in the western part of the United States, are paved with a class of hard-burned, or *vitrified*, brick. Formerly they were laid in two courses, the lower one being placed flat upon a well-graded and

sanded foundation and the other set on edge, but now brick pavements are constructed almost entirely by setting a course of brick on edge upon a concrete foundation about six inches thick.

In many places where timber is abundant, wooden pavements are constructed of rectangular or cylindrical blocks. These blocks are about six inches long and are set closely together on the ends, which form a smooth surface. Usually a foundation of boards covered with hot coal tar is placed below, while the interstices between the blocks are filled with gravel or sand, and a coating of hot coal tar is poured over the surface. In many places the pavements are made of asphalt, but this material is not serviceable where the traffic is heavy. The asphalt is mixed with sand so as to form a coating two or three inches deep, which is spread over a solid foundation, and smoothness is obtained by running a heavy roller over the new work. This class of paving is noiseless and less injurious to driving horses than either brick or stone. However, it is quite slippery in wet weather and on heavy grades. A good kind of asphalt paving is built by first molding trap rock and asphaltic cement under heavy pressure to form blocks and these are laid much like brick. It has the advantage of being more uniform in composition than ordinary asphalt pavements.

PAVIA (pá-vě'á), a city in northern Italy, twenty miles south of Milan, on the Ticino River, near its confluence with the Po. It is the capital of the province of Pavia, has extensive railroad facilities, and is surrounded by a fertile agricultural and fruit-growing country. Pavia has a considerable trade and numerous municipal facilities, including electric lighting, waterworks, and stone pavements. Among the manufactures are porcelain, textiles, jewelry, wine, toys, musical instruments, and machinery. Its celebrated university was founded by Charlemagne in 774, and in the Middle Ages it ranked as a noted seat of learning. With it are affiliated a number of colleges, historical and anatomical museums, a school of fine arts, a botanical garden, and a library of 160,000 volumes. This institution has advanced courses of study and is attended by about 1,400 students. Other noted buildings include the cathedral founded in 1488; a splendid monastery built by the first duke of Milan, situated four miles north of the city; the Church of San Pietro; and the Church of San Michele, regarded the oldest in Italy. The Gauls founded Pavia, but Attila captured it in

453, and it was taken by Odoacer in 476. It was made the capital of Lombardy in the prosperous times of the Lombards, when it ranked as the most important city of Italy. The French were defeated here in 1525, but two years later it was laid waste by them, and Napoleon pillaged it in 1796. In 1814 it became a part of Austria, but since 1859 it has belonged to Italy. Population, 1906, 36,744.

PAWNBROKER (pa'n'brō-kēr), a person who loans money on the security of personal effects, such as jewelry and clothing, which are left in possession of the lender. The business of a pawnbroker is usually limited to small loans and a large amount of the goods pledged or deposited are not redeemed within the time agreed upon, hence the business involves both lending money and selling the unredeemed goods. In some countries the law requires that the goods are to be advertised for sale and sold at auction, but this provision is either evaded directly, or the loan is stipulated so as to have the effect of a sale after the expiration of a definite time. Many pawn shops are maintained in the larger cities of Canada and the United States, and a majority are in the hands of Jews. Loans made by pawnbrokers usually bear a high rate of interest, or a specified sum of money is charged instead of specifying a definite rate.

PAWNEES (pa-nēz'), a tribe of North American Indians who were first found in the basin of the Platte River, in Nebraska. They consisted of four different bands, known as the Grand Panis, the Tapage Panis, the Republican Panis, and the Lanks. Their hostility to the Sioux, Arapahoes, and Sacs and Foxes extended through a period of many years, but they were peculiarly friendly to the whites. A cession of their lands was made in 1833, when they were confined to a reservation on the north side of the Platte River, but in 1876 they retreated before the Sioux to southern Nebraska, and in the latter part of that year removed to Indian Territory, now Oklahoma. Their history includes an account of a number of brave chiefs. At present they are making rapid progress in educational and industrial arts. A vocabulary of their language has been published, but there is no extended grammar.

PAW-PAW. See Papaw.

PAWTUCKET (pa-tūk'ēt), a city of Rhode Island, in Providence County, on the Pawtucket River, four miles north of Providence. It is at the head of steamboat navigation and on the New York, New Haven and Hartford Railroad. The river supplies an abundance of

water power, having a fall of about fifty feet. It has the Collyer Monument, Daggett Park, and a soldiers' memorial monument. Among the principal buildings are the State armory, the Sayles Memorial Library, the public high school, the city hall, the Kinyon Block, the Taylor building, and the home for aged poor. Samuel Slater established the first cotton factory in Pawtucket in 1790. Cotton goods and cotton thread are the leading manufactures. Other products include knit goods, braid, cement, textiles, dyed goods, plush, cordage, leather, ironware, machinery, packed meat, and boilers. It has a large trade in lumber, coal, cement, brick, and merchandise. The place was settled in about 1654 and incorporated in 1765 as North Providence. In 1886 it was incorporated as the city of Pawtucket. Population, 1900, 39,231; in 1910, 51,622.

PEA, the common name of a genus of plants of the natural order *Leguminosae*. It is assumed that peas are native to Western Asia, where several species grow wild, especially in the region of the Caspian Sea. They were cultivated as garden plants by the ancient Greeks and Romans, who obtained the improved varieties from the Egyptians. Their introduction into Western Europe came about through traders from Holland, whence they were distributed to all the continents. About fifty species are cultivated, all of which have been improved by propagation. Two distinct classes are recognized, known as the *common pea* and the *eatable-podded pea*. The latter is sometimes spoken of as sugar, skinless, and string pea, from the circumstance that its pod is sweet, tender, and succulent. In most climates it grows to a height of two to five feet. It bears long pods containing spherical seeds and flowers later than the common pea. This plant should be supported by trellis work in order to secure the best yield. The common pea is cultivated very abundantly, largely because of its early yield of seeds, which are valuable for cooking or canning while in an unripe condition. Its pods are rarely eaten, having a tough, parchmentlike lining. The *German dwarf pea* is a favorite species for early use. It grows to a height of about nine inches and, if sown early in the spring in a rich, warm soil, it yields abundantly. Other species include the *little gem*, *Tom Thumb*, *Kent*, and *May pea*. The *cow pea*, which is grown extensively in the Southern States, is a forage plant.

PEABODY (pē'bōd-ī), a city of Massachusetts, in Essex County, fourteen miles north of Boston, on the Boston and Maine Railroad. It is a manufacturing and commercial center.

Among the manufactures are glue, clothing, leather, textiles, earthenware, machinery, and utensils. The noteworthy buildings include the public library, the townhall, the buildings of the Essex County Agricultural Society, and many schools and churches. It is the seat of the Peabody Institute, an institution founded by George Peabody, who endowed it with \$200,000. The city was incorporated as South Danvers in 1855, but in 1868 it adopted the present name in honor of the philanthropist, George Peabody, who was born here. Population, 1905, 13,098; in 1910, 15,721.

PEACE, a river of Canada, which rises in the Rocky Mountains, in British Columbia, by two branches. It flows in a tortuous course toward the east and merges into the Slave River, near Lake Athabasca, and enters the Great Slave Lake by five mouths as the Slave River. The delta of the Peace River is remarkably fertile and its valley is rich and beautiful. Rapids impede navigation in many places, but it is navigable for some distance by small steamers. The entire length is about 800 miles.

PEACE CONFERENCE. See *Hague, The*.

PEACH, a class of fruit trees, which are cultivated in all the countries having a warm or temperate climate. Some writers have classed the peach tree as a distinct genus, while others consider it allied to the almond, cherry, and plum. The size and shape differ largely according to the soil and climate, though it may be stated that its general height is from eight to twenty feet.



PEACH FLOWER.

Its branches are irregular, the leaves are glossy and lanceolate, and the rose-colored blossoms appear in early spring before the leaves are apparent. The fruit is fleshy, juicy, and highly flavored. It is a roundish drupe from one to three inches in diameter, has a downy reddish, yellowish, or whitish skin, and incloses a furrowed flattish stone. The peach tree is native to Persia and Syria, where several species grow wild. It was introduced into Western Europe at an early date, and is now grown for the market

in abundance. The two principal classes are the *freestones* and the *clingstones*, so named on account of the stones being free from or attached to the fleshy part of the fruit. Each of these classes includes many species.

In the more severe climates of the Temperate

States averages about 40,500,000 bushels of marketable peaches. Ontario and British Columbia are well adapted to the culture of peaches. Those gathered for the markets are picked by hand before they are fully ripe and are shipped in refrigerator cars. Large quantities are canned and dried for the market, in which condition they can be kept indefinitely. A fine grade of peach brandy is made where large orchards abound.

PEACOCK, or **Peafowl**, a class of beautiful birds of the pheasant family, native to Southeastern Asia. In the wild state peacocks are met with mostly while perching in trees, but they make their nests on the ground, where the peahen lays from twenty to thirty eggs in the early spring and may later be seen in company with a large brood of young, usually from ten to twenty. The young are very difficult to rear in a cold climate, and the adult peacocks are quite unskilled in making rapid escape while on the ground. The males and females have a similar appearance until about two years old, when the tail coverts of the male begin to develop. They reach full development at three years, when the male has a most beautiful appearance. The *common peacock* is about the size of a hen turkey, and the wild birds are more brilliant than the domesticated. Both sexes are marked by various spots, but the tail coverts of the male are especially beautiful for their eyelike spots and are much used for purposes of decoration. The *Tibetan peacock* is somewhat smaller, but



1, COMMON PEACOCK. 2, TIBETAN PEACOCK.

zones the peach trees bear only from two to three years, but in those having an equable and favorable climate they yield fruit successively for nearly 100 years. This fruit is grown more extensively in North America than in any other continent. It is propagated from the seed and is cultivated in orchards like apples. The most productive peach-growing regions are on the southern shores of the Great Lakes, in the central part of the Mississippi valley, in the Southern States, and on the Pacific coast. New York, Ohio, Michigan, California, Texas, Georgia, Oklahoma, and Florida are among the larger producers of peaches. All the Southern States produce peaches, though the largest yield is in Georgia, where the annual production is about 5,750,000 bushels. The total yield of the United

has fine plumage. A fully developed male peacock has blue and golden colors. Formerly they were eaten, but now peacocks are kept chiefly for ornament in house and barn yards. The ancients regarded the peacock as the attribute of Juno, and the Christians of Byzantium looked upon it as a symbol of the resurrection. At present it is typical of vainglory.

PEANUT, **Ground-Nut**, or **Ground-Pea**, a trailing plant of the bean family, bearing a hairy stem, small yellow flowers, and two-paired primate leaflets. The flowers are sterile above ground. After they wither, the forming stalk of the ovary bends downward and forces the young pod underground, and the seeds mature some distance below the surface. The pods have from one to three seeds. Peanuts are

cultivated extensively in many parts of the United States, especially in Virginia, the Carolinas, and other Southern States. They thrive best in a light, sandy soil, yielding from 35 to 100 bushels per acre. Many well-defined species have been obtained by cultivation, most of which are thought to be from plants that are native to Africa, where they are grown extensively, but other species are native to South America. They were cultivated on the Maranon River, in Brazil, as early as 1596. Where they are cultivated on a small scale, the laborers take them



PEANUT—PLANT AND FRUIT.

from the ground with hoes, but on the larger plantations the roots and nuts are plowed out with a peanut digger. After drying several days in cocks or sheds, they are cleaned carefully and in some cases are bleached. Large quantities are baked and eaten. They yield peanut oil, a product resembling olive oil, which is used extensively in manufacturing fine grades of soap. It is employed for salads and other purposes. The husks and shells of peanuts are useful in feeding stock. Some species may be grown as far north as central Illinois and Iowa, but they must be planted early, else the seeds do not mature.

PEAR, a fruit tree belonging to the same genus as the apple, cultivated extensively for its fruit. It is native to Asia and some parts of Europe, where it may be found growing wild, either in the form of a shrub or tree. The fruit in a wild state is small and the trees are thorny, but under cultivation the tree is thornless, grows to a height of from 25 to 60 feet, and in favorable climates attains a diameter of three feet. Writers recognize 225 species, of which 36 were cultivated in Rome at the time of Pliny. In some climates the trees bear only a few years,

while in others they have been known to yield fruit for more than 300 years successively. The wood of old trees is hard and durable and is of value in manufacturing musical instruments and turners' tools and for making wood engravings. The fruit has a juicier pulp than the apple, is somewhat longer, and tapers toward the stem end.

The pear may be propagated by grafting on the quince, white thorn, and other trees, and is usually budded or grafted on seedlings of a species of pear called *free stocks*. A species known as the *Bartlett pear* is the favorite variety in the American market. It is luscious, yields abundantly, and is of large size. Next to it is the *Seckel pear*. The *Bartlett* constitutes fully ninety per cent. of all the pears grown in the United States.



PEAR FLOWER.

The cultivation of pears extends to practically every country within the tropical and temperate zones. California produces large quantities of excellent size and next to it the State of New York takes rank. Other states producing large quantities include Ohio, Michigan, Indiana, and Pennsylvania. The pear crop of the United States aggregates about 5,500,000 bushels annually. Canada is a prolific producer of several fine grades of pears. The largest yield is in Nova Scotia, New Brunswick, Ontario, and British Columbia. Pears are picked before quite ripe, wrapped in separate papers, and transported in refrigerator cars. Large quantities are eaten fresh or canned for table use. In some regions pears are dried similarly to apples and peaches. They are used in the manufacture of wine and a pear cider known generally as *perry*. Pear cider is made in large quantities in France and other countries of Western Europe.

PEA RIDGE, Battle of, an engagement of the Civil War in America, fought at Pea Ridge, Ark., on March 7 and 8, 1862. Gen. S. R. Curtis had an army of 10,500 Federals and advanced against Springfield, Mo., which was held by the Confederates under General Price. However, the Confederates withdrew and made an attack upon the Federals from the rear, the

battle taking place at Pea Ridge, in the north-western part of Arkansas. They had about 14,000 men and were commanded by General Van Dorn, who retreated under cover of his artillery, having lost about 950 in killed and wounded. The Federals sustained a much heavier loss, a total of 1,384, but Missouri was saved to the Union cause.

PEARL, a calcareous secretion formed chiefly of calcium carbonate, found as a morbid deposit around a central nucleus within the shells of various mollusks, especially those of pearl



INSIDE VIEW OF PEARL-OYSTER SHELL.

oysters and river mussels. Pearl oysters occur in beds similar to those of the common oyster. Their shell is rough and greenish on the outside, and on the inside is a coating composed of nacre, or mother-of-pearl. Pearls of the same material as mother-of-pearl occur both in the flesh of the oyster and as attached particles on the outside, often from ten to twenty different pearls being found in one oyster. It is thought that the pearl originates from some foreign substance like sand getting into the shell or oyster, around which the hard, pearly growth forms. The Chinese have developed a system of cultivating pearls by placing small beads and other hard substances in living pearl oysters and replacing them in the sea, where they remain until pearls are sufficiently developed, when they are caught and the developed product is secured.

The most valuable pearl fisheries are those of Ceylon and the Persian Gulf, where the industry has been carried on from remote antiquity. Pearl fisheries of much value exist in the Gulf of Manar, on the northeastern coast of Ceylon, where the shells of mollusks measure from nine to twelve inches in diameter,

though in the pearl fisheries of California and the Gulf of California the shells are somewhat thicker. Pearl fishing on the Asiatic coast continues only about a month each year, usually beginning in March. Divers descend to a depth of from sixty to eighty feet, where they loosen the oysters and are pulled up in from 40 to 60 minutes, though in rare cases they are able to remain under water 75 minutes. The diver is aided in sinking by a weight of about thirty pounds being attached to his feet and, when he has gathered a number of oysters into a net, he is pulled up by means of a rope. Boats receive the oysters at the surface and carry them to the shore, where they are piled in the sun and allowed to decompose. When sufficiently rotted, they are carefully washed and examined for pearls, and those attached within the shell are removed by means of a hammer. Pearl oysters occur over extensive areas of the Pacific Ocean, including the coasts of Borneo, the Sulu Islands, Australia, and the Bay of Panama. Pearls are also secured in the Gulf of Mexico, and in many of the rivers of the United States, Canada, Russia, Germany, Great Britain, and other European countries.

Pearls are more or less dependent on their size, form, and structure for commercial value. They are separated into several classes. The smaller are called *seed pearls* and are sold in the market by weight, while the larger ones are sold with reference to their composition and color. Those of a rose tint are counted the most valuable in some countries, though others prefer the yellow. Pink pearls are valuable on account of their rarity, but the highest price is paid for black pearls, which are the most rare and are found only in several kinds of shells. The principal uses of pearls include decoration, ornament, and trimming for inlaid work. *Mother-of-pearl* is used in making the handles of knives and forks and for buttons. Within recent years considerable progress has been made in the manufacture of artificial pearls, particularly in Italy, Germany, and France. The imitations consist of blowing very thin beads of glass and finishing them with the scales of certain fishes, as the dace and bleak. Julius Caesar possessed a large number of pearls, many of which he brought from the streams of Great Britain. In one instance he is said to have paid \$240,000 for a fine specimen. It is reputed that Cleopatra dissolved a pearl valued at \$350,000 in vinegar and drank it, while another was cut under her direction into earrings for the statue of Venus in Rome. The most valuable pearl now in existence is owned by the Shah of Persia.

PEARL RIVER, a river having its source in Neshoba County, Mississippi, about 100 miles northeast of Jackson. After a course of about 350 miles, it flows into the Gulf of Mexico. It has a winding course toward the south, is navigable as far as Jackson, and the lower valley is subject to overflow. The Bogue Chitto River, which joins it in Louisiana, is its largest tributary.

PEASANTS' WAR (pěz'ants), an insurrectionary movement in Germany, which was instituted by the peasants for the purpose of securing relief from the extravagant taxes and the oppression of the nobles. The movement was organized in the south of Germany, in 1476, and by 1525 it had spread over all that country. Some of the nobles regarded the movement with favor, since it was at least partially directed against the clergy, a part of which had become both oppressive and sensual. In several instances the peasants secured success. They were supported by the towns of Frankfurt, Mühlhausen, Fulda, and others, but the lack of systematic coöperation made it impossible for the enterprise ultimately to succeed. Among the principal demands were the abolition of serfdom, the free election of their parish clergy, the support of the poor, the equality in the administration of justice, the abolition of clerical exactions, and the restoration of titles to certain forests and land. The peasants were defeated with vast losses in South Germany in the early part of 1525, and Philip of Hesse defeated them in several engagements in the North. The movement was unfortunate for the peasants in that they were reckless in the destruction of castles, convents, and churches, which they pillaged, and they also committed other excesses. After they were finally quashed, their burdens became even greater than before and many of their leaders were executed. In this conflict for human rights fully 150,000 persons suffered death.

PEAT (pēt), a substance resulting from the decomposition of various plants in the presence of moisture, found chiefly in bogs and marshes. It is confined principally to the colder countries, since decomposition takes place too rapidly in the warmer climates to form peat. At the surface it contains considerable water and becomes gradually more compressed toward greater depths until it approaches the condition of lignite. In the high latitudes it is formed of various species of bog moss. These forms of vegetation produce peat below, while at the surface new shoots grow up to take the place of the decaying parts. Recently formed peat has a brownish hue and a soft con-

sistency, while the older is quite dark in color. Extensive peat bogs often have a depth of fifty feet, and when the product is taken from the deposits it contains about eighty per cent. of water.

The peat is cut by implements in rectangular forms and is placed on an elevated surface to dry. When sufficiently dry it is used for fuel, giving out a constant heat with little smoke. Peat of ordinary consistency contains 56 per cent. of carbon, six per cent. of hydrogen, and 38 per cent. of oxygen and nitrogen. It occurs extensively in Northern Europe, particularly in Russia, Great Britain, and Germany. Extensive beds are found in New England, Canada, and other high latitudes, where it is used for fuel. Within late years various machines have been invented to compress peat artificially to free it from water, though formerly moisture was removed exclusively by a slow drying process. Peat can be burned in furnaces, ranges, stoves, and open grates. It is employed both for heating and cooking. Dense peat gives the best results when burned upon a grate, and the fibrous kind is best for use in stoves and open fireplaces without a grate.

PEBBLE, a fragment of rock ranging in size between a grain and a cobble, having a rounded form due to the action of water, ice, or wind. Pebbles are found in abundance among the deposits of all geological periods, but in most cases they are held together by lime, silica, or iron, thus forming large stones. Pebbles formed of rock crystal and agate occur in many places. In this form they possess value in the manufacture of optical supplies and jewelry.

PECAN (pě-kăn'), a species of hickory common to North America. It is noted for its fruit, which is the most palatable of all the hickory nuts. The tree attains a height of sixty to seventy feet, has a straight trunk, and bears leaves with thirteen to fifteen leaflets. The wood is of little use aside from fuel, but the nut is raised extensively for the market. It thrives in Arkansas, Mississippi, Illinois, Louisiana, and Texas. Large quantities of the nuts are exported to the markets of Europe.

PECCARY (pěk'kà-rŷ), a genus of animals allied to the swine, found extensively in South America and the southern parts of North America. Two species have been described, the *white-lipped* and the *collared* peccary. The former is confined principally to the region between Mexico and Paraguay, where large droves are often met with, while the latter ranges from Patagonia to Arkansas in small packs. The white-lipped peccary has been successfully domesti-

cated. It never produces more than two young at a birth. It has tender, agreeable flesh, which is less fat than that of swine. The peccary feeds on potatoes, maize, sugar cane, and other vegetable forms. Both species have curved tusks and a dorsal organ secreting an oily, musky substance. The latter must be removed immediately after the animal is slaughtered, since it otherwise conveys a peculiar scent to the flesh.

PECOS (pā'kōs), a river of the United States, which rises a short distance east of Santa Fé, N. M., and, after a course of about 800 miles toward the southeast, joins the Rio Grande at Painted Cave, Tex. It has a number of tributaries both in New Mexico and Texas, but in the summer season little water flows in its channel.

PEDAGOGY (pěd'ā-gō-jǎ), or **Pedagogics**, the science and art of teaching. A wider definition would be the science and art of education and this would probably be also a truer definition of the word as now used. Some American educators have objected to the term pedagogy, but there seems to be no just ground for this objection and any dislike of the word is certainly not shared by either German or French writers upon the subject. The term may not be wholly satisfactory in the etymological sense, but by our widespread usage it has come to connote quite clearly the processes of formal education.

The subject includes educational psychology, methodology, and educational economy. The first underlies the whole subject, as there can be no good teaching and no successful school management that are not based upon psychology.

EDUCATIONAL PSYCHOLOGY. Educational psychology is both theoretical and practical, or applied. As theoretical, it is constantly pushing forward into the realm of observation and experiment, seeking to establish definitely the conditions and modes of mental growth. In its applied phase, it claims to have formulated certain fundamental laws of mind activity that shall furnish trustworthy guidance to the teacher who is actually at work. It should be remembered that there is much psychology of a most interesting character which is purely speculative, or is concerned with problems of consciousness that lie outside the field of teaching. In these phases of psychology the teacher has little or no professional interest. They do not touch in any helpful or intimate way his daily work. It is here that the chief criticism lodges against much psychology that is offered in teachers' reading circles; it is of no special benefit to the teacher as a teacher, no matter how inter-

esting it may be to the investigator or the general reader.

A subdivision of psychology which should receive special attention from the teacher is genetic psychology, which undertakes to show something of the beginnings of the activity of the different powers of consciousness. The constantly developing subject of child study is the leading phase of genetic psychology. The important questions here are: What activities manifest themselves first? In what order are they manifested? And at what ages of the child do they become most characteristic? It is now generally recognized that the most important periods of the child's life are in the first two or three years of school and in adolescence. Genetic psychology, in the strict meaning of the words, deals with the earlier years of the child's mental life, and the psychology of adolescence is usually treated as a separate subject; although, if the term *genetic* be used in its widest sense, it could be applied to the beginnings of any phase of development of mental activity. It is hardly necessary to say that although the psychology of childhood should receive the special attention of the elementary teacher and the psychology of adolescence should receive the special study of the secondary teacher, yet it is helpful to both to study both subjects. The elementary teacher should constantly look forward to the adolescent period and the secondary teacher should know how the child develops into the adolescent.

The teacher of any grade should study with care not only the best writing he can find upon psychological subjects, but should especially study the mental growth of the pupil himself with particular reference to the function of the sensory apparatus and the processes of concept, formation of judgment, imagination, the feelings, and the will. The mental life and growth of the pupil are wholly dependent upon the activity of these powers. The richness of an individual's mental equipment is dependent upon the number and clearness of his concepts. His adjustment to his surroundings and his adjustment of his surroundings to his own needs are dependent upon the quickness and accuracy of his judgment, the force of his imagination, the fullness of his emotional nature, and the strength of his will. The teacher should, therefore, know how to secure in his pupil the acquisition of abundant concepts, the exercise of the relational power which we call judgment, of the creative power or imagination, and of the great character builders, which are the feelings and the will.

The points of closest contact between psychol-

ogy and the work of the teacher are in the psychological valuation of studies and in the mental operations of acquisition, assimilation, and expression. Only such subjects should find a place in the school curriculum as show rich values in practical utility, in mental discipline, or in culture. The determination of which subjects have greatest utility lies in the field of *educational economy*. The determination of the disciplinary and cultural value lies in the field of *psychology*. Some subjects are particularly valuable in developing the acquisitive powers—the senses and memory. It is true that every subject has some value in each of these three phases, but the subjects that are distinctly acquisitional are nature study and the elementary sciences, history, geography, physiology, and spelling. The subjects that are especially fitted to cultivate the assimilative powers are arithmetic, grammar, advanced history, and the sciences. Subjects that are particularly rich in culture value are those which are homocentric, such as geography, history, civil government, and sociology. It will be readily seen that most subjects have all three values to some extent. How much they have and how best to give the pupil the benefit of it can be determined only by a careful study of applied psychology.

A safe ground for the teacher to stand upon in his daily work is that furnished by the psychological fact of sensori-motor activity. All human knowledge comes from sense activity either directly or indirectly. The sensory stream is the ingoing stream and brings to the growing consciousness sense impressions of the external world. In the normal child, however, sensory impression tends to start a motor current which will have its effect in some form of expression. It has been too long the case that our schools pay but little attention to the material of either stream. There has not until comparatively recent years been any definite intelligently directed effort to supply valuable sense stimuli to the growing consciousness. With a world of sense objects all around him to which he must adjust himself and in which he must work all his life, the child has had little specific sense training. Book work has been the principal thing and has been sadly overdone. It is good to note a change for the better in the introduction of nature study and elementary sciences in the grades. Since the ingoing stream is the sensory stream, it should be enriched in every way possible by the use of concrete objects in the student's environment. Every sense organ should be trained to a delicate sensitiveness to impression and the growing consciousness

should be surrounded by carefully selected sense stimuli.

The truth, that the ingoing stream is a sensory current, has its correlative in the equally important truth that the outgoing stream is the motor stream, and that the motor impulses follow closely upon the sensory impulse is getting to be more and more recognized. This means simply that the present-day tendency to make manual training, vocational activities and even play integral and important parts of the curriculum is based upon the soundest psychology and is a clear if somewhat tardy recognition of the other arc of the sensori-motor circuit. The fully equipped school will provide abundant facilities for sense training and for motor training in all grades. It seems strange that so fundamental an application of an evident psychological truth should have been so slow in coming.

In the training of expression, or, as it has been well termed, *self-externalization*, it is well to remember that there are several equally important forms of externalizing the results of imagination, thought, and feeling. Of these, language, which has heretofore received the most attention, is only one, and not necessarily the most valuable. Other forms are drawing, music, constructive work in the making of things, and conduct. It is necessary to train pupils in all these forms of expression in order to produce the fully rounded human which modern ideals demand as the practical product of educational processes.

It is in expression that the usefulness of the teacher's knowledge of psychology and the value of his work in the schoolroom find their unerring test. The teacher cannot tell how much a pupil has acquired, how well classified his acquisitions are, or how accurately active his mental processes have been, except through the pupil's power to express results. Books that will be found helpful to the teacher in the study of educational psychology are: Halleck's "Education of the Central Nervous System," Roark's "Psychology in Education," Baldwin's "Psychology Applied to Teaching," Baldwin's "Elementary Psychology and Education," and Compayre's "Psychology Applied to Education."

METHODOLOGY. Methodology, or the science and art of method in teaching, grows immediately out of educational psychology and must rest upon it. This division of pedagogy is made up of the principles of sound and rational practice in teaching which have been drawn from a careful study of the learning mind. It is essentially an inductive science. The validity of its principles is wholly dependent upon conclusions

that have been drawn from an extended observation of the actual movements of the mind in its processes of growth.

The chief problem which the student of method has to solve is: How has the learning child advanced so far in the short time between infancy and his entrance into school? The most important foundations of method which rest immediately upon known psychological facts and upon which in turn must rest all valid principles of methodology are: First, the child is innately active in mind and body and enjoys this natural and inherent activity; second, the mind has an inherent tendency to form general conclusions, that is, to generalize the facts of sensory perception, concepts, and all forms of expression; and, third, all the mental and physical life of the child tends constantly to find expression. A teacher who is in full possession of these fundamentals and some of their more evident applications is in a position to develop his own methodology which, after all, will be better than any other that he can get.

The two concepts which have been found most fertile in modern methodology are: First, that the child is the best guide to the teacher; that the teacher must study the child's method of acquisition, assimilation, and expression of knowledge rather than try to graft upon him an abstract, logical, and artificial method of the teacher's own. Second, that, if the child's interest be enlisted, all work becomes a pleasure to both pupil and teacher.

Pedagogy was not free to do any work worth while until it freed itself from the medieval conception that the child starts out innately wrong and needs restraint or alteration of its inherent tendency at every point. We know now that the only safe road in pedagogy is that indicated by the words of the Book, "A little child shall lead them." It may be truthfully said that the greatest discovery of modern pedagogy is the discovery of the child as a living organism that develops according to its own inherent laws and whose normal growth is in right directions. Just as the laws of biology were discovered by observing the behavior of living organisms, so the laws of pedagogy are discovered by observing the modes of activity of the psychic organism. Since taking the child as the only safe guide, pedagogy has traveled rapidly along the right road.

Another most favorable concept lying at the basis of good method is that embodied in the Herbartian doctrine of interest. It was, perhaps, unavoidable that so stimulating a principle should sometimes run into extremes. Two

things should be carefully remembered by the teacher as safeguards against absurd applications of the doctrine of interest. One is, that interest is neither more nor less than some form of feeling; whatever arouses, stimulates or gratifies feeling creates interest. The other fact to be remembered is that the teacher should be more concerned with remote interests than with immediate ones. The function of the teacher is not to follow blindly the transient and evanescent interests of the pupil, but to arouse in him an abiding interest in the work he ought to do to reach a definite end. This interpretation of the doctrine of interest cannot fail to carry pupils and teachers through almost any kind and amount of drudgery. A boy will do a great deal of work readily and willingly even when he feels a pronounced aversion to it, if he knows that by doing it he can attain to something that he especially desires. The same fact is the governing fact with all classes of workers, and is as true of the old as of the young.

It remains to mention a few of the most familiar and helpful general rules of method. One of these—to proceed from the known to the unknown—means that the introduction of a new subject should be connected with knowledge which the learner already possesses. If the new matter is altogether strange, there is nothing for the mind to take hold of in the attempt to master it. Another good rule is, proceed psychologically rather than logically in the presentation and development of a subject. For example, the logical presentation of a study of the human body would begin with cells and cell structure and pass to tissues, organs, and systems. The psychological presentation, which is the proper one and which conforms to the analytic-synthetic method, would begin with systems and pass to the organs, tissues, and cells. A third rule of methodology that should be generally observed is to train the learner in the ready formation of general notions derived from individual percepts and concepts. All fruitful mental activity depends upon the richness and accuracy of concepts, and, therefore, the formation of such concepts by the pupil should receive the constant thought and attention of the teacher.

The whole subject of methodology may be divided into general method and special method. *General method* is made up of the fundamental principles to which allusion has already been made, and *special method* is concerned with the application of these general principles to the work of the several branches of study. The following books have been found very helpful to

the student of methodology: McMurry's "Method of Recitation," McMurry's "General Method," Roark's "Method in Education," Brooks' "Normal Methods," and McMurry's books of special method in the separate branches.

EDUCATIONAL ECONOMY. This division of pedagogics includes the principles of practice, school organization, and management. It is now generally recognized that educational economy is as important and wide-reaching a study as political or social economy. In fact, educational economy is a necessary and integral part of social economy. Much of the best thought of the most careful students of sociology is given now to the topics just named. Valuable articles upon these subjects may be found, not only in the educational publications of the day, but in the best of the literary periodicals and papers. The American people are becoming fully awakened to the fact that they have a much more intimate and abiding interest in their school system and in the individual school which they are called upon locally to support than they have in who shall go to the State or Federal capitals to represent them in the state or national legislatures.

Educational economy naturally falls into three subheads: First, organization and administration of the individual school; second, organization and administration of school systems; and, third, correlation of the school and the community. The discussion of the organization and management of the individual school corresponds closely to the old title of school management, but includes not only the management of the rural school but the management also of the city school, the academy, the college, and the normal school, the fundamental principles being the same for all of these. The organization and administration of school systems include the making of a State, or Provincial, system and of a city system, and the careful planning and administration of the curricula for each.

In the second division of educational economy are discussed such topics as the culture epoch theory, the election of studies, the distinctive function of the elementary school and the secondary school, and the respective values of a vocational and a cultural curriculum.

For a time, considerable significance was attached in school circles to what is known as the *culture epoch theory*, which teaches that, as the child develops, he recapitulates or repeats the culture epochs in the development of the race from savagery and barbarism up to modern civilization. Attempts have been made to base practical school curricula upon this theory and provide study and employment for children

suited to the different stages of their development, but the effort has been abandoned practically everywhere in America, as it now seems certain that many of the earlier experiences of the race should not be repeated by the child of to-day. It has been found also that the *culture epochs* in individual cases are so overlaid by race, local, and individual idiosyncrasies as not to be worth considering, other than in a very general way, in the arrangement of a school curriculum.

Many of the strongest American educators have advocated the doctrine of election of studies which promises to pupils the greatest freedom and choice of studies which they will pursue. This doctrine also, like many others in modern pedagogy, has been carried to an absurd extreme. Some schoolmen go so far as to advocate freedom of election in the grades. The same view to which most educators are now coming is that the schools should offer and should require every pupil to take that definite body of knowledge which the experience of the race has found to be worth while, but that to this may be added such other subjects as the pupil shows special aptitude for.

Coming to a consideration of the relative functions of different schools, it appears that there is practically no difference of opinion as to the function of the elementary school. All are agreed that it is the agency for putting the child in possession of the alphabet to knowledge. With regard to the function of the secondary school there has been much difference of opinion and discussion. At present the tendency among schoolmen seems to be to advocate the establishment of one or all of the leading classes of high schools according to local conditions and the size of the community. Thus in one community there will be a classical high school; in another, the English-scientific; in another, the commercial; in another, the manual training or vocation school; and in the larger centers all of these will frequently be found, their existence based upon the fact that the secondary school should concern itself with the preparation of the youth of both sexes for such things as a majority of them in any community will want to do after completing the high school course. If the community is one that has always sent a large number to college or university, the secondary school should fit for college. If the community is one in which the utilitarian view prevails, the high school should prepare for active life rather than for entrance to college.

With these questions is, of course, bound up intimately the question as to whether the modern secondary school and college should offer

a vocational or a cultural curriculum. This question is still under active discussion and a conclusive answer will probably not be arrived at for some years to come. It is to be hoped that it will be so answered that every boy and girl will have, upon completing the work of the high school, a means whereby he may make an honest and satisfactory living and have his higher nature so trained at the same time that he can get rich enjoyment from the humanities.

The correlation of school and community, which is the third division of educational economy, includes such topics as the mutual relation of the home and school, the coöperation of public libraries, museums, and art galleries with the school, the establishment of night schools, and the use of schoolhouses as community centers every day or night as means of culture and growth for citizens of all ages, the establishment of public playgrounds, vacation schools, and educational extension designed to reach all classes. It will be seen from this summary that educational economy has a very wide reach and includes all topics which take the school on the one hand and the community on the other.

There has been in recent years a great increase in the interest of the general public in educational affairs. For a long time there was too much feeling that the work of the school-room, beyond mere rudiments of learning, has no vital connection with the practical affairs of life. The great educational awakening of the past decade or two has brought about many important and valuable changes in method and in management. The work of the classroom has been made more agreeable to the learner and thus more productive of mental growth and development. The course of study has been greatly enriched as the result of a realization of the relation of the individual to society and of the duty of society to the individual. The rapid changes brought about as the result of a closer study of educational processes and conditions have sometimes run into fads, but on the whole the tendency in educational matters has been constantly upward in the direction of better things.

The student of educational economy will find most valuable matter in the reports of the National Commissioner of Education, the reports of the National Educational Association, and in the reports of the city and State or Provincial superintendents.

PEDEE, Great and Little. See **Great Pedee**.

PEDOMETER (pě-döm'ě-těr), or **Odom-**

eter, an instrument in the form of a watch, which is used to measure distances passed over in traveling. A small pedometer, containing a train of wheels in a small case and registering on a dial the number of impulses from a cord attached to the foot, is worn by persons walking. In this form it measures the number of paces traveled. An instrument of similar construction is attached to the wheel of a carriage or bicycle to indicate distance. The Romans attached pedometers to the wheels of carriages and chariots.

PEEKSKILL (pěks'kĭl), a village of New York, in Westchester County, on the Hudson River, 43 miles north of New York City. It is on the New York Central Railroad and has communication by electric railways. The chief buildings include the Field Library, the high school, the House of the Good Shepherd, and the Saint Joseph's Home. Among the manufactures are flour, machinery, ironware, stoves, cigars, electrical appliances, and clothing. It has systems of waterworks and sanitary sewerage. The place was settled in 1764 and incorporated as a village in 1816. Population, 1905, 13,200; in 1910, 15,245.

PEER, the general name applied to any one of the five degrees of nobility in England, consisting of the ranks of duke, marquis, earl, viscount, and baron. In a more strict sense it denotes a member of the House of Lords, who may be a nobleman or a prelate of the Church of England. The term, as used in a general sense, signifies equality, having reference to one of the same rank and station. This is the sense in which it is used by the English common law, which provides that the trial of a person is to be by his peers.

PEGASUS (pěg'á-sūs), in Greek legend, a beautiful winged horse that sprang from the body of Medusa when she was slain by the hero Perseus. It is stated that he immediately flew to the top of Mount Olympus, where he was employed by Zeus to convey thunder and lightning through the heavens, and later he carried Bellerophon in his fight against Chimaera. In later times Pegasus served the Muses and represented the poetical inspiration that tends to develop man's higher nature and causes the mind to soar heavenward. He was regarded the author of the sacred fount Hippocrene, which he produced by stamping with his heel near the summit of Mount Helicon, whence the Muses obtained their richest draughts of inspiration. Some writers assert that he was bridled by Bellerophon with a golden bridle received from Minerva.

PEI-HO (pā'ho'), a river in the northern

part of China, which rises near the Great Wall and flows in a southeasterly direction through the province of Chi-li. It discharges into the gulf of Pe-chi-li at Taku, after a course of 350 miles. The Hun-ho joins it at Tien-tsin, where it is connected with the Grand Canal. Coast and river steamers navigate it to this point, a distance of eighty miles from its mouth.

PEIPUS (pī'pōos), a lake in the northwestern part of Russia, about thirty miles south of the Gulf of Finland. It is fifty miles long and twenty miles wide. A narrow channel connects it with Lake Pskov, located a short distance south. The Narova River carries the overflow into the Gulf of Finland.

PEKIN (pē'kīn), a city in Illinois, county seat of Tazewell County, on the Illinois River, 55 miles north of Springfield. It is on the Illinois, Central, the Chicago and Alton, the Atchison, Topeka and Santa Fé, and other railroads. The surrounding country produces grain, hay, and fruits. The principal buildings include the county courthouse, the public library, the high school, and many churches. Among the manufactures are spirituous liquors, flour, hardware, soda water, marble products, carriages, cigars, and machinery. The public utilities include sanitary sewerage, pavements, waterworks, and street railways. It was settled in 1829 and incorporated in 1850. Population, 1900, 8,420; in 1910, 9,897.

PEKING (pē-kīng'), or **Pekin**, the capital of the Chinese Empire, in the province of Pe-chi-li, 100 miles northwest of the Gulf of Pe-chi-li. The site is in the center of a sandy plain, about 60 miles south of the great Chinese wall. It is surrounded by walls built of brick and stone laid in cement. Properly it consists of two parts, the northern and the southern. The northern part forms the Tartar city. It is surrounded by a wall 60 feet high, which is 50 feet wide at the base and 40 feet at the top. The southern part is the Chinese city and is inclosed by a wall 30 feet high, 25 feet wide at the base, and 12 feet at the top. It is estimated that the walls surrounding the outer city and suburbs are about 30 miles in length. They are so constructed that fully 25 square miles are inclosed by them. Sixteen gates are provided for entrance into the city, and each is protected by an enceinte and an imposing tower. Within the northern part is the Prohibited City, known as the Kinching, where the palace of the emperor and the buildings of the principal officers are located. This section includes the Tranquil Palace of Heaven in which the emperor resides. Within its confines are the Palace of Earth's

Repose and the residence of the empress. Beautiful gardens, magnificent groves, and artificial lakes are in this vicinity. It is at once a place of security and beauty.

The legations of foreign countries, including those of the United States, France, Germany, Russia, and Great Britain, are located in the Tartar city proper. In 1900 the German minister, Baron von Ketteler, was murdered in that portion of the city, and there the United States minister, E. H. Conger, was held captive in 1900 until liberated by the allied forces of the United States and European nations. Peking has many excellent temples and public buildings. Among the more important structures are the Temple of Agriculture, the Mohammedan mosque, the Temple of Eternal Peace, the Imperial Library, the Temple of Heaven, the Grand National College, the Observatory, and the Chinese Medical College. The city has many elementary schools, colleges, and places of worship. As a whole its trade is limited and the manufactures are not extensive. The store buildings are open in front, and are so built that the customers stand on the street when making purchases. Few pavements are in the city, though telephone and telegraph connections are abundant, and a railroad line connects the city with the Gulf of Pe-chi-li and several other important points. Many of the citizens are extremely poor. Residences are not uncommonly mixed with factories, public offices, and temples, and the sanitary regulations in many parts are greatly neglected.

Peking was the capital of the kingdom of Yen many centuries before the Christian era, but when the Tsin dynasty overthrew the kingdom, in 222 B. C., it ceased to be the seat of government. The Kitan dynasty restored it as the capital in 938 A. D., but Genghis Khan captured it in 1215, though with the conquest of the Mongols, about 1280, it became second to Nanking, and that city was made the capital. Yung-Lo, the third emperor of the Ming dynasty, removed the court to Peking in 1421, and since then it has continued to be the capital. The allied army of the French and English, in 1860, invaded China, when they secured from the emperor the Treaty of Tien-tsin. Subsequently other treaties were concluded whereby legations are allowed to reside in the city, but they are forbidden entrance into the Prohibited City. In 1900 Peking was the scene of vast military disturbances, and was occupied by the allied armies of the United States, Germany, Russia, England, and France under General Waldersee. Population, 990,000.

PELASGIANS (pē-lās'gī-anz), an ancient

and widely distributed tribe of prehistoric people, who are considered the ancestors of the Greeks and of the earliest civilized inhabitants of Asia Minor and Italy. It is not known where or how these people originated, but most writers agree that Arcadia was one of their principal seats, where they prospered for many centuries. Many Greek writers, including Homer, Herodotus, and Aeschylus, speak of them as the Pelasgi and regard them the inhabitants of Greece at a very early period, though Strabo and several others speak of them only as a branch of the early Hellenic inhabitants. Some historians assert that they were a powerful people even before the 15th century B. C., when they were in possession of the northern coast of the Mediterranean. Later they formed an alliance with the Lydians and Achaeans. In the reign of Rameses I. they conquered a portion of Lower Egypt.

PELÉE (pē-lā'), **Mont**, an active volcano in the island of Martinique, near the north-western shore. The slopes are gradual, but the surface is scarred by many deep ravines and waterways. Formerly it had an elevation of 4,200 feet, but the destructive eruption of 1902 increased the height about 700 feet. Before that time Saint Pierre, located near the base of Mont Pelée, was the chief commercial center, but it was almost totally destroyed at the time of the eruption. It was supposed to be an extinct volcano, as disturbances had not been noticed since about 1850, and in its crater was a lake fully fifty yards in diameter and surrounded by vegetation. The first occurrence of activity became known in April, when clouds of smoke rose from the summit and the temperature grew several degrees warmer, but no serious eruptions took place until May 5th, when mud was thrown from the crater and flooded the sides of the mountain. Three days later the great eruption occurred, which destroyed Saint Pierre and a number of adjacent towns, killing about 30,000 people within a space of ten minutes. In the harbor were eighteen vessels at the time of the eruption and of these only one escaped. The temperature in the vicinity of the volcano was so intense that relief parties could not reach the towns in ruin and, when a landing was effected, it was found that not a living thing remained. However, Saint Pierre was not embedded in lava and ashes, but life was destroyed by poisonous gases and extreme heat.

PELEW ISLANDS (pē-lōō'), a group of islands in the North Pacific Ocean. They are located about 425 miles east of the Philippines and belong to the Caroline Archipelago. The

group includes about 25 inhabitable islands, most of which have a rich and fertile soil, an abundance of water, and excellent fisheries. The interior is mountainous. Coral formations encircle the greater number of islands. The climate is healthful and quite favorable to Europeans. Among the productions are cocoanuts, sugar cane, tropical forest trees, cattle, goats, fowls, agricultural products, and many kinds of fruits. The population consists principally of Polynesians, but several European settlements are maintained, the most flourishing being at Tomil Harbor. Spanish navigators explored the group in 1543, and in 1899 they and all the Carolines, except Guam, were bought by Germany, to which country they now belong. Population, 1908, 6,745.

· PELICAN (pēl'ī-kān), a genus of web-footed water birds, remarkable for their broad bill with a pouch under it. The bill is flattened, nearly straight, and very long. At the end of the upper mandible is a hook curving over the tip of the lower one. In size the bird is about as large as a swan and the feathers are hair-like. The pouch is underneath the lower mandible. It consists of naked skin and serves for the temporary storage of food, thus making it possible to preserve a quantity for future wants. Pelicans are swift in swimming and in flight, and hover over their prey until they can catch it by swooping down unawares. Several species are native to the United States, including the familiar *white pelican*. It is about six feet long, has an expanse of wing of about nine feet, and weighs eighteen pounds. The *brown pelican* is found on the coasts of the Gulf of Mexico and the Caribbean Sea. Several allied species of birds are found in the Old World, including the *common pelican* of Asia and Africa, which is as large as a swan. These birds live along the shores of streams and the seacoast, where they feed on fish and other aquatic animals. Their nests are built close to the shore, usually in rushes, where they feed the young from the pouch. The ancients had a tradition that the young are fed with blood from the breast, and a number of interesting fables have been written on account of it. Pelicans can be domesticated successfully. Negroes and Indians regard their flesh valuable food, but it is rank and has a fishy taste and is not eaten by the whites. See illustration on following page.

· PELLA (pēl'lā), an ancient city of Macedonia, on the Ludias River, near the present Lake of Janitza. Philip II. made it a town of much importance and in his time it had a population of about 90,000. It gradually declined after its

surrender to the Romans in 168 B. C., but at present only a few scattered ruins remain. Pella was the birthplace of Alexander the Great.

PELOPONNESUS (pě-l-ō-pōn-nē'sūs), the peninsula forming the southern part of Greece, now called the Morea, so named from King Pelops, who made it the seat of a Grecian colony. The peninsula is connected with northern Greece by the Isthmus of Corinth, a narrow neck of land lying between the Saronic Gulf



WHITE PELICAN.

and the Gulf of Corinth. It is about 140 miles from north to south, has an area of 8,975 square miles, and formerly contained a population of 2,000,000, though at present the inhabitants number only about one-seventh of that number. The principal cities of ancient times were Argos, Mycenae, and Sparta, and in 431-404 B. C. it was the seat of the Peloponnesian War. Anciently it was divided into the six states of Laconia, Sparta, Messenia, Arcadia, Elis, and Argolis. Some writers add a seventh state, Sicyon. A part of the region was conquered by the Turks in the 15th century, and subsequently it was a possession of the Venetians. In 1821 it was the scene of several battles in the Greek war of independence.

PELOTAS (pā-lō'tāsh), a city of southern Brazil, in the state of Rio Grande do Sul, on

Lake Patos. It is surrounded by a productive stock country and is the seat of a large meat-curing industry. The place has railroad connections with interior towns and seaport cities, and a large market in tallow, bones, hides, horns, merchandise, and utensils. The streets are regularly platted and intersect each other at right angles. It is one of the wealthiest and most beautiful cities in Brazil. Population, 1906, 44,250.

PELVIS (pě'vīs), the portion of the human frame which connects the column of the spine with the lower extremities, serving to transfer the weight of the upper part of the body to the lower limbs. It consists of two main bones known as the *innominales*, into the sockets of which are fitted the thigh bones. The pelvis has an oblique position with regard to the trunk of the body and behind are the *sacrum* and *coccyx*, two bones forming the lower extremity of the vertebral column. Within the pelvis cavity is the lower part of the intestines. The pelvis varies somewhat in the skeleton of the different races, as well as in the male and female.

PEMBA (pěm'bà), an island off the east coast of Africa, about 30 miles north of Zanzibar. It has an area of 380 square miles. The products include rice, maize, fruits, and sugar cane. For the purpose of government it is connected with Zanzibar, being a part of the dominion of the native sultan, but under the protectorate of the British. Chaka is the chief town. Population, 50,000.

PEMBROKE (pěm'brōk), a city of Ontario, county seat of Renfrew County, on the Ottawa River and the Canadian Pacific Railway, 85 miles northwest of Ottawa. The noteworthy buildings include the high school, the county courthouse, the city hall, and a number of churches. It has a large trade in lumber and merchandise. The manufactures include furniture, lumber products, and machinery. An extension of the Ottawa River, known as Lake Allumette, contains the island of Allumette. This island was visited by Champlain in 1633, while exploring the valley of the Ottawa. Population, 1901, 5,156.

PEMMICAN (pěm'mī-kān), an article of food originally made of buffalo meat by the American Indians. They first cut the lean meat into strips. After drying it in the sun or wind, it was pounded into a paste and tightly pressed

to form cakes, which they sometimes flavored with the juice of the Juneberry. A somewhat similar food is now made from beef and dried fruit. It possesses a large per cent. of nourishment in small space and keeps well for a long time. This class of food is used on long voyages or explorations.

PEN, an instrument for writing with a fluid ink, usually made of metal and fitted to a holder. The ancients used pens made from reeds for writing on papyrus or parchment, and reed pens are still in use among the people of Persia and other countries of Western Asia. A pointed stylus of metal, bone, or other material was employed in early times for writing on wood or stone. The peoples using characters like those employed by the Chinese and Japanese write with a hair pencil or brush. With the manufacture of paper suitable for writing pens came into general use, but they were originally made from quills, mostly those of the goose, turkey, swan, crow, and ostrich. The best quill pens are obtained from quills taken from the wings of the goose, and in many sections of the Old World pens of this kind are still used extensively. The quills are at first soft and tough, but they are prepared for use by a process of heating and dipping in alum

Other improvements in pen manufacture speedily followed, and within a very short time steel pens came into general use. The process of manufacturing involves a variety of operations, including the rolling of the best quality of cast steel into sheets, cutting them into flat pieces called *blanks*, and afterward stamping and embossing them. An emery wheel is used to finish the nibs or points, after which the slit is cut, and the pens are glazed with a varnish and boxed for the market.

Gold pens are more expensive than those made of steel, but by exercising care they serve a useful purpose for many years. The nibs of gold pens are made by tipping them with iridium, one of the hardest of metals, after which they are ground down on an emery wheel and polished. *Fountain pens*, having a reservoir from which the ink feeds by gravity to the point, were invented by Joseph Bramah. A similar class, the *stylographic pen*, has a reservoir to hold the ink, but the fluid escapes when the pencil-shaped point is pressed upon the paper. These pens are used extensively by persons desiring to have writing material at hand when they are away from the office. Pen making is now an important industry. Extensive factories are maintained in which mil-



water, after which they are cut for use with a pen-cutter's knife.

Steel pens are now in general use among the people of America, Europe, and most of the more highly civilized countries. They were first manufactured in the early part of the 19th century, and originally were made to resemble the quill pen, forming a barrel of very thin steel, being cut and slit in the manner of a quill. The principal fault was their hardness, which caused them to scratch the paper in a disagreeable manner. In 1820 Joseph Gillott introduced marked improvements in the manufacture of pens, by which he was able to make them of much thinner sheets of steel and thus render them more elastic, at the same time giving them higher finish and temper. His factory at Manchester, England, became an important seat of pen making, and the price was so materially reduced that in 1821 1,000 pens could be purchased at the price of a single pen made by manufacturers at the same place in 1803.

lions of pens are made annually for home use and for exportation. The principal manufactories of North America are located in Camden, Philadelphia, Meriden, and New York City. At present the pen manufactories of England are the most important in Europe, though Germany, France, Sweden, and a number of other countries produce large quantities. The *Gillott pens* and several others of European make are sold extensively in the markets of Canada and the United States.

PENANCE (pĕn'ans), the penalty accepted or self-imposed by a repentant sinner who manifests his sorrow for sin. In this way the penitent sinner seeks to avert punishment through the atonement. Luther taught the doctrine of justification by faith in Jesus Christ alone, and opposed the doctrine of penance as being contrary to the essential principle that Christ completed or finished his work. In this he has been generally followed by Protestants, who do not recognize penance. The Roman Cath-

olics regard it as one of the seven sacraments and believe that it is of divine origin. They instituted it from the words of Jesus in John xx., 22: "Receive the Holy Ghost; whose sins ye shall forgive they are forgiven them, and whose sins ye shall retain they are retained." The conditions required on the part of the penitent are contrition and confession, after which absolution is pronounced by the priest. While this releases him from sin, the temporal reparation required by divine justice is not always canceled, but this satisfaction, as it is termed, is imposed in the form of prayer, almsgiving, and fasting.

PENANG (pě-nǎng'), or **Prince of Wales Island**, an island belonging to Great Britain, situated near the west coast of the Malay Peninsula, in the Strait of Malacca. It is about thirteen miles long and seven miles wide, and has an area of 106 square miles. The surface is partly mountainous, but consists in part of fertile plains. It is well watered and has a favorable climate: Among the principal productions are coffee, rice, pepper, tapioca, nutmegs, coconuts, cloves, sugar, and tropical fruits. Minerals are found in the mountains, especially tin ore. In all parts of the island are valuable forests. Georgetown is the capital and principal seaport. The inhabitants consist mostly of Chinese, Malays, and Burmans. Mohammedanism is the chief religion, but many natives are Christians. Population, 1906, 128,986.

PENCIL (pě'n'sil), an instrument used for writing, drawing, marking, and painting. It is usually made of a slender casing of wood inclosing a thin strip of graphite, colored chalk, or other material, or of a relatively large piece of graphite, slate, or chalk without a casing. The name is frequently applied to a small brush of hair used by painters in laying on their colors, the hairs used being mostly those of the badger, camel, mink, and goat. In some cases the bristles of hogs are used in making such pencils. Originally pencils consisted of chalk and other material cut to be held in the hand, but later pencils similar to the black-lead instrument now used extensively were invented. The first allusion to a pencil formed of wood and lead occurs in a treatise on fossils by Conrad Gesner, of Switzerland, bearing date of 1565. Pure lead was used in writing for some time, but, as this makes only a light mark on paper, it was soon displaced by the discovery of graphite or plumbago, which is now employed in the manufacture of the common black-lead pencils in general use. The wooden casing is usually made of cedar, though higher grades of

pencils are made of more expensive species of wood.

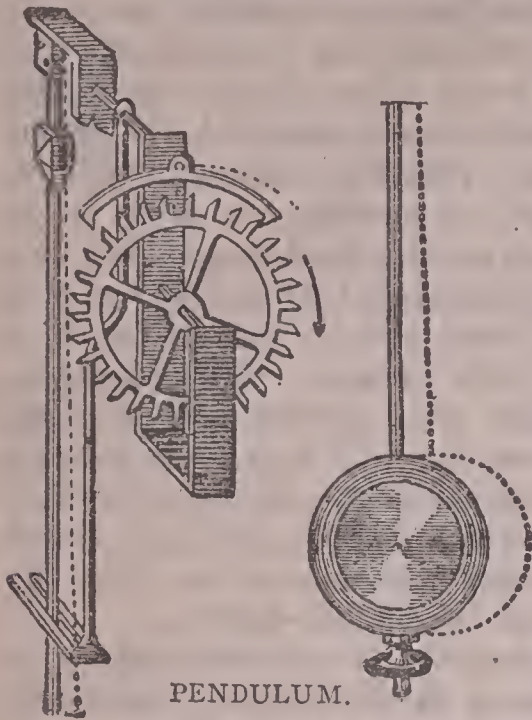
The casing of lead pencils consists of two slips of unequal thickness, the thicker one having a groove in which the lead fits perfectly and the thinner one being glued on to cover the lead. After these parts are adjusted, the pencil is rounded in a revolving cutting machine. Pencils of an inferior quality are made of a mixture of sulphur and the dust of graphite, but this preparation is softened by the addition of a little tallow. Colored pencils are made of a mixture of clay with mineral coloring matter. The essential part of indelible and copying pencils is composed of clay and gum colored with an aniline preparation. Slate pencils are cut from thin strips of slate and afterward rounded by a cutting machine, or are made by encasing thin strips of slate in wood.

The largest manufactories of lead pencils in Europe are situated at Nuremberg, Germany, where extensive deposits of graphite occur. The first manufactory for making lead pencils in the United States was established in New York City by M. L. Leman in 1830. In 1849 A. W. Faber, of Stein, Germany, established an agency in New York, and in 1881 founded a large manufactory in the same city, from which the pencil-making industry of America may be said to date. The Joseph Dixon Crucible Company has one of the largest pencil manufactories in the world, at Camden, N. J. Usually pencils are numbered according to the degree of hardness, as 1, 2, 3, 4, etc., the larger numbers representing those having harder lead than No. 1. In some cases letters are employed for the same purpose.

PENDLETON (pě'n'd'l-tŭn), a city of Oregon, county seat of Umatilla County, on the Umatilla River, 45 miles southwest of Walla Walla, Wash. It is on the Washington and Columbia River Railway and the line of the Oregon Railroad and Navigation Company. The surrounding country has large interests in farming and stock raising. Extensive water power is supplied by the river, furnishing an abundance for manufacturing purposes of various kinds. The county courthouse, two academies, the high school, and a number of churches are among the public buildings. The manufactures include flour, artificial ice, and machinery. It has electric lighting, a sewerage system, and public waterworks. Population, 1900, 4,406.

PENDULUM (pě'n'dŭ-lŭm), a body suspended or supported from a fixed point by a rod or cord so as to swing freely to and fro. The path through which it passes is called the *arc*, its

movements to and fro are termed *vibrations*, or *oscillations*, and the extent to which it goes in either direction from the lowest point is styled its *amplitude*.



Vibrations performed in equal times are said to be *isochronous*. A pendulum once set in motion would continue to move forever in the same arc if it were not impeded by the friction of the air and other agencies, since it acquires sufficient force

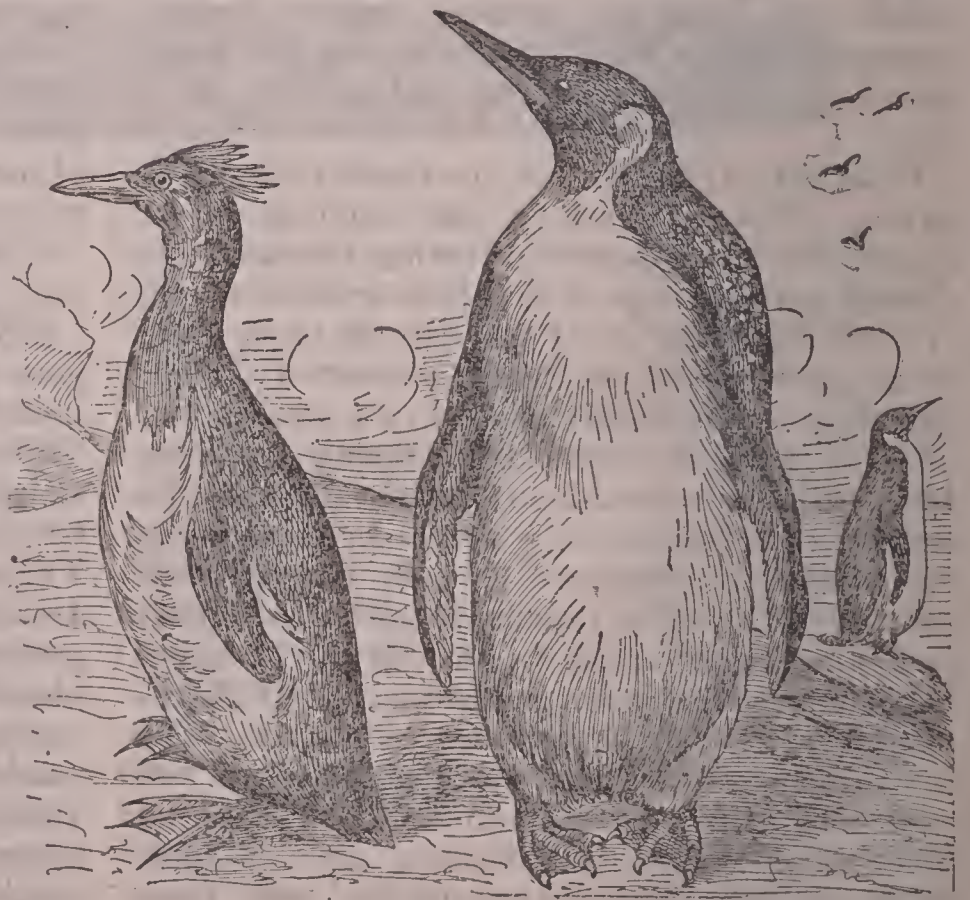
while moving downward the first half of the circular path to raise it to the same height on the opposite side. The three laws of the pendulum may be briefly stated as follows: 1. In the same pendulum, all vibrations of small amplitude are isochronous. 2. The times of the vibrations of different pendulums are proportional to the square root of their respective lengths. 3. The time of the vibration of the same pendulum varies at different places.

The *first law* was discovered by Galileo in watching the motions of a lamp swinging at the end of a long chain suspended from the cathedral roof at Pisa, where he observed that the oscillations were always equal in duration, and, when the arc of the circle became shorter, the movements were correspondingly slower. The resistance which the air offers causes the pendulum to swing through smaller and smaller arcs until it comes to rest, unless it is connected with a spring or weight. According to the *second law*, a pendulum one-ninth the length of another will vibrate three times as fast. Thus, a pendulum which vibrates seconds must be four times as long as one which vibrates half seconds. Heat lengthens and cold contracts the rod of a pendulum, if it be of a single metal, as steel or iron. These effects are neutralized by compensation pendulums, the two classes being known as mercurial and gridiron pendulums.

A *mercurial* pendulum has a vessel containing mercury at the lower end. The adjustment is such that, when the pendulum is expanded

downward by the heat, the mercury ascends in its inclosure, and, when the pendulum is contracted by cold, it descends correspondingly. The *gridiron* pendulum has bars of iron and brass to work against each other, the contraction or expansion of certain rods being overcome by that in the others. Clocks not provided with compensation pendulums have a screw below the bob, by which the length of the pendulum may be regulated according to the temperature at different times of the year, while others have a pendulum of wood, which is less liable to expansion and contraction than metal. The *third law* of the pendulum was discovered by observing the vibrations of a pendulum at different latitudes. At the Equator a pendulum vibrates most slowly, this being due to the fact that vibrations are directly proportional to the force of gravity at the place. The length of a pendulum vibrating seconds at sea level at the Equator must measure 39.02 inches; at New York, 39.10; at London, 39.13; and at Spitzbergen, 39.21. See **Escapement**.

PENGUIN (pĕn'gwĭn), a genus of web-footed birds found in the Southern Hemisphere. They have short wings that are useless in flight. The feet are adapted for an erect position of the body, the legs are very near the back part, and the body is covered with short, rigid



PETREL PENGUIN. GREAT PENGUIN.

feathers. A large number of species have been described, the principal ones being known as the *petrel penguin*, *great penguin*, *king penguin*, and *jackass penguin*. Most of the species

measure about two feet when standing erect, have completely webbed toes, and are remarkably skilled in swimming and diving, their rudimentary wings facilitating the rapidity of movement. They are found most abundantly in the high latitudes, especially on the shores of the Straits of Magellan, where they congregate in large flocks on rocky islands and coasts to breed. Navigators have frequently observed from 25,000 to 30,000 of these birds congregated together. They are described as stupid when approached, but show some courage when actually attacked. The young are edible. Penguins feed on cuttlefish and other marine animals and many species are noted for their bright plumage. These birds are remarkable for incubating their eggs by keeping them close between the thighs. The female becomes very fat during incubation, subsisting on food gathered for it by the male.

PENINSULAR CAMPAIGN (pĕn-ĭn'sŭ-lĕr), the name given to a movement in the Civil War of the United States, by which it was designed to capture Richmond, Va., the capital of the Confederate States. General McClellan was appointed to command all the Federal troops in the vicinity of Washington, on July 21, 1861, and everywhere resounded the popular cry, "On to Richmond." The campaign properly began on April 2, 1862, when McClellan landed his forces at Fort Monroe and marched between the York and James rivers toward Richmond, where General Johnston was in command. The Federals had an army of 120,000 men. They spent a month in the siege of Yorktown, but all the Confederates escaped. On May 4 McClellan was successful in the Battle of Williamsburg, where he defeated Johnston. However, Stonewall Jackson, with an army of 20,000 Confederates, marched through the Shenandoah valley and gained victories at McDowell and Winchester.

A large portion of McClellan's army took a position at Fair Oaks, where Johnston made a vigorous attack but was repulsed and wounded. He was succeeded in command by General Lee, who immediately sent reinforcements to Jackson in the Shenandoah valley. Then followed the engagements at Mechanicsville, Gaines's Mill, White Oak Swamp, Frazer's Farm, and Malvern Hill, known collectively as the Seven Days' Battles, and all were unfavorable to the national cause. In the last of these engagements, that at Malvern Hill, the Confederates sustained great losses and were defeated, but McClellan ordered a retreat to Harrison's Landing, where he reorganized his forces, but soon embarked for Washington.

The Peninsular Campaign ended by the later part of July, but Richmond had not been reached, although the Federals lost about 15,000 men. As a result of this movement, public confidence in the Federal army was weakened, while the Confederates gained strength in this respect.

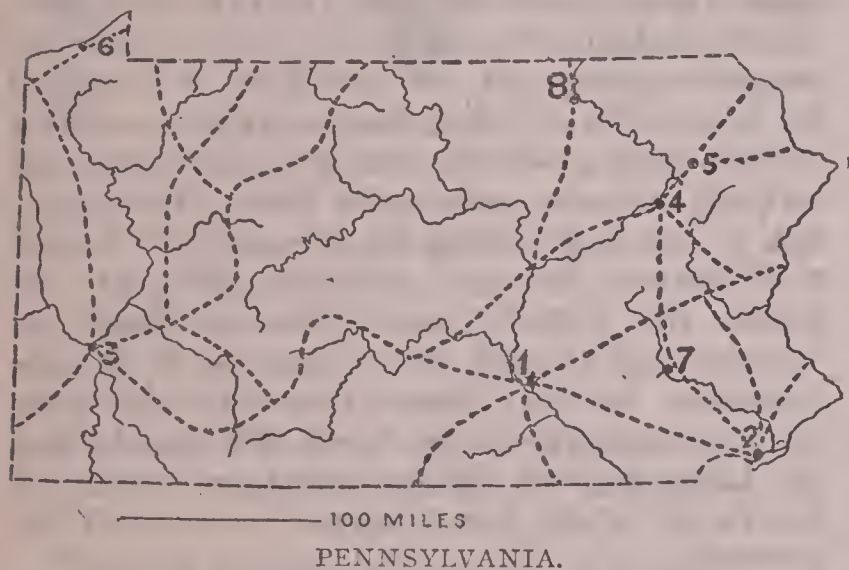
PENINSULAR WAR, the name generally applied to a war waged by Napoleon for the conquest of Spain and Portugal. It was caused principally by a disagreement between Charles IV., King of Spain, and his son Ferdinand, in 1807, which Napoleon made the occasion of interference. Accordingly he placed his brother Joseph on the throne of Spain, who was proclaimed king on July 24, 1808. The royal family of Portugal had previously fled to Brazil, but the people of both Portugal and Spain rose against the French in all parts of the peninsula. Napoleon had stationed French troops at many strategic points and the people at first carried on a guerrilla warfare, but on July 12, 1808, a British army of 30,000 men was sent under Sir Arthur Wellesley, afterward Duke of Wellington, to aid in expelling the French. He landed at Figueras, Portugal, and on Aug. 21 defeated the French under General Junot at Vimeiro. Wellesley was superseded in the command by Sir Harry Burrard, who soon after was superseded by Sir H. Dalrymple, and the latter on Aug. 30 concluded the Treaty of Cintra, by which Junot agreed to evacuate the country.

Napoleon, being dissatisfied with the turn of affairs, sent large reinforcements to Spain and came in person to Madrid to direct his army. At that time Sir John Moore commanded the forces in Spain, and on Jan. 16, 1809, lost his life in the Battle of Coruña. Shortly after Wellesley returned to take command of an army made up of English and Portuguese, when he was confronted by 375,000 French veterans. His operations were attended by a series of successful battles, the most noted being those of Salamanca in 1812 and Vittoria in 1813. On Oct. 7, 1813, the French were driven across the Pyrenees into France, and the war was concluded the following year by a decisive victory at Toulouse. In 1814 the veterans of Wellington's army were transported to America to take part in the campaign against the United States.

PENNSYLVANIA (pĕn-sĭl-vā'nĭ-ă), one of the original thirteen states of the United States, classed with the middle Atlantic group, popularly called the *Keystone State*. It is bounded on the north by Lake Erie and New York, east by New York and New Jersey, south by Delaware, Maryland, and West Virginia, and west

by West Virginia and Ohio. The length from east to west is 302 miles; width, 158 miles; and area, 45,215 square miles, of which 230 square miles are water surface.

DESCRIPTION. The surface is generally hilly and mountainous through the central part, where the Appalachians trend across the State from northeast to southwest, the principal chains being the Allegheny and Blue Ridge mountains. In the eastern part is a portion of the Piedmont plain, which is elevated but slightly above sea level, and from it the surface rises toward the west. South Mountains, an isolated group of hills, stretches through the southeastern part. West of these hills are the Blue Mountains, which range in altitude from 1,000 to 1,500 feet above the sea. Farther west, trending parallel to it, are the Allegheny



1, Harrisburg; 2, Philadelphia; 3, Pittsburg; 4, Wilkesbarre; 5, Scranton; 6, Erie; 7, Reading; 8, Towanda.

Mountains, which culminate in North Knob, 2,685 feet, the highest summit in the State. The western half of the State is characterized by the Allegheny Plateau, elevated from 1,000 to 2,000 feet, and through it the rivers have cut narrow and deep valleys. The State has a coast line of 45 miles on Lake Erie, along which lies a narrow lake shore plain. The only good harbor is at Erie.

The Delaware River, which forms the eastern boundary, drains the eastern part of the State. It receives a number of tributaries, including the Lehigh and the Schuylkill. A large region in the central part is drained by the Susquehanna and its tributaries. These include the West Branch and the Juniata, both from the west. The western part belongs mainly to the Mississippi system and is drained chiefly by the Allegheny and the Monongahela, which unite at Pittsburg to form the Ohio. Within the State, from Pittsburg to Beaver, the Ohio flows toward the northwest, and then assumes a southwesterly direction and crosses the

western border. A small area in the south central part is drained into the Potomac and a few short streams flow into Lake Erie. The State has numerous mountain lakes, but all are small.

The climate is more equable and warmer along the Delaware than farther inland, being influenced by the breezes from the Atlantic. Extremes of temperature are quite marked in most parts of the State, ranging from 20° below zero to 105° above. At Pittsburg the mean temperature for January is 31° and for July 75°, while at Philadelphia the corresponding figures are 32° and 76°. Rainfall is evenly distributed throughout the year as well as in most parts of the State. It is given at 44.5 inches for the year, but in some localities it falls as low as 35 and in others reaches 50 inches. Snow falls to a depth of several feet, especially in the mountains and in the northwestern part.

MINING. In mining Pennsylvania has long held first place. The output of coal exceeds in value the total mineral product of any other State, partly for the reason that it is conveniently located to the larger markets, but chiefly because its quality of anthracite is the finest in the world. The anthracite mines are principally in the vicinity of Pottsville, Pittsburg, Hazelton, Scranton, Ashland, Shenandoah, and Wilkesbarre. Extensive deposits of bituminous coal are found in many sections of the State, but the leading shipping centers are at Johnstown, Connellsville, Irwin, Idlewood, Philipsburg, Towanda, Mercer, and Monongahela City. In the output of natural gas Pennsylvania exceeds all other states, and it has long held an important place for the production of petroleum. Marble quarries of great value are worked in the vicinity of Philadelphia, and limestone, sandstone, and valuable clays are abundant, occurring in many places between the veins of coal. Lancaster County has deposits of nickel and lead and copper are mined at Phoenixville. The State produces more than half of the entire output of slate in the country and large quantities are used in building and for export. Iron has been mined since the early colonial period and the output long supplied the iron furnaces, but at present large quantities are imported from the mines in the vicinity of Lake Superior. The larger deposits mined at present are near Lebanon, in the Cornwall hills. Other minerals include talc, salt, feldspar, bromide, ochre, glass sand, and mineral waters.

AGRICULTURE. The soil of the valleys and undulating regions is generally fertile, while the more hilly portions are formed principally of

clays and rock. Formerly much of the surface was covered with a heavy growth of timber, and fine forests are still maintained, but they are largely in connection with the farms and are used more or less for pasturage. The farms as a rule are small, but are well tilled and farming is diversified. Hay is grown on a larger acreage than any other product. The cereals grown extensively include wheat, corn, and oats. Considerable interests are vested in raising rye, buckwheat, potatoes, and tobacco. Grapes, peaches, apples, and small fruits are grown extensively.

The live-stock interests are centered largely in raising cattle, and fully half of this class of farm animals is represented by dairy cows. Much of the dairying is conducted on a coöperative basis, and the greater share of profits is obtained from the sale of milk, but much attention is given to the production of butter and cheese. A fine class of horses is grown and large investments are represented by the sheep and swine industry. Mules are raised for use as draft animals, especially in connection with the mines. The poultry products are extensive.

MANUFACTURES. The State has taken second rank in manufacturing since 1850, being exceeded only by New York. In the output of steel and iron products it surpasses all the other states combined. It produces about half of the Portland cement made in the United States and holds a very high place in the production of coke. Philadelphia is the chief center of the textile industry, producing large quantities of cotton and woolen goods, silk fabrics, and ingrain carpets. About half of the steam locomotives made in the country are produced in Pennsylvania and large quantities of railway cars are constructed, the chief centers of the latter enterprise being in Altoona, Philadelphia, and Reading. In the building of iron and steel ships the State has a foremost position. It produces large quantities of machinery, malt and distilled liquors, and boots and shoes. Other manufactures include glass, leather, cured and packed meats, flour, tobacco products, sugar, chemicals, and electrical apparatus. The forests yield large quantities of merchantable timber, such as hemlock, white pine, chestnut, oak, laurel, and walnut. Much of the timber is used for lumber, paper, and furniture.

TRANSPORTATION AND COMMERCE. The railroads aggregate 11,500 miles, which is exceeded only by the mileage of Illinois and Texas. Many trunk lines cross the State and all of them have branches, hence nearly every part has adequate transportation facilities. The principal lines include those of the Lake Shore and Michigan

Southern, the Pennsylvania, the Lehigh Valley, the Erie, the Baltimore and Ohio, the Philadelphia and Reading, the Delaware, Lackawanna and Western, and the Pittsburg, Cincinnati, Chicago and Saint Louis. Electric railways are operated in many rural districts. About 800 miles of canals are in use, but this class of transportation is not as important as formerly, though considerable quantities of coal and other freight are transported by these means. Pittsburg, Philadelphia, Scranton, and New Castle are among the leading railway centers. Lake Erie, the Delaware, and the Ohio furnish transportation facilities of considerable extent.

The State has a large domestic and foreign commerce. Erie and Philadelphia are ports of entry, and the latter ranks third in the value of foreign trade among the ports of the Atlantic coast. Large quantities of lumber are imported from Canada through Erie, which exports much coal and manufactured articles. Iron ore takes rank as the leading import. The smelters are chiefly at Pittsburg and other centers where iron and steel are manufactured. Much trade is carried westward by the Ohio and by the railroads.

GOVERNMENT. The first constitution was adopted in 1776, when the State was organized. A new constitution was adopted in 1790 and this has been amended several times. It vests the chief executive authority in the governor and lieutenant governor, elected for four years; the secretary of internal affairs and auditor-general, for three years; and treasurer, for two years. The Governor, with the consent of the senate, appoints a secretary of the commonwealth, an attorney-general, and a superintendent of public instruction, each for four years. The legislative authority is vested in a Legislature, consisting of a senate of not more than fifty members chosen for four years, and a house of representatives with a membership apportioned according to population and elected for two years. Sessions of the Legislature are held biennially, beginning on the first Tuesday of January. The supreme court consists of seven judges, who are elected by the people for a term of 21 years and are ineligible for reelection. A superior court, the courts of common pleas, and several minor courts are subordinate to the supreme court. Local government is administered by the counties, cities, towns, and villages.

EDUCATION. The public school system of Pennsylvania was established by law in 1834 through the efforts of Gov. Geo. Wolf, Judge Samuel Breck, and others. In 1835 Thaddeus Stevens saved the law from repeal in a speech which he regarded the greatest effort of his

public life. The law passed in 1854 was much improved and created the office of county superintendent. Text-books and school supplies were made free to all the children in 1893. Two years later a general law for the establishment of high schools was enacted. The school unit is the township, city, or borough, but the law also provides for the creation of independent districts. The schools are maintained by local taxation, supplemented by liberal appropriations from the State. In 1907 the Legislature made a biennial appropriation of fifteen million dollars for school purposes. This does not include the large appropriations for normal schools and other educational purposes.

The attendance in public schools approximates 1,350,500 children, in addition to which 150,000 are enrolled in private and parochial schools. The University of Pennsylvania, located at Philadelphia, with an attendance of about 5,000 students, is a cosmopolitan institution and has over 100 more students from foreign countries than any other university in America. Pittsburg is the seat of the Western University of Pennsylvania, which has departments of law, medicine, dentistry, and pharmacy in addition to those in the arts and sciences. State College, located in Center County, has an attendance of over 1,000 students in the departments of art, agriculture, engineering, and the sciences. Lehigh University, at South Bethlehem; Lafayette College, at Easton; Jefferson Medical College, at Philadelphia; Drexel Institute, at Philadelphia; the Carnegie Technical Schools, at Pittsburg; and other institutions for higher learning have a national reputation. The State maintains thirteen State normal schools located as follows: Westchester, Millersville, Kutztown, East Stroudsburg, Mansfield, Bloomsburg, Lock Haven, Indiana, California, Slippery Rock, Edinboro, and Clarion. The total value of the public school property is estimated at between sixty and eighty million dollars. A total of 33,500 teachers are employed. The schools are managed by directors or controllers, who are elected by the people, except in Philadelphia, where the board of education consists of twenty members appointed by the judges. School attendance is compulsory between the ages of eight and sixteen years.

Hospitals for the insane are located at Warren, Danville, Harrisburg, Norristown, Dixmont, and Warrensville. Erie has the State Soldiers' and Sailors' Home. Penitentiaries are located at Allegheny (Pittsburg) and Philadelphia. Allegheny County has a workhouse, Morganza has a reform school, Huntington has an industrial reformatory, and Philadelphia has a house of refuge and a house of correction. Carlisle

is the seat of the principal Indian school in the country, being maintained by the Federal government.

INHABITANTS. The State has a population of 140 to the square mile. In the number of foreign born inhabitants it has second rank, having a total of 985,250. The most numerous of this element are the Irish, Germans, and English. The Methodist, Presbyterian, Lutheran, Baptist, Roman Catholic, and Episcopal are the leading religious denominations. Harrisburg, on the Susquehanna, is the capital. Other cities include Philadelphia, Pittsburg, Scranton, Reading, Erie, Wilkesbarre, Lancaster, Altoona, Allentown, Johnstown, McKeesport, Chester, York, Williamsport, New Castle, Easton, Norristown, Shenandoah, Lebanon, Shamokin, Pottsville, Pottstown, Hazeltown, and Mahanoy City. In 1900 the State had a population of 6,302,115. This included 1,639 Indians, 1,927 Chinese, and 156,845 Negroes. Population, 1910, 7,665,111.

HISTORY. The history of Pennsylvania dates from 1609, when Henry Hudson visited Delaware Bay and the Delaware River. Swedish colonists established the first permanent settlements at Chester in 1643, but the Dutch took possession of that region in 1655. William Penn obtained a grant of the region now included in the State from Charles II., in 1681, in consideration of \$80,000. The colony planted by Penn was designed as a refuge for Quakers, but he extended religious liberties to all and established relations of friendship with the Indians by treaty, both parties observing the conditions faithfully for fully fifty years. A dispute between Pennsylvania and Connecticut as to the territory north of latitude 41° arose in the course of time, but it was settled in 1783 in favor of the former. Another dispute as to the boundary occurred with Maryland, which was settled by establishing the Mason and Dixon line in 1763 and 1767. Philadelphia was the seat of the first Continental Congress, in 1774, and here the Declaration of Independence was issued on July 4, 1776. The Battle of Germantown, on Oct. 4, 1777, and the incidents of Valley Forge identify the State with the Revolution. It included many Tories among its inhabitants, but gave loyal support to the colonies, and the State was equally enthusiastic in supporting the Union in the War of 1812, the Civil War, and the Spanish-American War. A State constitution was adopted in 1776, but was replaced by the present constitution in 1790, and the National Constitution was ratified on Sept. 12, 1787.

Pennsylvania has been an important factor in the Union from the beginning. It has grown

in wealth and population with every decade. In 1794 it was disturbed by the Whisky Rebellion, which was caused by the opposition of the Scotch and Irish to the excise tax. The Schuylkill Canal was completed in 1825. A system of public schools was established by the Legislature in 1834. Anthracite coal was first mined on a large scale in 1839, when it came to be used extensively in the manufacture of iron, and the first oil well was sunk at Titusville in 1859. The Johnstown flood, in 1889; the Homestead strike, in 1892; and the anthracite coal strike, in 1902, are other events. The panic of 1907 had a depressing influence upon the industries, but they soon recovered from the effects.

PENNSYLVANIA, University of, an institution of higher learning in Philadelphia, Pa. It was founded in 1740 and was first known as the College and Academy of Philadelphia, but in 1779 its present name was adopted. The institution owes much of its early prosperity to Benjamin Franklin, who spoke and wrote much in its favor. At present it maintains the college and school of arts, the laboratory of hygiene, the Wistar Institute, the Flower Astronomical Observatory, and the departments of law, medicine, philosophy, archaeology, dentistry, and veterinary medicine. It has an endowment of about \$5,000,000, an income of \$650,000, and property valued at \$4,650,000. The library contains 275,000 volumes. The institution is nicely situated on a tract of fifty acres overlooking the Schuylkill River. It is attended by 4,500 students.

PENNSYLVANIA DUTCH, a name commonly applied to a German dialect spoken extensively in Pennsylvania and by the descendants from Germans who settled there in an early period. The people speaking this dialect immigrated chiefly from Germany, Switzerland, and Austria. They settled in large colonies, thus maintaining the original language, but mixing with it a number of words derived from the English and other languages. The dialect is not properly called Dutch, but was so named from the German word *Deutsch* (German). That it consists of merely a slight change of the words may be seen from the use of *bem* for *Bäume*, *bes* for *böse*, *bicher* for *Bücher*, *gfunne* for *gefunden*, and *schlof* for *Schlaf*. Considerable literature has been produced in this dialect, but most of it is poetic or of a religious character.

PENNY, a coin current in England, representing in value the twelfth part of a shilling. The name was derived from the Anglo-Saxon word *penig*, which corresponds to the German word *pfennig*. The English penny dates from

the latter part of the 7th century, when it was coined under King Ina of the West Saxons, and was a silver coin weighing $21\frac{1}{2}$ grains. It was made of copper previous to 1860, but is now made of bronze, containing one part of zinc, four parts of tin, and 95 parts of copper. The weight is 145.833 grains troy, and the value in metal is about one-fourth of its nominal value. The abbreviation is *d.*, being derived from the Roman coin *denarius*.

PENOBSCOT (pě-nōb'scōt), a river and bay in Maine. The river is the largest in the State. It rises by the West Branch in a small lake near the border of Quebec, flows southeast into Penobscot County, where it joins the East Branch, or Seboois River, and thence flows toward the south into Penobscot Bay. The river furnishes an abundance of water power. It flows through a productive lumbering region, has a length of 300 miles, and is navigable for ships to Bangor. Penobscot Bay is an inlet from the Atlantic Ocean. It is about thirty miles long and twenty miles wide at its entrance, and contains a number of islands. Both the bay and river furnish excellent facilities for navigation and contain valuable fisheries. Among the chief towns on the Penobscot are Bangor, Belfast, Hampden, Old Town, Lincoln, and Medway.

PENSACOLA (pěn-sà-kō'là), a city in Florida, county seat of Escambia County, on Pensacola Bay, an inlet of the Gulf of Mexico. Communication is furnished by the Pensacola, Alabama and Tennessee and the Louisville and Nashville railroads. It is a port of entry, has an excellent harbor, and near it are forts Pickens and McRae. The city has steamboat connections with many trade emporiums and an extensive trade in lumber, cotton and woolen goods, coal, hides, tallow, fish, and supplies for the naval stores. Among the noteworthy buildings are the State armory, the county courthouse, the opera house, several fine schools and churches, and the United States government building. It has manufactures of cigars, clothing, earthenware, canned fish, and machinery. The public utilities include electric street railways, pavements, sewerage, a number of parks, and a public library. The city was founded by the Spaniards in the early part of the 18th century. General Jackson captured it in 1814 and five years later it became a permanent possession of the United States by virtue of the Florida Purchase. A fire destroyed much of the city in 1864, but it was soon rebuilt. Population, 1900, 17,747; in 1910, 22,982.

PENSION (pěn'shūn), an allowance of money paid to a person who previously rendered

services, or to the widow and children of a deceased person. Pensions are paid as periodical allowances or rewards for service rendered in a civil or military capacity. In a number of European countries they are granted to persons who have served the government in the time of peace for a specified length of time, whether in a military or civil capacity. In such cases the pension is not based on injury or disability, but wholly upon valued services covering a long period of time. However, there is the additional provision for the payment of pensions in case of injury or disability. Such laws are now maintained in England, Germany, and other countries to a modified extent. Canada had 2,651 pensioners in 1908 and paid out \$427,743.99 as pensions.

In the United States pensions are paid wholly upon injury or disability, but Congress has in many cases made special provision for persons who were left in indigent circumstances after having served their country devotedly for a long time. Besides, a private or noncommissioned officer who has served 30 years may, on application to the President, be placed on the retired list and receive three-fourths pay for the remainder of life. The same privilege extends to commissioned officers who have been in the service 40 years and have reached the age of 65 years. In 1818 an act was passed granting all survivors of the Revolutionary War service pensions, in 1871 a like law was passed in relation to the survivors of the War of 1812, and in 1878 to the survivors of the Mexican War.

An act of Congress passed Aug. 26, 1776, established the pension system for disabled soldiers and sailors, but it has been amended and revised at numerous times, although the system in general is based on personal injury or disability. Invalid pensions range from \$24 to \$2,000 a year, this depending upon the degree of disability and the rank of the pensioner. In cases where both hands or both eyes are lost the pension is \$72 per month; total deafness, or the loss of a foot or hand, \$30; amputation of a limb at the hip or shoulder joint, \$45; and total incapacity for manual labor, \$30. Where the attendance and aid of others is required constantly, from \$50 to \$75 per month is paid. The widow of a deceased soldier, who would have been entitled to a pension of \$12 per month, receives an invalid pension of \$12 per month and an allowance of \$2 for each child of the soldier under sixteen years of age, this being paid during her widowhood. Widows and children of deceased members of the life-saving service are entitled to pensions.

In 1890 a dependent pension law was passed. By its provisions all persons who served at least ninety days in the naval or military service of the United States in the Civil War, and who were honorably discharged, are entitled to pensions of from \$6 to \$12 per month in case of suffering from any permanent disease or disability not caused by vicious habits, whether or not such injury or disability is the result of disease or injury contracted while in the service. However, this was modified by the law of 1904, which entitles all veterans 62 years old to a pension of \$6; 65 years, \$8; 68 years, \$10; and 70 years, \$12 per month. The widow of a deceased soldier is entitled to receive \$8 per month, provided she has no means of support other than her daily labor and was married to the deceased soldier prior to the passage of the law, June 27, 1890. It is specially provided that an attorney presenting the claim for any pension is not entitled to more than \$10 in any case, and the penalty for violation is fixed at a fine of not more than \$500 and imprisonment for not more than two years, or both.

By an act of 1833 the pension business was established as a special bureau, and in 1849 it became a bureau of the Department of the Interior. The President appoints the Commissioner of Pensions, who has the assistance of about 2,000 persons in the transaction and settlement of the pension business, and fully 3,000 surgeons are nominated in different sections of the country as examiners of applicants. Any one making false statements in relation to procuring a pension is liable to fine. Pensions are paid every three months, and there are agencies in different parts of the United States to distribute to pensioners the vouchers issued for them. Pension money due individuals from the government cannot be taken by garnishment or attachment. This is a provision of the national statute. In some states the money received as pensions and invested in securities or property of any kind cannot be taken by a court process in payment of debts without the consent of the pensioner.

At the close of the fiscal year ending June 30, 1908, there were 951,687 pensioners on the rolls. This is a notable reduction since 1902, when the number of pensioners in the United States was 999,446, the largest in the history of the pension bureau. The disbursements in 1905 were \$155,894,049.63, which were exceeded only in 1893, when the total amount paid to pensioners was \$161,774,372.36. The total disbursements in 1861-1908 inclusive were \$3,767,515,842.82.

Daniel F. Bakeman was the last survivor of the Revolution. He died April 5, 1869, aged

109 years, at Freedom, N. Y. Hiram Cronk, the last survivor of the War of 1812, died at Ava, N. Y., May 13, 1905, aged 105 years. Two pensioners are still on the roll for the Revolution, both being daughters of soldiers pensioned by special act. The report of the commissioner of pensions shows the following classification by wars:

Revolution	2
War of 1812.....	471
Indian Wars.....	4,838
Mexican War	9,846
Civil War, widows.....	264,010
Civil War, invalids	695,241
Spanish War, widows and mothers.....	4,780
Spanish War, invalids.....	15,711

PENTATEUCH (pě'n'tā-tūk), a term applied to the first five books of the Old Testament when spoken of collectively, these including Genesis, Exodus, Leviticus, Numbers, and Deuteronomy. The Jews apply to them the Hebrew name *Torah*, meaning the Law. Josephus was the first to mention the five-fold division. Many modern writers group these five books with the Book of Joshua under the term *Hexateuch*, since they form a continuous line of writing.

PENTECOST (pě'n'tě-köst), one of the three principal festivals of the Jews, held on the fifteenth day after the 16th Nisan, the second day of the Passover. It is celebrated as a thanksgiving for the ingathering of the harvest. Formerly two loaves of leavened bread made from new grain, called the *first fruits*, were offered and the poor were remembered by liberal gifts. At present the Jews celebrate Pentecost two consecutive days and the name *Feast of Weeks* is used to some extent, since it follows the Passover after seven weeks. The Christians celebrate Pentecost in commemoration of the descent of the Holy Ghost on the disciples, occurring fifty days after Easter. The names Whit-Sunday and Whitsuntide are used to designate this day in England, from the circumstance that white garments were formerly worn by those upon whom baptism was conferred.

PENUMBRA (pě-nŭm'brā), in astronomy, an incomplete or partial shadow. In an eclipse, where the light is partly cut off by the intervening body, the shadow cast is called the penumbra. It occurs in a partial eclipse between the *umbra*, or *perfect shadow*, on all sides, and the full light. At the time of a total eclipse of the sun the observer is in the umbra. See **Eclipse**.

PEONAGE (pě'ōn-āj), a term variously applied to different countries, but usually to describe a system of servitude in Spanish-American countries. The *peon* of Mexico was in early

colonial times placed under bondage to serve his creditor until the debt was paid and, by reason of limited wages and a system of loaning money to the peons, it often became necessary for several generations to labor before the obligations could be complied with. A law of Congress, in 1867, abolished peonage in New Mexico, where it had been introduced from Mexico, and it has since been abolished in some of the countries of South America, though in others it still remains as a system not unlike perpetual servitude.

PEONY (pě'ō-nŷ), a genus of plants of the crowfoot family. They are cultivated extensively in gardens and for ornamental purposes. The species include a half shrubby plant native to Eastern Asia and Japan, where it attains a height of about twelve feet, and bears beautiful whitish flowers with pink markings. Other species are of the herb order, having deeply lobed leaves and perennial tuberous roots. The *Siberian peony* bears a double white flower, the peony native to Switzerland has double crimson or white flowers, and the Russian peony is fern-leaved; all these belong to the herbs. Emetic and cathartic properties are found in the seeds and roots. Formerly the common peony was held in repute for its medical properties, though at present it is not so regarded.

PEOPLE'S PARTY, a political organization formed in the State of New York in 1824 by a wing of the Democratic party, which favored choosing the electors by a direct vote of the people. They supported William H. Crawford for President, who received 41 votes in the electoral college. In 1891 the farmers' alliances, the labor and granger organizations, and the greenback party organized the People's party that was prominent in the election of 1892 and several subsequent elections. Afterward it became generally known as the *Populist* party. James B. Weaver, of Iowa, was the nominee for President in 1892, receiving 1,030,128 popular votes and 23 votes in the electoral college. In 1896 and 1900 the party supported William J. Bryan, the nominee of the Democratic party, for President. Among the principal issues advocated by the People's party are included the abolition of national banks, the issuance of money direct by the government, the payment of all government obligations in any kind of lawful money, the establishment of postal savings banks, bimetallism, an income tax, the election of United States senators by direct vote of the people, and opposition to all forms of monopoly harmful to industrial and commercial enterprises.

PEORIA (pě-ō'rĭ-ā), a city of Illinois, coun-

ty seat of Peoria County, on the Illinois River, 162 miles southwest of Chicago. It is on the Iowa Central, the Illinois Central, the Chicago and Alton, the Lake Erie and Western, the Chicago, Burlington and Quincy, the Chicago and Northwestern, the Chicago, Rock Island and Pacific, and other railroads. The site covers an area of ten square miles and borders on the outlet of Lake Peoria, an expanse of the Illinois River. It is surrounded by a rich agricultural and bituminous coal-mining country. Bradley and Glen Oak parks are fine public resorts. Among the principal buildings are the city hall, the public library, the high school, the United States government buildings, the county courthouse, the Coliseum, the Y. M. C. A., and the House of the Good Shepherd. It has the Spalding Institute, the Bradley Polytechnic Institute, and a soldiers' monument.

Peoria is well built, much of the architecture being of brick and stone. Intercommunication is by an extensive system of electric railways, with branches to many towns and interurban points. Much of the paving is of brick and asphalt. The public utilities include gas and electric lighting, systems of sewerage and waterworks, and fire and police departments. It is noted as a jobbing and wholesaling center. Distilling is the most important industry, producing annually about 35,000,000 gallons of spirits. Other manufactures include jewelry, soap, carriages, trunks, watches, farming machinery, hardware, monuments, furniture, oatmeal, tobacco products, brooms, and stoves. In 1680 a post was established on its site by La Salle, who named the place Fort Crevecoeur. The first permanent settlement was made in 1819 and it was incorporated as a city in 1844. Population, 1900, 56,100; in 1910, 66,950.

PEPPER, a class of plants native to the East Indies, but now extensively naturalized and cultivated. These plants include a large number



PEPPER.

of species, but the most important is the black pepper, or common pepper. This is a climbing plant. It bears broad ovate leaves and globular berries, the latter being of a bright reddish color when ripe, for which it is grown in fields and plantations. Poles or other supports are provided for the plants, which bear fruit in three or four years, and the berries are picked when beginning to turn red. Their color afterward becomes black and the berries

shrivel in drying, when they constitute the common or black pepper sold in the market. Two crops are secured each year, the plants yielding about ten pounds of pepper berries annually for eight to twelve years. This product constitutes one of the most valuable and extensively used of the spices. Black and white pepper are made from the same berries. In order to secure white pepper, the berries are soaked in water before grinding and the outer covering is rubbed off. Formerly pepper was of an extraordinarily high price, but since the early part of the last century its cultivation has been greatly extended and the price became correspondingly cheapened. Sumatra, Java, and Malacca are the most productive regions at present, but pepper culture has been introduced in the West Indies and other tropical sections of the Western Hemisphere.

PEPSIN (pěp'sin), a digestive compound contained in the gastric juice of the stomach. It possesses the power, when united with hydrochloric acid, to dissolve the otherwise insoluble proteids and to convert them into peptones. Pepsin is a ferment. It is soluble in water, weak spirits, and glycerin, and its function is to render soluble and diffusible substances that would otherwise be indigestible to a considerable extent. When the food has been dissolved under its influence, it forms a grayish liquid called *chyme*. Both pepsin and hydrochloric acid are secreted by the stomach, and the vigorous action of that organ depends upon the proper production and union of the two. The exact nature of pepsin is not known, but it constitutes an essential element in the digestive process, and forms ordinarily about eighty per cent. of the composition of the gastric juice. Pepsin is obtained from the stomach of the calf, pig, and other animals, and is used largely in the medical practice as a stimulant in cases of disorganized digestion. A commercial product known as *pepsina porci*, obtained from the stomach of the pig, is considered the best. The pepsin of the market is a light yellowish powder, which enters as a constituent into most of the digestive preparations. Alcohol impairs the activity of pepsin, but this is compensated for, at least partly, by its stimulating influence.

PEPTONE (pěp'tōn), a proteid soluble in water and not coagulable by heat. Peptones are produced in the stomach during the process of digestion. It results from the action of the pepsin contained in the gastric juice upon the nitrogenous elements. See **Proteids**.

PEQUOTS (pě'kwōts), or **Pequods**, a tribe of North American Indians, belonging to the Mohican family, first met with in Connecticut.

In 1634 they entered into a treaty with the colonists at Boston, but soon after became hostile, and in 1637 were defeated near the present site of Groton, Conn. The struggle against them continued for a number of years, resulting in great loss of life, but they were finally subdued in a battle at Fairfield Swamp. Shortly after they became widely scattered or were sold as slaves. At present the tribe is assimilated in part by other tribes, but a few of the descendants are found in Wisconsin, mostly at Green Bay.

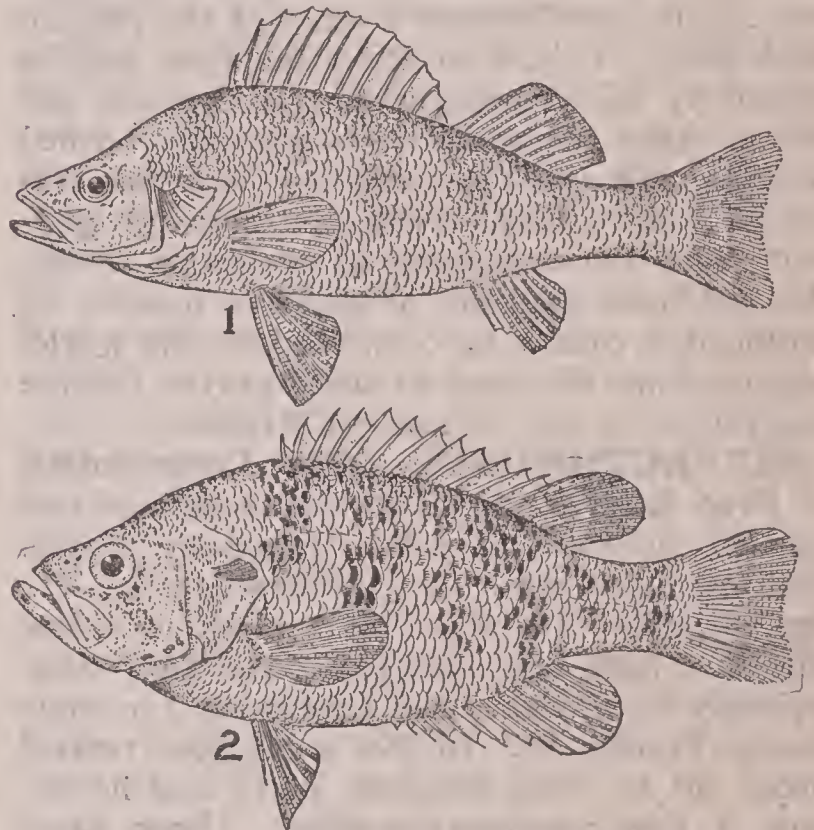
PERCEPTION (pěr-sěp'shŭn), the faculty of the mind by which we gain knowledge, through the senses, of the existence and properties of matter. It is the power that the mind has of cognizing external objects and their qualities. Perception differs from *conception* in that it deals with things having an actual, not merely a possible, existence, and from *consciousness*, in that it is concerned with objects external to the mind. Writers have employed the term in various relations, and it is now sometimes applied to the act and product of perception as well as to the power of perceiving. Perception is both direct and acquired, since what the mind perceives through one sense enables us to know certain facts resulting at least in part from former experience of the different senses.

PERCH, a genus of fish which includes many species, found widely distributed both in salt and fresh water. They are especially abundant in the northern part of the United States and Canada and are found in the ponds, rivers, and lakes of the northern part of Europe and Asia. The common fresh-water perch has a broad body flattened laterally, and two dorsal fins supported by strong bony spines. The color at the upper parts is greenish-brown. Blackish bands mark the sides and at the lower parts the color is a goldish-yellow. From one to three pounds is the usual weight. The perch feeds on smaller fishes, worms, and insects. It is fond of still waters. A species known as the *Sacramento perch* is found in the waters of California. The *yellow perch* common to the fresh waters of Canada and the United States is a favorite food fish and may be easily propagated in artificial lakes and ponds. It seldom nibbles at the bait, but bites quickly at hooks baited with worms or minnows.

PERCUSSION (pěr-kŭsh'ŭn), in medicine, a method of detecting certain diseases of the chest and vital organs by means of tapping, or gently striking, the surface of the body. The object is to ascertain the presence or absence of air and fluid in certain internal organs, or

to determine the comparative density of the subjacent parts by the nature of the sound. The tapping is sometimes done with the fingers or a small hammer tipped with India rubber, and the test is made on the surface of the body just above the place to be investigated. An instrument known as a *pleximeter* is sometimes used, and this is struck either with the fingers or a hammer. In some cases the *stethoscope* is employed in connection with percussion, when it is said to be *auscultatory percussion*. See **Auscultation**.

PERCY, the name of a celebrated Norman family, which descended from William de Percy, who came to England with William the Con-



1, YELLOW PERCH. 2, SACRAMENTO PERCH.

queror in 1066. This sovereign granted him large tracts of land in the north of England, where his family held vast possessions for many ages afterward. The house of Percy is the most distinguished of all the noble houses of England. It is alike remarkable for its culture of arts and letters and for its long, unbroken line. In 1766 the present dukedom of Northumberland was created in the Smithson family, which assumed and still bears the name of Percy.

PERFECTIONISM (pěr-fěk'shŭn-iz'm), the doctrine that perfection is attainable in this life. When that state is reached, the believer is presumed to be freed from the responsibility for sin. Those holding this view generally agree that the soul becomes united with God by contemplation and devotion until all that is sinful in it is annihilated, when it participates in the divine protection. However, they do not as-

sume superiority of goodness over others, since their condition is due to the work of grace, and they are free from sin and guilt in that they do not consent to be led astray by temptations. Most of the advocates of this doctrine hold that it is a state of growth in which the soul may maintain perfection and progress in developing into consecutively higher states, thus making the early stage only a beginning of growth in grace. The Anglican, Lutheran, Roman Catholic, and many other churches hold that no one can live absolutely without sin, except by divine grace. That perfection is a state equivalent to *sanctification*, and not for the complete achievement thereof, was first held by the German Mystics and became a tenet of the English Methodists. This is in effect the view held at present by the Friends, certain Methodists, and several other sects, and it is generally termed *entire sanctification*, meaning complete consecration of soul to God. Protestant churches generally deny the attainment of perfection in this life and hold that the progressive process of sanctification cannot be completed in this world, thus teaching the need of daily prayer for the forgiveness of sin by every Christian.

PERFECTIONISTS, Bible Communists, or Free Lovers, an American religious sect founded in 1848 by John Humphrey Noyes. The organizer was born at Brattleboro, Vt., Sept. 6, 1811. He was first a clerk in a law office and later was admitted to the bar. Subsequently he practiced his profession for some time at Putney, Vt. In 1831 a religious revival spread in the New England states and he became a Congregational minister. Soon after he separated from that church, claiming to have experienced a second conversion, and began organizing a sect with the view of restoring ideal primitive Christianity.

The first church organized as a community was at Putney, but soon after it was removed to Oneida, N. Y., and another was established in the vicinity of Wallingford, Conn. Among the teachings are community of labor and its fruits, that communication with Christ provides a relief from disease, sin, and death, that all must be reconciled with God to secure salvation, that man and woman must be recognized on the equality of brotherhood, and that faith in God is the necessary element in securing salvation. Perfectionists were originally organized in a family, in which fixed marriage ties were not recognized, but in 1880 the ordinary family relationship by marriage was established. Noyes died at Niagara Falls on April 13, 1886, and since then many property and other reforms have been effected by the members.

PERFUMES (pēr'fūmz), the fragrant substances which are prepared to emit pleasant odor. They are used on the person or in the dwelling to fill the air with an agreeable scent. The manufacture of perfumery dates from remote antiquity. It was a common art among the peoples of Assyria, Babylonia, Egypt, Phoenicia, and Palestine. The Grecians and Romans developed the manufacture of perfumes into an important industry. During the Middle Ages the enterprise spread to Western Europe. Two classes of perfumes are recognized in arts and trades, those derived from an animal and those from a vegetable origin, and they are known in the market as crude and prepared. *Crude* perfumes are secured from animals or plants and are not mixed as special preparations, while *prepared* perfumes are sold under special names, being mixed according to particular formulae. Many classes of prepared perfumes are now sold on the market, some business houses manufacturing several hundred kinds.

Perfumes of animal origin include musk, ambergris, hartshorn, civet, and castor. *Musk* is the most important of these, since it has the most permanent scent. It is used largely in the preparation of commercial perfumes, and serves in that capacity to add durability and intensity to the fragrance of many sweet-smelling preparations. The vegetable perfumes include a large variety. They are made from flowers, as the violet, rose, and tuberose; from different kinds of wood, as sandalwood, sassafras, and cedar; from various fruits, as the lemon, orange, and bergamot; from seeds, as dill, caraway, and aniseed; from spices, as the cloves, nutmeg, and cinnamon; from herbs, as the peppermint, lavender, and rosemary; from nuts, as vanilla and bitter almonds; from roots, as orris root; and from gums, as the styrax, camphor, and myrrh. Some of the vegetable perfumes are secured from plants and trees, from which they exude naturally, or are obtained from wounds inflicted artificially in the bark of wood. These include the gum resins, as benzoin, myrrh, and camphor.

Most of the vegetable perfumes are procured in the form of essential oils by distillation. These perfumes were formerly called *quintessences*, but now they are generally termed *ottos*, from the Turkish term *attar*, a word associated with the rose. Distillation involves the simple process of placing the fragrant product of the plant in a still of tinned copper, where a quantity of water is added. A small furnace underneath supplies the heat, and, when the water boils, the odorous parts are carried into the worm with the steam. Afterward decanting is

employed to separate the odoriferous parts from the steam or water that may have formed. Roses are gathered for distilling about the first of June and are placed in cool cellars until they can be distilled. All the roses of the harvest are distilled by a single process, when the product forms only *rosewater*, which is distilled a second time. The product now includes the sweet-smelling, oily attar in the form of little globules, but still contains a quantity of water. By placing it in small vessels, the oily attar comes to the top and is separated from the water by dipping it with a spoon. The otto of roses is the most expensive perfume on the market, and the higher grades made of selected rose petals sell at \$500 per pound. Two other processes for extracting perfumes, known as *enfleurage* and *maceration*, are employed to some extent.

The process known as *enfleurage* consists of putting a layer of grease, such as suet or lard, in a small box and placing the fresh blossoms of flowers on the grease. The box is carefully closed and allowed to stand about 24 hours and fresh flowers are added every 24 hours for several weeks, when the fat becomes filled with the perfume of the flowers and, after melting and straining, it is ready for use. The process of *maceration* consists of placing flowers in oil or melted fat for a few hours, when the fat is heated and the flowers are strained out. New flowers are added from time to time until the grease is highly perfumed, when the product is bottled for use, or the oil may be melted and combined with alcohol, by which volatile oil is brought to the surface. It is then skimmed off the surface and bottled. Such flowers as the tuberose and jasmine are injured by heating and their perfumes are extracted by *enfleurage*, while in some cases both processes are employed. The manufacture of perfumes is an extensive industry in France, Germany, England, and many cities near the Mediterranean. Lavender is produced in large quantities in England, Nice leads in the production of violet and mignonette, and Cannes is a center for manufacturing perfumes from the jasmine, rose, and tuberose. The principal manufactures in America are the middle and New England states, but growing interests in the preparation of perfumes are developing on the Pacific coast.

PERGAMUS (pĕr'gā-mŭs), or Pergamun, an ancient city of Asia Minor, in Mysia, fifteen miles from the mouth of the Caicus River. It is thought that the city was founded by Arcadian colonists under Telephus, son of Hercules. In the time of Alexander the Great it was select-

ed as the treasury of the Grecians and Phil-etaerus, in 280 B. C., made it the capital of an independent kingdom. The Romans acquired complete control of the kingdom, converted it into the province of Asia, and made it a great center of commercial activity and military influence. It was one of the principal seats of worship, and invalids flocked there to obtain advice from its deities and priests. At that time it had a public library second only to the library of Alexandria, but the city began to decline when it came under the influence of the Byzantine emperors. It is now known as Bergama and is noted for its ruins of ancient palaces, temples, aqueducts, and walls.

PERI (pĕ'rĭ), a being mentioned in Eastern legends as immortal, but who is excluded from Paradise. He is said to have descended from fallen spirits, and was thought to occupy a position midway between angels and demons. Many interesting fables mention peris in various relations, and belief in them is enjoined upon the Mohammedans by the Koran. Generally both grace and beauty are attributed to spirits of this class, when they are represented as female, though generally they are regarded as both male and female. When spoken of as male beings, they personify strength and skill in administering to the wants of mankind.

PERICARDIUM (pĕr-ĭ-kār'dĭ-ŭm), the name of the sac which surrounds the heart. It is conical and membranous and consists of two layers. The *external* layer has many interlacing fibers, which, at the upper end, are closely interwoven with the external coats of the larger blood vessels, while the *internal* layer is composed of serous, lining membrane. A thin lubricating serous fluid is secreted by the pericardium, which serves to prevent friction and facilitates the movement of the heart.

PERIM (pā-rēm'), a barren and destitute island in the Strait of Bab-el-Mandeb, near the entrance to the Red Sea, about two miles from the Arabian shore and nine miles from Africa. The island is four miles long and two miles wide. It has an area of seven square miles. The general elevation is 245 feet above the sea. It is important as a strategic position in the Red Sea. Since 1857 it has been a possession of the British, who maintain a lighthouse and coaling station. It is governed as a dependency of Aden. Anciently it was called Diodori Insula.

PERIODICAL (pĕ-rĭ-ōd'ĭk-əl), a publication issued at regular intervals, such as a magazine or newspaper. Periodicals are devoted either to the circulation of news or the promotion of knowledge in literature, arts, science, or the

industries. The term is variously applied to different publications appearing at regular intervals, though not generally to daily newspapers. Such publications as *The Strand Magazine*, *The Pall Mall Gazette*, *The Cosmopolitan*, *The North American Review*, and *The Review of Reviews* are representative English and American periodicals. A periodical devoted principally to general criticism is called a *review*, and one having contents of a miscellaneous or entertaining character is known as a *magazine*. In North America and many countries of Europe the several classes of periodicals are not closely specialized, but in Germany they are confined quite carefully to particular lines, and are published with the view of meeting consistently the taste of particular readers. Most of the publications of America are of a miscellaneous character and are designed to meet the wants of many classes, though some are quite closely confined to the individual needs of certain professions, trades, and occupations. See **Journalism**.

PERIPATETIC PHILOSOPHY (pĕr-ĭ-pā-tĕt'ĭk), the school of philosophy originated by Aristotle and supported by his followers, so named from the building in which the founder lectured. According to others, it is so called because the founder was accustomed to walk while he lectured to his disciples. It is concerned very little with metaphysics, but, instead, seeks to popularize the study of ethics through contact with nature. Happiness is held to be the highest good. Virtue, which consists in the practice of justice, bravery, generosity, and temperance, is the essence of willingness to practice what conforms to reason. While man is made better through his association with nature, the practical ends of life cannot be attained without the political state, of which organized society is the basis. The teachings of Aristotle were modified to some extent by his followers, chiefly in the direction of naturalism, especially by Theophrastus, who was at the head of the school for a number of years. He was succeeded by Strato of Lampsacus in 288 B. C. As a school of philosophy it continued long after the decline of Grecian power, until the ascendancy of Augustus.

PERJURY (pĕr'jū-rĭ), the crime of willfully making a false statement while under oath or affirmation, or willfully giving false testimony material to the issue or point in a case at law. To constitute perjury, the oath or affirmation must be lawfully administered, the false swearing must be willful and corrupt, the matter sworn to must be material to an inquiry or investigation, and must be before an officer created by law or in a proceeding in a court of

justice. In some states the act of making an affirmation about a matter in regard to which a witness has no knowledge is held to be perjury. The punishment provided is by fine or imprisonment, or both, and in most cases the maximum imprisonment fixed is ten years.

PERNAMBUCO (pĕr-nām-bōō'kō), or **Recife**, a city in northeastern Brazil, capital of a state of the same name, on the Atlantic coast. It is situated near the mouth of the Beberibe River and consists of three parts, Boa Vista, on the mainland; Recife, on a small peninsula; and San Antonio, on an island. Recife is the principal seat of commerce, but is connected with the other parts by a number of bridges and causeways. The city has broad and well-improved streets, an excellent harbor, and a lighthouse. It is defended by strong forts. Among the improvements are several public parks, waterworks, pavements, public lighting, and electric street railways. The principal buildings include an Episcopal palace, the public courthouse, the customhouse and post office, several educational institutions, and the central railroad station. Pernambuco is the most extensive sugar market of Brazil. It has a large export and import trade in manufactures, farm produce, and live stock. The manufactures include tobacco, cigars, clothing, leather, dyes, implements, sugar, machinery, and earthenware. It has many elevators, warehouses, and railroad machine shops. The place was founded in 1504 and was captured by the Dutch in 1630, but was retaken by the Portuguese in 1654. Population, 1908, 163,482.

PERPETUAL MOTION (pĕr-pĕt'ū-āl), a motion which, being once generated by mechanical means, continues perpetuating itself indefinitely. The problem of inventing machines to move perpetually was studied in different countries as early as the 13th century. When the conservation of energy was discovered, it became apparent that the hopes of ambitious inventors to construct a machine which, once set in motion, would perpetuate its movement without drawing on any external source of energy, were vain and delusive. The Academy of Science in Paris as early as 1775 refused to further entertain schemes that claimed to have overcome the impossibility, and henceforth considered the problem equally absurd with the duplication of the cube and the quadrature of the circle. No combination can produce energy; it can only direct the energy imparted.

If a body could be set in motion where it would not be exposed to friction or fluid resistance, it would continue to move forever. However, friction occurs as soon as a moving

body comes in contact with the air or with other bodies, and by it the motion must be eventually overcome. Even if conditions existed whereby a body could be induced to move perpetually, such a machine would be useless, for the reason that the quantity of energy possessed by it would be limited to the energy applied to start the device, and if it were employed to do any work or impart motion to other machines, it would cease moving as soon as it had expended an amount of energy equal to that imparted to it in the beginning. Many patents have been issued to persons claiming to have invented devices by which perpetual motion was secured, but in every case it was shown successfully that the mechanical structure was useless and the originator was ignorant of the basic principles of philosophy. Among the favorite contrivances are the overbalancing wheel; a device in which a system of weights slide to produce continuous movement; wheels having iron attached which are to be attracted by magnets; and masses of liquid moving within a mechanical device.

PERPIGNAN (pâr-pên-yän'), a city of France, capital of the department of Pyrénées-Orientales, 35 miles south of Narbonne. It is on the Tet River, five miles from the Mediterranean, and has railway communication with the leading cities of France. Situated near the eastern extremity of the Pyrenees, at a convenient passway from Spain into France, it is strongly fortified and garrisoned. The streets are regularly platted and well improved, but many of the buildings are Moorish in construction. Among the chief buildings are the Cathedral of Saint Jean, the university, the city hall, and a college. In the vicinity are many fine orchards and vineyards. Paper, furs, machinery, corks, and woolen clothes are the chief manufactures. The city was long a possession of the kings of Aragon and of Spain, but was united to France in 1659 by the Treaty of Pyrenees. Population, 1906, 38,868.

PERRY, a city in Oklahoma, county seat of Noble County, thirty miles northeast of Guthrie, on the Atchison, Topeka and Santa Fé and the Saint Louis and San Francisco railroads. The surrounding country is fertile, producing cereals, fruits, and grasses. It has electric lighting, waterworks, and a growing trade in merchandise. The chief buildings include the county courthouse, the high school and a number of churches. It has flouring mills, cigar factories, grain elevators, and other industries. Population, 1900, 3,351.

PERRYVILLE, Battle of, an engagement of the Civil War in the United States, fought

at Perryville, Ky., on Oct. 8, 1862. General Bragg had a Confederate force of 17,000 men and made an attack upon a Federal force of 22,000, under command of General McCook. The latter were at first driven back, but they finally compelled the Confederates to retreat through Perryville, and during the night they retired from the field. The engagement was a strategic victory for the Federals, although it is usually looked upon as a drawn battle. A loss of 3,450 men was sustained by the Confederates, while the Federals lost 4,200 men.

PERSEPOLIS (pēr-sēp'ō-līs), a city of ancient Persia, which is famous for its former importance and the remarkable ruins on its site. It was located in a fertile valley near the confluence of the Medus (now Polwar) and the Araxes (now Bendemir) rivers, about 35 miles northeast of Shiraz. Persepolis is the Grecian name, its Persian name being now unknown. The city was one of the capitals of Persia. Its founding is ascribed to Cyrus, though some writers think it was not the capital until many years after the time of that eminent Persian, and that it became the residence of Darius, Xerxes, and Artaxerxes. Many of the leading monarchs of Persia were buried here. On its site are many remains of marble columns, bas-reliefs, huge figures, walls, and other notable ruins. Both history and the extent of its ruins indicate that the city at one time possessed vast wealth and great magnificence. Alexander the Great destroyed the city in 331 B. C. to demonstrate to the people of Asia his great military power. Tourists find much of beauty and interest at its site.

PERSIA (pēr'shà), a kingdom in the western part of Asia, called *Iran* by the natives. The name Persia is applied locally only to a small province, but in European geographies it extends to the entire country. It is bounded on the north by Russian territory and the Caspian Sea, east by Afghanistan and Baluchistan, south by the Arabian Sea, and west by the Persian Gulf and Asiatic Turkey. It extends about 900 miles from east to west and 700 miles from north to south, but its extent from southeast to northwest is 1,400 miles. The area is 635,000 square miles.

DESCRIPTION. The surface consists principally of an elevated plateau, much of which is desert, and along the western and northern boundaries are vast areas broken up by chains of rocky and precipitous mountains. The eastern part is quite level, but elevated, and along the Arabian Sea and Caspian Sea are tracts of fertile coast plains. The general elevation of the interior ranges from 2,000 to 6,250 feet above sea level,

while the Elburz Mountains, trending along the Caspian Sea, rise to nearly 20,000 feet, Mount Demavend being the culminating peak. This mountain is a nearly extinct volcano, altitude 18,500 feet, and from its summit an outlook may be had over a vast stretch of country. West of the Caspian Sea are the mountains of Ararat and along the Persian Gulf are several ranges that approximate an elevation of 16,500 feet, including the range known as Kuh-Dinar. In the interior are two deserts, known as the Great Salt Desert, or Dasht-i-Kavir, in the north central part, and the Great Sand Desert, or Dasht-i-Lut, in the southeastern section.

The rivers of the interior are few and unimportant, and fully two-thirds of the surface is not drained into the sea, but the drainage is lost in the sands or swamp lands. Lake Urumiah, in the northwest, is the most important body of water, but there are many small inland saline lakes, fully thirty of them covering a considerable area and having no visible outlet to the sea. The Euphrates forms a small portion of the western boundary and is the only river of importance in navigation, though the Karun has been improved by jetties and canals for small boats. A number of small streams flow into the Caspian Sea, including the Atrek and the Sefid Rud.

The climate of Persia varies according to location and elevation. In the central part the summers are extremely hot and the winters are cold. The region lying adjacent to the Persian Gulf has remarkably hot and oppressive summers and the winters are quite moist. As a whole the rainfall is limited, some regions being particularly arid, but along the Caspian and Arabian seas and the Persian Gulf there is an abundance of moisture and a dense growth of forests. Few sections of the country have to exceed ten inches of precipitation per year. Among the more important trees are the elm, oak, walnut, beech, cypress, cedar, box elder, and cottonwood.

MINING. Though rich in mineral wealth, mining has not been developed extensively as an industry. Turquoises of considerable value are obtained in Nishapur and other parts of Khorasan, the northeastern province. Salt is obtained in large quantities in the region lying inland from the Persian Gulf, which contains deposits of nickel, iron ore, gypsum, and sulphur. The coal fields are chiefly in the northern section and the province of Kerman, in the southeastern part, is rich in lead, copper, and marble. Other minerals include antimony, cobalt, nitrates, petroleum, and asbestos.

INDUSTRIES. Agriculture ranks as one of the

leading industries. It is carried on partly in regions supplied with sufficient moisture by nature and partly in irrigated districts, but the methods of farming are crude and primitive. Wheat, barley, and rice are the principal cereals. Cotton of a superior quality is grown. Considerable interests are vested in the production of silk in the plains bordering on the Caspian Sea. Tobacco of a superior quality is grown for export. The poppy was introduced in 1864 and is cultivated as a source of opium in the southern provinces. Fruits of all kind thrive, but the larger share of attention is given to dates, grapes, oranges, peaches, and apples. Vegetables of all kinds are abundant and the melons of Persia take high rank in flavor. Other crops include sugar cane, madder, and indigo.

Stock raising is an important source of wealth. Large herds of domestic animals are pastured in the arid regions of the interior, vast tracts of which are peculiarly fitted for grazing. The horse of Persia is held in high esteem, both for cavalry and ordinary draft purposes. Sheep and goats are grown on a large scale, the former for wool and the latter for meat and milk. Other animals include cattle, camels, mules, and swine. Fishing is carried on extensively off the shores of the Caspian Sea and the Persian Gulf.

Manufacturing is confined chiefly to artistic fabrics and textiles made of cotton, silk, and wool. Persian carpets are celebrated in the markets of the world and not less than thirty standard varieties are exported. Woolen shawls are made of the hair of goats, the work being done almost entirely by hand. Velvets, embroidery, and silks of fine grade are produced. Considerable quantities of caviare are prepared from the sturgeon, sterlet, and other fishes. Earthenware, rugs, utensils, jewelry, glass, and carvings are made to a considerable extent.

TRANSPORTATION AND COMMERCE. Railroad building has been opposed on the ground that it is detrimental to the country, but a line is now in operation from Teheran to the Caspian Sea and other lines have been projected. While numerous national highways are maintained, only a few are improved by substantial bridges and extensive grading. A large majority of the inland trade is carried by caravans, for which purpose the camel is used extensively. About 8,500 miles of telegraphs and many lines of telephones are in use.

Tabriz, about eighty miles from the Russian frontier, is the leading commercial center. Teheran has a large inland trade. Bendu Abbas and Bushire, on the Persian Gulf, and

Meshhed-i-Ser, on the Caspian Sea are the principal ports. The imports somewhat exceed the exports. Foreign commerce is chiefly with Russia, Turkey, Great Britain, Germany, and the United States. Cotton and woolen fabrics, sugar, breadstuffs, metal wares, and machinery are the principal imports. The exports include raw cotton and wool, rice, fish, fruits, cocoons, gums, opium, tobacco, live stock, and precious stones.

EDUCATION. The educational interests of Persia are in a very primitive state. Instruction is carried on by means of primary schools, tutors, and a number of higher schools. Government support is extended to the higher schools and to several colleges, mostly in the form of grants, and the courses outline instruction in religion, Persian and Arabic literature, sciences, and some of the industries. The Koran is the principal book of instruction and the greater part of the people who receive any instruction at all learn to read that book. All the wealthy parents employ private tutors.

GOVERNMENT. The government is a constitutional monarchy and the Shah is the chief executive. He is assisted by a ministry of eight members, who officiate under the direction of a grand vizier. Mohammedanism of the Shiite sect is the prevailing religion and is directed by the Imam-Juma. Legislative authority is vested in a senate of 60 and a national council of 156 members. The former are appointed by the crown and the provinces and the latter are elected by popular suffrage. For the purpose of local government the country is divided into five provinces, or *mamlikats*, and thirty smaller provinces called *vilayets*. The Shah holds his office by hereditary and has the power to appoint the governors of the provinces. The priests have a large influence in governmental affairs and justice is generally summarily administered. It has a standing army of 25,000 men, but a reserve brings the mobile military force up to 105,500. The navy consists of five small steamships. Revenue is raised principally from the mines, fisheries, customs, and various concessions. The *kran* is the monetary unit and is valued at eight cents in the money of Canada and the United States. The largest estate of Persia belongs to the Shah, is estimated at a value of \$22,500,000, and consists largely of precious stones.

INHABITANTS. A large proportion of the rural population consists of nomadic tribes of Kurds, Turks, Arabs, and Lurs. However, the inhabitants consist chiefly of Iranians, or pure Persians, and the Turkish and Tartaric tribes known as Turanians. The people may be di-

vided into dwellers in villages and towns and dwellers in tents. During the hot summer months many of the richer families take up their residence in the mountains, where they have summer homes. The religion is almost exclusively Mohammedan. Those not Moslem in faith include principally Jews, Armenians, and Nestorians. The percentage of Europeans in the country is small, a total of not more than 950. In 1908 Persia had a population of 9,125,000. Teheran, in the north central part, is the capital. Other cities include Tabriz, Ispahan, Meshed, Kerman, Balfrush, Yezd, Resht, Shiraz, and Kashan.

LANGUAGE AND LITERATURE. Many different but closely related dialects are spoken in Persia. The Iranian language is used most extensively. It includes a number of dialects and is grouped with the Aryan or Indo-European division of languages. The Zend-Avesta is the oldest writing. It is the sacred book of the Parsees (q. v.) and dates from the time of Zoroaster, though at present only a portion of the original is extant. Other writings include the Gathas, dating probably from the period between 1200 and 1000 B. C., which constitutes a part of the sacred Zoroasterian literature in a language closely allied to the Sanskrit of the Vedas. The language afterward became greatly modified, as is shown by the cuneiform inscriptions on monuments dating from the time of Cyrus. With the Mohammedan conquest other changes in language and literature occurred, but in the 9th century A. D. Persia again ascended to importance, and continued the predominating influence until the Mongols overran the country and destroyed much of its treasures in wealth and literature.

Modern Persia dates practically from the ascent of Ismail Sufi, and since that time the modern Iranian language has been gradually developing. The Arabic characters are used in writing, but four letters have been added. Persian literature is rich in poetry, biography, and history. Rudagi, who flourished about the middle of the 10th century, is the father of Persian poetry, and Tabari of about the same period is the first great historian. Ausari, author of "Mamik and Asra," and Firdusi, author of the national epic, "Shah-Nameh," flourished in the 11th century. Omar Khayyam (died 1123) wrote the celebrated lives of saints, entitled "Pend-Nameh." Sadi, the great didactic poet, flourished in the 13th century, and Hafiz, the most captivating of Persian poets, wrote in the 14th century. Fericht Ferishtah, who lived in the early part of the 17th century, wrote historic works of great value.

Many of the legends of Persia have been translated into numerous European languages. The Persian drama is the most noted extant in Asiatic countries. Much of the knowledge of astronomy was secured from the Arabs, but the original works in religion are both numerous and superior. The dictionaries and texts on grammar are abundant, and the country has some excellent and authoritative works on geography and geology. Persia had few great writers after the 18th century. Ferid Ghafer Khan, who enriched literature by collections of Oriental fairy tales, is among the latest of note. Within recent years many translations have been made from European languages.

HISTORY. The history of Persia begins several thousand years before the Christian era, but the earliest data are wrapped in doubt and tradition. Originally, the country was limited to a small tract along the northern shore of the Persian Gulf. Later it became part of the Assyrian Empire, but in 708 B. C. an empire was established under Dejoces. The sovereigns eventually united in the kindred tribes and subdued all of Assyria. Cyrus, about 558 B. C., rebelled against the Medes and by his successes made the Persians a powerful nation. The boundaries were extended to include Syria, Palestine, Mesopotamia, and Asia Minor, and he became known as the founder of the Persian Empire. His son, Cambyses, succeeded to the throne in 529 B. C., and during his reign of seven years conquered Egypt, Tyre, and Cyprus. Darius I. annexed Macedonia, Thrace, and a part of India. Xerxes I. became the ruling sovereign in 485 B. C. and was succeeded by Artaxerxes I. in 465 B. C., the latter ruling until 425 B. C. Soon after internal strife began to divide the empire, and in 330 B. C. Alexander the Great, King of Greece, conquered all of the former provinces of Persia and made them a part of Greece.

With the death of Alexander, in 323 B. C., Persia was divided into several provinces, but the greater part was governed by Seleucus, the general of Alexander, and later by his successors, the Seleucidæ. Subsequently a long line of dynasties governed the country, during which time it was visited by successive wars that destroyed its former glory and tended to greatly lessen the population. The Arabians under Caliph Omar conquered Persia in 636 A. D., after which the religion of ancient Persia became supplanted by Mohammedanism. In 1387 Tamerlane conquered Persia with a horde of Mongols and extended his reign from Hindustan to Asia Minor. At his death, in 1405, the country came under the dominion of the Tur-

komans, who reigned until 1501, when they were succeeded by Ismail Sufi. The latter pretended to be a descendant from Ali, son-in-law of Mohammed, and assumed the title of Shah.

Teheran was made the capital of Persia in 1796, when Futteh Ali removed his residence to that city. This sovereign carried on a disastrous war against Russia and in 1828 was obliged to cede all of Persian Armenia to the Czar. He was succeeded by Mehemet Shah in 1834, whose reign was uneventful, and he died in 1848, when Nasr-ed-Din became the ruling



CHALCEDONY CYLINDER: SIGNET OF DARIUS I.

sovereign. In the meantime a dispute arose with the British regarding the sultanate of Herat, which was ceded to the latter in 1857, but subsequently some territory formerly belonging to Oman was annexed. The Shah was assassinated at Teheran, in 1896, and Muzaffar-ed-Din was proclaimed the sovereign. He not only reduced the taxes and instituted important reforms, but in 1906 subscribed to a constitution, the first in the history of the country. By this act the nation passed from an absolute to a representative government. However, the sovereign died early in 1907 and was succeeded by his son, Mohammed Ali Mirza. The present ruler is the sixth of the dynasty of Kajârs, which has ruled the country since 1794.

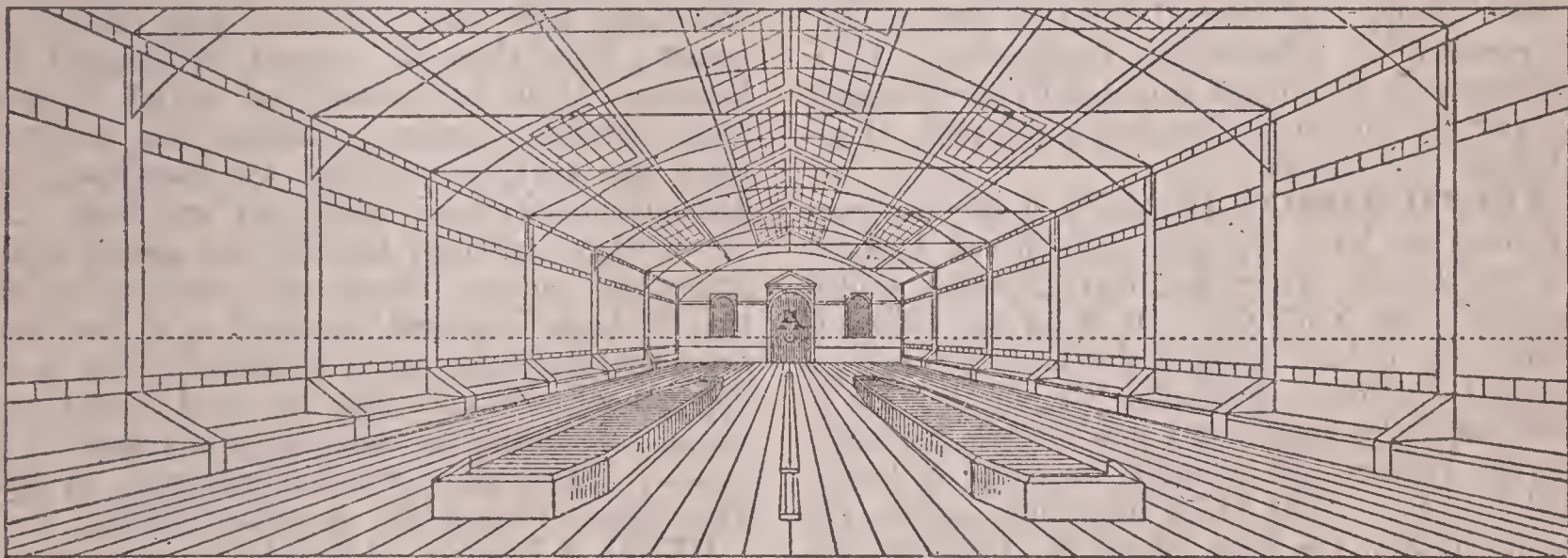
PERSIAN GULF, an inlet from the Indian Ocean, situated between Persia and Arabia, and connected with the Arabian Sea by the Strait of Ormuz. It is 575 miles from north to south, and about 185 miles wide. Within the gulf are a number of islands, including Ormuz and the Bahrein Isles. The shores are generally rocky, except in the northern part, where the Euphrates and Tigris enter by a vast delta. Both the fin and pearl fisheries are abundant. The gulf is valuable for navigation. Bushire is the principal seaport. The tide rises twelve feet at the Strait of Ormuz. In ancient times the Persian Gulf was known as the Sea of Babylon.

PERSIMMON (pēr-sim'mūn), a tree of the ebony family, sometimes called the *date plum*. It is native to Asia and was introduced to the southern part of the United States in 1875. The *American persimmon* is native to the region extending from Indiana to the Gulf of Mexico. It attains a height of from 25 to 60 feet and yields a plumlike fruit about an inch in diameter. The fruit is much smaller than that of the species found in Asia. It has from six to eight seeds and is astringent and bitter to the taste until it is made sweet and mellow by the frost. The fruit is edible. Tonics and astringents are prepared from the bark of the tree.

PERSONAL PROPERTY, the name applied to every kind of property which is not real estate, such as furniture, jewelry, live stock, money, and stocks and bonds. Title to personal property may be acquired by an agreement between the parties, but the contract need not to

be used, as each eye, having its own view, sees the objects in a different place on the plane of the glass. Since no painting can be entirely satisfactory without correctness of perspective, it will be seen that perspective is intimately connected with painting and other arts.

The term *linear perspective* has reference to the effects produced upon the observer by the distance and position of the apparent form and grouping of objects. On the other hand, *aerial perspective* is confined to the distinctness of objects, as modified by light and distance. In the contemplation of a landscape, we observe that the objects nearest to us are most distinct in outline and color, but as they recede from the view the forms become vague and shadowy and the colors lose their intensity and blend together. In painting a picture, therefore, to harmonize with nature, it must not only be drawn true to perspective, but it must also be colored



INTERIOR OF A HALL, SHOWING IMPORTANT POINTS AND LINES.

be completed before an officer of the law, as is the case in transferring real estate by deed or otherwise. In some states personal property cannot be held as acquired by purchase, unless the possession passes from the seller to the purchaser. Where the possession does not change by reason of a sale, it is necessary in most cases to have a bill of sale properly acknowledged and recorded.

PERSPECTIVE (pēr-spĕk'tiv), the art of representing on a plain surface objects as they appear to the eye from any determinate point of view. All the points of the surface of a body are visible by means of luminous rays which proceed from these points to the eye. As we look out of a window, the glass may be considered the intersecting plane, and, if we draw or paint upon the glass the objects visible through it, we produce in the painting a true perspective. However, only one eye must

in reference to the proximity of the objects to the spectator. This is termed the art of *aerial perspective*. A projection called *isometrical perspective* has been devised to aid in giving a perspective effect to the drawing of an object and yet enable it to be measured by a scale. Isometry is applied both to mechanical and architectural drawing.

PERTH (pĕrth), a city of Australia, capital of the State of Western Australia, near the Indian Ocean. It is located on the Swan River, about ten miles northeast of Fremantle, its port, and has communication by the Eastern Railway. The surrounding country is mining and agricultural. Among the principal buildings are the Governor's palace, the city hall, the Parliament house, an observatory, and several schools and churches. The streets are regularly platted and improved with pavements. It has waterworks, gas and electric lighting, and elec-

tric street railways. Clothing, tobacco products, machinery, earthenware, and canned fruits are among the manufactures. The place was platted and incorporated as a city in 1856. Population, 1907, 50,527.

PERTH a city in Scotland, capital of a county of the same name, on the Tay River, 42 miles northwest of Edinburgh. The Tay is crossed by a fine bridge of nine arches, 880 feet long. Perth has a beautiful site on the banks of the river, where the scenery is beautified by the Grampians and by excellent forests and parks. It has extensive railroad connections, a city water system, street railways, pavements, and other municipal facilities. Among the manufactures are spirituous liquors, machinery, textiles, dyes, and utensils. The salmon fisheries of the Tay are valuable and much of the product is canned here. The city has a number of fine buildings, including the Church of Saint John, the King James VI. Hospital, a penitentiary, the public library, the central railway station, and a number of educational institutions. It is thought that Perth was founded by the Romans. It was the capital of Scotland until 1437. Population, 1907, 34,866.

PERTH AMBOY (ăm-boi'), a city and port of entry of New Jersey, in Middlesex County, on the Raritan River and Bay, 21 miles southwest of New York City. It is on the Pennsylvania, the Lehigh Valley, the Central of New Jersey, and other railroads. Communication is maintained by steamboats and electric railways. In the vicinity are valuable deposits of kaolin and fire clay. The chief buildings include the public library, the high school, the townhall, the Y. M. C. A., and many churches. Among the manufactures are terra cotta, cork, emeryware, chemicals, tobacco products, oil, and drain tile. The city has a large trade in cereals and merchandise. It was settled by Scotch people in 1683 and was incorporated as a city in 1784. Population, 1905, 25,895; in 1910, 32,121.

PERTURBATION (pěr-tür-bā'shūn), in astronomy, a disturbance in the movement of the planets or other celestial bodies, causing them to deviate from their elliptic orbit. These movements are due to the attraction of other planets upon a heavenly body. According to Kepler's laws, if a planet were attracted by no body except the sun, it would describe an ellipse, with the sun in one of the foci, but other planets in the solar system cause it to deviate from such an ellipse. Perturbations are either *periodic* or *secular*, the former of which compensate each other, while the latter are changes in the form of the orbit which go on in the same direction from time to time.

PERU (pě-rōō'), a city of Illinois, in La Salle County, on the Illinois River, 98 miles southwest of Chicago. It is on the Illinois and Michigan Canal and on the Chicago, Rock Island and Pacific and the Chicago, Burlington and Quincy railroads. The surrounding country is agricultural, producing cereals and dairy products, and contains extensive deposits of bituminous coal. It has several fine bridges, a public park, and public waterworks. The chief buildings include the Turner Hall, the Masonic Temple, and the Saint Bede College. Among the manufactures are flour, hardware, cigars, machinery, farming implements, and lumber products. It has a growing trade in merchandise. Peru was settled in 1827, platted in 1834, and chartered as a city in 1852. Population, 1900, 6,863; in 1910, 7,984.

PERU, a city in Indiana, county seat of Miami County, on the Wabash River, 75 miles north of Indianapolis. It is on the Wabash, the Lake Erie and Western, and other railroads. The river is crossed by several fine bridges. It is surrounded by a rich farming and dairying country. Among the manufactures are textiles, artificial ice, carriages, flint glass, ironware, flour, machinery, and bags. The noteworthy buildings include the county courthouse, the public library, the sanatorium, and the Wabash Railroad Hospital. It has good municipal facilities, such as waterworks, a fire department, electric lighting, and street railways. Natural gas and coal are found in its vicinity. The place was incorporated in 1848. Population, 1900, 8,463; in 1910, 10,910.

PERU, a country of South America, one of the five republics that border on the Pacific Ocean. It is bounded on the north by Ecuador, east by Brazil and Bolivia, south by Chile and the Pacific, and west by the Pacific. The length from north to south, measured along the coast, is 1,100 miles and the greatest breadth is 800 miles. It has a total area of 698,350 square miles.

DESCRIPTION. The surface varies greatly in its composition and elevation above sea level. A narrow coast plain lies along the Pacific and about 60 miles inland the Andes Mountains trend almost parallel to it. This coast region is largely a sandy desert, ranging in width from 20 to 120 miles, and rises gradually to form the foothills of the Andes. The Andes are about 250 miles wide and are characterized by many lofty summits, among which stretch elevated plains and tablelands. These highlands are in two chains, or cordilleras, many of which are volcanic and contain thermal springs. Fully two-fifths of the surface of Peru is occupied by the highlands and mountains.

They reach summits of from 14,000 to about 20,000 feet, including Cotopaxi and Chimborazo, with elevations of 19,613 and 20,498, respectively. In the eastern part stretches a vast region included in the Amazon basin, through which many streams flow eastward. The Amazon basin in Peru is known as *Montaña*, or Los Bosques, and abounds in dense forests and other forms of luxurious vegetation.

The drainage belongs to two systems, that of the Pacific slope and that of the Amazon. All of the streams on the Pacific slope are short and unimportant and many are lost in the desert sands. A few streams, such as the Santa River, carry a small quantity of water during the dry season, but at the time of heavy rains become great torrents. The rivers east of the Andes include the Amazon, the upper course of which is called the Marañón, the Ucayale, the Javari, and the Juruá. Of these the Amazon is the most important, being navigable from Iquitos, in eastern Peru, to the Atlantic. Several beautiful lakes are in the mountain regions, including Junín and Titicaca, which are more or less valuable for their fisheries. The latter has an elevation of 12,500 feet above sea level. It is the most important inland lake of South America and belongs partly to Bolivia.

The rainfall is greatly diversified, owing to the varying effects of the altitude and the trade winds. On the coast region rain seldom falls, for the reason that the trade winds, passing across the continent from the Atlantic, exhaust their supply of moisture in sweeping over the Cordilleras, hence that region is dry and arid, and the rivers, fed partly by springs and mountain snow, are practically the only source from which water can be drawn for irrigating cotton and sugar plantations. At Lima, on the coast, not more than one or two inches of rain fall during the year. In the mountains and the Amazon basin rainfall is abundant. The climate of the coast is hot, but is somewhat modified by the winds blowing from the snow-capped Andes and by cold oceanic currents. January and February are the hottest months, when the mean temperature on the coast is 84°, but the maximum of 98° and even 105° is reached. In all parts of Peru the climate is exceptionally healthful.

MINING. The country is rich in minerals, but comparatively little effort is put forth to develop the resources. In the mining industry it is surpassed by both Chile and Bolivia. Silver is mined extensively at Cerro de Pasco, Puno, and Recuay. These fields were opened as early as 1660 and produced \$475,000,000 in silver up to 1849, but at present the annual output is

only about 1,225,000 ounces. Gold is obtained in many sections of the country, but is mined most extensively in the eastern ranges of the Andes. Coal of a good quality is mined in the provinces of Huamachuco and Hualgayoc. Other minerals include petroleum, copper, salt, lead, borax, sulphur, quicksilver, mercury, and zinc. Mining has been retarded to a great extent for the want of transportation facilities.

AGRICULTURE. Farming is developed most extensively in the fertile coast valleys, where coffee, sugar cane, and cotton are grown. The irrigated area includes a total of 450,000 acres and a large part of this is utilized to cultivate sugar cane. Rice and tobacco yield good returns and maize and alfalfa are grown profitably. Potatoes and vegetables thrive. Fruit culture receives marked attention, especially olives, grapes, and bananas. Other products embrace cinchona, coffee, rubber, cocoa, and guano. Various medical plants and dyewoods obtained in Peru possess great value.

The live-stock industry, though not represented as extensively as the resources permit, has been developed chiefly in the eastern part, where large areas have nutritious grasses. Sheep are grown extensively for wool, but this product is obtained also from the alpaca and the llama. Poultry raising has received much attention and the grades are superior, but cattle and horses are not well bred. Goats, swine, and mules are grown to some extent. An extensive and remarkable fauna of wild animal life is still represented, including the tapir, vicuña, sloth, armadillo, alligator, guanaco, monkey, and boa constrictor. Many beautiful birds of song and plumage abound. The larger species of birds include the toucan, hawk, buzzard, pheasant, and condor.

MANUFACTURES. Comparatively little has been done to develop manufacturing, but foreign capital is promoting many lines that furnish commodities for exportation. Sugar is one of the leading products and is made almost exclusively from home-grown sugar cane. Several large establishments prepare rice for market, and considerable interests are vested in the manufacture of wine from native-grown grapes. Smelting is an important enterprise in connection with the mines. Pipe tobacco, cigars, malt and distilled liquors, furniture, clothing, and textiles are made chiefly for home consumption. Fine straw hats are made in large quantities and these are sold in the trade as *Panama* hats. While a large quantity of petroleum is produced, only a small per cent. of it is refined. Other manufactures include boots and shoes, soap, olive oil, cotton-seed oil, and canned fruits.

TRANSPORTATION AND COMMERCE. The Amazon is the only navigable river and steamers ascend regularly as far as Iquitos. Callao, the port of Lima, has a large coastwise trade and steamboat connections with the principal ports of Europe and America. Railway building is encouraged by the government and the lines in operation have a length of 2,100 miles, but a large part of the systems is narrow gauge. The principal lines connect the coast with interior points, but few branches are maintained. The longest line extends from Mollendo, on the Pacific, to Puno, on Lake Titicaca, with a branch running north to the valley of the Apurimac River, and several lines have been projected to connect with the railways of Bolivia and Brazil, which form a part of the transcontinental systems. Most of the highways are in poor condition and consist principally of paths used in transferring goods by mules and llamas. The telegraph lines include about 8,500 miles and the telephone, about 5,200 miles. Railway and highway construction is extremely difficult in the mountainous regions, owing to their vast elevation and the rocky and craggy character, thus requiring great engineering skill in promoting these enterprises.

The exports slightly exceed the imports, but both have shown a slight increase from year to year. Sugar and ores are the leading exports and these are followed in order by wool, cotton, coffee, borax, hides, rice, and cocaine. Manufactures of various kinds, especially cotton and woolen goods and small wares, are the leading imports. Other commodities imported include furniture, wines, drugs, and machinery. Foreign trade is chiefly with Great Britain, Germany, the United States, France, and Chile.

GOVERNMENT. The present constitution was revised in 1860. It vests the executive power in a president, who is elected by popular suffrage for four years. He is assisted by a cabinet of six ministers, who hold office at his pleasure, but his acts are subject to their approval. The legislative authority is vested in a senate and house of representatives, the former having 48 and the latter 108 members. A supreme court of justice has final jurisdiction and is composed of judges appointed by the president subject to confirmation by congress. Peru is divided into seventeen departments and two provinces. Each department has superior courts. Local government is administered in departments and districts, the chief officers of which are appointed either by the president or by prefects in the various departments.

EDUCATION AND RELIGION. Education has not advanced materially, though there is a compul-

sory attendance law. A system of high schools is maintained under national laws and the high schools are generally under departmental supervision. San Marcos is the seat of the national university, which has an attendance of 675 students and maintains faculties of medicine, law, literature, theology, and political science. Other universities are maintained at Cuzco and Arequipa, and several botanical and zoölogical gardens are supported at Lima. Equal political and religious freedom are guaranteed under the constitution, but Roman Catholicism is the state religion. While other sects have not been excluded, it is required by law that the state religion be respected.

INHABITANTS. The native population, consisting chiefly of Peruvian Indians, comprises more than half of the inhabitants. About one-fourth are of mixed blood and the remainder are chiefly Spaniards or of Spanish descent. Although Spanish is the national language, the Peruvian dialect is still spoken by a majority of the people. The population is quite stationary, showing only a slight increase from time to time, and immigration from Europe is very small. In 1909 the population was estimated at 4,850,000. Lima, the capital, is the largest city. Other cities include Cuzco, Arequipa, Callao, Concepcion, Catacaos, Iquitos, and Truxillo.

HISTORY. Little is known of the ancient history and civilization of Peru. Writers generally divide its history into three periods: the Pre-Incarial, the Incas, and the Spanish periods. The *Pre-Incarial* period includes a time of unknown duration, when the region was populated by a people who were highly advanced in language and civilization and built vast cities. Traces of this period are abundant near Lake Titicaca and elsewhere, and occur in the form of sculptures, pillars, immense masses of hewn stone, ornaments, and fragments of buildings. Nothing is known of the origin of the Incas, but they are thought to have been less advanced in civilized arts than the people who preceded them and, when the Spanish invaders conquered the region, their cities and industrial arts had reached much development. The region now included in Peru, according to some writers, then had a population of fully 30,000,000 people. Pizarro with a band of Spanish adventurers invaded Peru in 1532 and before the end of the year captured Athualpa, the Incas sovereign, and destroyed his power.

From the conquest by Pizarro until 1821 Peru was a Spanish possession, but in the latter year independence was proclaimed. However, Spanish dominion did not terminate until 1824, when a prolonged war ended favorably to the

revolutionists. A constitution was adopted soon after, which was supplanted by the constitution of 1856, and the latter was revised in 1860 and modeled after the Constitution of the United States. Peru and Bolivia formed an alliance against Chile in 1879, which resulted in the success of the latter, and accordingly Peru ceded by treaty, in 1883, the province of Tarapaca to Chile. This cession was a heavy loss, because the province contains vast deposits of nitrates and other valuable minerals. Since then several unimportant insurrections have occurred, but in the main the government has been stable and the country has been reasonably prosperous. Jose Pardo was elected president in 1904 and gave the country a conservative administration. He was succeeded in 1908 by Minguel R. Davila, who was pledged to carry out a policy of internal improvement.

PERUGIA (pā-rōō'jā), a city of Italy, on the Tiber River, ten miles east of Lake Perugia and 83 miles north of Rome. It is the capital of the province of Perugia, which is highly fertile. The city is surrounded by fortifications and contains a number of massive buildings, including a Gothic cathedral built in the 15th century. The University of Perugia was founded in 1320. This institution has a fine museum, carries advanced courses of study, and has a library of 30,000 volumes. Other noteworthy buildings include the orphan asylum, the public library, the central railroad station, and the Roman Arch of Augustus. Among the manufactures are silk and woolen goods, velvets, liquors, soap, utensils, and machinery. The railroad connections with Rome, Florence, and other cities make it an important market for produce and merchandise. Perugia was anciently an Etrurian republic, but in 294 B. C. it became a part of Rome. In 1860 it was annexed to Italy by Victor Emmanuel, since which time it has benefited greatly by railway building and other improvements. Population, 1906, 63,835.

PERUVIAN BARK (pē-ru'vī-ān), a valuable product of several species of trees belonging to the genus *Cinchona*. The trees that yield this product are native to Peru and other countries of South America. Peruvian bark is known in some countries as *cinchona bark*, *china bark*, and *Jesuits' bark*, the last mentioned name being from the Jesuits, who introduced it into Europe. This product is valuable as the source of *quinine*, which is extracted and sold extensively for medical purposes. It also yields *cinchonine*, an alkaloid occurring with quinine in the bark, but it is less powerful than quinine, though its physiological effects are the same.

PESHAWAR (pā-shā'wūr), or **Peshaur**, a

city of India, capital of a province on the north-western frontier, twelve miles east of the Khyder Pass. It is located on the Kabul River and has narrow and crooked streets. The architecture is largely of mud and wood. The chief buildings include a mission school, the government house, several large bazaars, and a number of Christian churches. It is important as a British military station and has railway connections with the leading cities of India. The trade is chiefly in carpets, live stock, and cereals. It has manufactures of cotton and woolen textiles, pottery, and machinery. A large majority of the inhabitants are Mohammedans. Population, 1906, 96,741.

PESO (pā'sō), a Spanish coin equal to from fifty cents to one dollar in the money of Canada and the United States, used as the monetary unit in several countries of South America. It is divided into 100 *centimos*, but in some countries the subdivisions are known as *centimes*, or *centavos*, and smaller coins known by these names are issued for circulation.

PESSIMISM (pēs'sī-mīz'm), the name applied to a doctrine announced by Schopenhauer in 1819, which implies the theory that the world is bad rather than good. It stands directly opposite to *optimism*, in that the optimist sees the good and beautiful in everything, while the pessimist maintains an unfavorable view of everything in nature and doubts whether life is worth living. The view that vast evils exist to overshadow the good has been associated with nearly all philosophic and religious systems at some stage in their development. Anciently the Greeks had doubts as to the reality of knowledge and good, while the Brahmans and Buddhists regard life illusory and burdensome. Rousseau agreed with the doctrine expressed by some of the Greek philosophers that the world is degenerating. Schopenhauer thought that the world is the worst possible under existing conditions, and that life should be a denial and suppression of will. Eduard von Hartmann (q. v.) expressed the view that the world is wholly bad, but he regarded it the best under metaphysical limitations. He thought that will is a craving to exist, involving much suffering, and that ultimately it will cease existence altogether.

The tendency to look on the dark side, though holding that there are both good and evil in the world, may be assigned to the fact that many individuals spend much time in contemplating unhappiness and actual pain. They place stress upon the realization that the ideals of the human soul are superior to the conditions actually experienced in the mortal state. That life is worth living is proven by our desire to live, and

that pleasure exceeds pain is evidenced by our experience, but its realization is often interfered with by brooding over trifling or apparent losses. Pessimism as a doctrine is good so far as it teaches that the highest reward of virtue is self-respect and points out barriers to happiness in this life, particularly if it seeks to remove these barriers by wise methods.

PESTH. See **Budapest.**

PETARD (pĕ-tărd'), an instrument used formerly for making breaches in the walls of forts and for destroying gates and palisades. It was made of a conical iron, in which from five to twelve pounds of powder were placed, and, after attaching it to the object to be demolished, a slow match was applied to the touchhole at the small end. Powder bags are now used almost universally in place of petards.

PETCHORA (pă-chō'ră), a river in the northern part of Russia, which rises in the Ural Mountains and flows north into the Arctic Ocean. Its source is in the government of Perm and in its lower course it passes through a part of Vologda and Archangel. The length is about 1,125 miles and two-thirds of this distance is navigable. The country through which it passes is sparsely settled, being extremely cold, and it discharges through an extensive delta. It passes the city of Koshva and receives the inflow from the Ussa and Koshva.

PETERBOROUGH, a city of Ontario, capital of Peterborough County, 75 miles northeast of Toronto. It is situated on both sides of the Otonabe River, on the Canadian Pacific and the Grand Trunk railways, and is surrounded by a fertile farming region. Extensive water power is afforded by the river, which has a descent of 150 feet within a few miles of the city. Among the features are the high school, the county courthouse, the public library, and a bridge across the river, which connects it with the village of Ashburnham. The manufactures include leather, woolen goods, furniture, engines, and farming implements. It has a large trade in grain, lumber, pork, and merchandise. Gas and electric lighting, waterworks, and street paving are among the public improvements. Population, 1901, 11,239.

PETERBOROUGH, a city of England, in Northamptonshire, 35 miles northeast of Northampton. It is on the Nen River and has direct railway connections with London. It has a cathedral 476 feet long and 203 feet wide, with a tower 150 feet high. Other buildings include an art school, a public library, a corn exchange, and several churches. Locomotives, hardware, clothing, and machinery are among the principal manufactures. It has waterworks, electric light-

ing, sewerage, public baths, and electric street railways. The Danes destroyed it in 1807, when it was known as Medeshamstede, but it was rebuilt and named Peterborough. In the cathedral are the remains of Queen Catherine of Aragon. Population, 1907, 32,178.

PETER'S, Saint, the largest church in Christendom, situated in Rome, where it was founded by Julius II. in 1506. It occupies the site of the old basilica, which was built by Constantine the Great in 306 A. D. on the grave of Saint Peter, near the place where the latter suffered martyrdom. The building of a magnificent place of worship had been projected by Pope Nicholas V. in 1450, but Julius II. was the first to take decisive measures and selected Bramante as the architect to make a design. This architect died in 1513 and others had charge of the work until it devolved on Michael Angelo, in 1546. He was 72 years of age when he commenced the important work of completing the structure. He designed the dome and before his death, in 1564, had the satisfaction of seeing the dome and most of the building practically completed.

Saint Peter's was finished twenty years after the foundation was laid. The nave was completed in 1612 and the façade and portico were finished in 1614. The building was dedicated on Nov. 18, 1626, by Urban VIII. The façade is 145 feet high and 368 feet long. Saint Peter's has a length of 613 feet, the breadth across the transepts is 445 feet, and the nave is 152 feet high and 90 feet wide. The dome has a diameter of 195 feet, the height to the lantern is 405 feet, and the height to the top of the cross is 435 feet. Copies of the most celebrated paintings extant are in the building and the whole is a work of much magnificence and architectural skill. Four great arches support the dome, the finest portion of the building. A high altar is immediately under the dome, where the grave of Saint Peter is located. Monuments by Canova, Michael Angelo, and Thorwaldsen adorn the building, besides which it has a large number of statues and beautiful works of art. The famous bronze statue of Saint Peter is near the canopy, seated in a chair, with the gilded right foot extended, which devout Catholics kiss as they visit the place. The cost of the structure is estimated at \$50,000,000.

PETERSBURG, a city of Virginia, in Dinwiddie County, on the Appomattox River, twenty miles south of Richmond. It is on the Appomattox Canal and on the Seaboard Air Line, the Atlantic Coast Line, and the Norfolk and Western railroads. The place is surrounded by a region containing granite quarries and pro-

ductive agricultural lands. The noteworthy buildings include the Masonic Temple, the city hall, the public library, the hospital for the insane, and the Odd Fellows' Hall. Among the institutions of higher learning are the Southern Female College, Saint Paul's Female College, and the Protestant Episcopal School for Girls. The manufactures include tobacco products, flour, paper, cotton and silk textiles, machinery, and farming implements. It has a very extensive trade in tobacco, cotton, flour, and paper. The place was settled in 1733 and incorporated in 1748. In 1864 it was besieged for ten months by the Union forces under General Grant, and in the spring of 1865 it was evacuated by the Confederates. Population, 1900, 21,810.

PETERSBURG, Siege of, a noted siege in the Civil War of the United States, which was designed as the means of capturing Petersburg, Va. General Grant, after the failure at Cold Harbor, on June 3, 1864, marched with an army of 100,000 men against Petersburg, which was defended by only 2,500 Confederates. This forced the latter to withdraw a part of their army from Richmond, whence the Confederates marched to prevent the city of Petersburg falling into the hands of the Federals. General Butler conducted an assault on June 15 and on several succeeding days, but was repulsed under the leadership of General Lee, the Federals losing about 10,000 men. The noted Petersburg mine, a subterranean channel run under the Confederate fort by General Rosecrans, with a length of 520 feet, was exploded on July 30, causing a heavy Confederate loss, but when the Federals tried to enter the fort through the crater they were cut down by the thousands by the steady artillery fire of the Confederates. The situation remained practically the same at Petersburg and Richmond until March 24, 1865, when Lee made an attempt to force the Union lines and join Johnston in the south. On April 1 the Confederates were defeated at Five Forks and Grant ordered a united attack. Lee evacuated Petersburg and Richmond on April 3, 1865, after sustaining heavy losses.

PETER'S PENCE, or **Romescot**, a tax levied in memory of Saint Peter for the benefit of the Pope. It is thought to have originated with Ina, King of Wessex, in 721. The tax was paid by those possessing cattle or land, but was discontinued in England in 1365, and in 1534 it was prohibited by an act of Parliament. The tax was only one penny for each family, but this was really a large amount, as the value of a day's labor was only a penny. When the Pope lost temporal power by the Revolution of 1848,

the tax was revived as a voluntary contribution in several countries, and there have been large funds accumulated in this manner. In 1877, when the jubilee of Pius IX. was celebrated, the sum raised amounted to \$3,300,000.

PETITION (pě-tish'ün), an appeal by one or more persons to any organized body or branch of the government, in the form of a written request, praying that a certain grace or right be granted. The right of petition is recognized by most governments as a natural right, and is regarded a fit and convenient means by which the citizen may place before public officials causes and grievances of importance. The Congress of the United States is prohibited from making any law to abridge "the right of the people peaceably to assemble and to petition the government for a redress of grievances."

PETITION OF RIGHTS, a celebrated declaration formulated by the British House of Commons in 1826, which was presented to Charles I. It was formulated for the purpose of limiting the powers of the crown, and obtaining a freer exercise of the personal and civil liberties in the nation. This document was not a new law, but rather a rehearsal of the statutes that had been disregarded by the king, and requested that the ancient rights of the people should be confirmed. It recited the more important provisions of the Magna Charta and called attention to certain statutes passed in the reigns of Edward I. and Edward III., particularly those that prohibited forced loans and unlawful taxes and assessments, illegal arrests and imprisonments, a resort to martial law in civil cases, and quartering soldiers upon the premises of private citizens without their consent. At first the king eluded the petition and his subjects were ordered not to meddle with affairs of state. However, the Commons proceeded to take up charges against Buckingham, one of the advisers of the king, and the latter was compelled to yield and assent to the petition.

PETOSKEY (pě-tös'ki), a city of Michigan, in Emmet County, 42 miles southwest of Sheboygan. It is on Little Traverse Bay, an inlet from Lake Michigan, and on the Père Marquette and the Grand Rapids and Indiana railways. Petoskey has a large inland and lake trade and is popular as a summer resort. The chief buildings include the Lockwood Hospital, the Petoskey Normal School, and several churches and public schools. Flour, leather, lime, and machinery are among the chief manufactures. It has electric lighting and public waterworks and carries a large trade in merchandise. The place was incorporated in 1878 and became a city in 1896. Population, 1905, 5,186; in 1910, 4,778.

PETREL (pĕt'rĕl), a genus of sea birds. They include many species, all of which have webbed feet and long and strong wings. The nasal tubes are united, the beak is as long as the head, and the upper mandible is hooked. They live almost constantly on the ocean. The petrels that frequent the high seas are rarely seen on the land, coming to shore only to lay their eggs and rear their young. The color is dusky and varied with white or gray, and most of the species are of small size. They feed on mollusks and may be seen upon the water when it is disturbed by storms, for the reason that many of the animal forms upon which they feed rise to the surface at that time. Among the familiar species are the *stormy petrel*, the cosmopolitan *Wilson's petrel*, and the northern *Leach's petrel*. The stormy petrel is sometimes called *Mother Carey's chicken*, and is one of the smallest web-footed birds, being only about the size of a lark. These birds are so named because they appear to be walking or running on the water, the term being applied from the Apostle Peter's walking on the water.

PETROLEUM (pĕ-trō'lĕ-ŭm), an inflammable liquid substance found in many localities by boring into the earth's crust, but in some

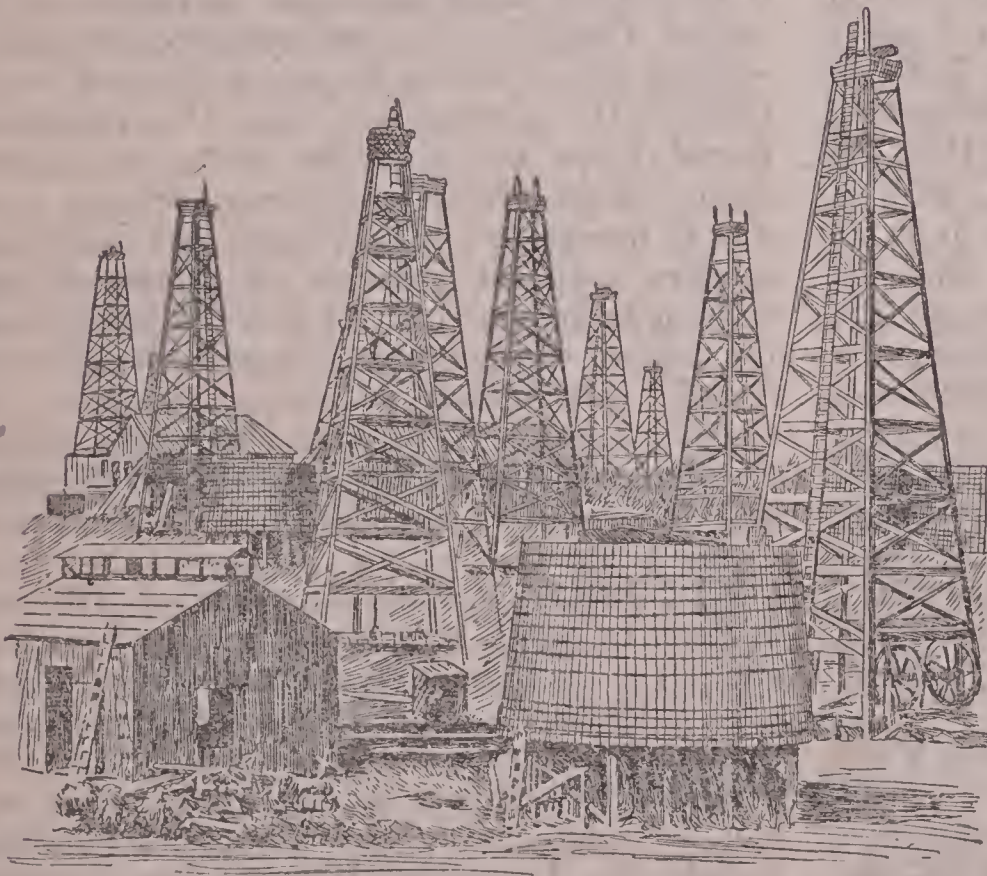
those used for artesian wells. The depth differs greatly with localities, ranging from a few feet to several thousand feet below the surface. The oil comes to the surface in some localities, being forced out by a gas always found in connection with it, but in some cases it must be pumped much like water from an ordinary well. *Crude petroleum*, as it is called when it comes out of the ground, has a dark brown to greenish color and in its native state has a disagreeable odor. From the wells it is transferred into great tanks by means of iron pipes and it is then taken through pipes into refineries, where it is distilled. In some of the Pennsylvania and Ohio oil regions several thousand miles of pipes are used to carry it to the refineries.

The crude petroleum yields different classes of products by distillation, the principal ones being gasoline, naphtha, benzine, kerosene, lubricating oil, and paraffine. *Gasoline* is used for mixing with coal gas and making gas; *naphtha*, for making oil cloths and cleaning kid gloves and clothing; *benzine*, in making varnishes and paints; *kerosene*, for burning in lamps; *lubricating oil*, for oiling or greasing machinery; and *paraffine*, for making waterproof cloths, chewing gum, candles, and matches. Petroleum is used to a considerable extent as fuel for furnaces and engines, but it is somewhat objectionable on account of being extremely smoky. In some regions a large amount of natural gas (q. v.) accompanies petroleum, when it is used extensively for lighting purposes.

Petroleum was known to the ancients, but it was not produced to any considerable extent until 1859, when a boring at Oil City, Pa., led to the discovery of a well that yielded 400 gallons a day. Pliny describes its use in lamps and Genoa was lighted by the product secured from the wells of Amiano at about the time of Tacitus, Pliny, and other Roman writers. The American Indians collected petroleum that exuded from the ground, which they sold as *seneca oil* for medical purposes, especially for rheumatism. Geologists generally agree in the opinion that petroleum has been formed by the decomposition of organic matter, either of animal or vegetable origin.

However, some writers think it was formed in the depths of the earth by the chemical action of water on heated carbides. It occurs in rocks of all ages.

The United States and Russia are the largest producers of petroleum. Although the output in



OIL WELLS AND TANKS AT BEAUMONT, TEXAS.

places it rises through natural channels and forms springs. It is frequently called mineral oil, rock oil, coal oil, natural oil, and seneca oil, the names differing in the trade of different countries. To secure the petroleum, wells are sunk into the earth by drilling tools, much like

these countries was about equal for some years, the United States is taking precedence as the largest petroleum-producing country in the world. It is likewise obtained in large quantities in India, Austria, the Dutch East Indies, Canada, Rumania, and Japan. The principal oil wells of the United States are in Pennsylvania, West Virginia, California, Kansas, Ohio, Texas, Tennessee, Kentucky, Wyoming, and New York. However, California, Illinois, Kansas, and Pennsylvania have the largest yield. Deposits have been discovered in several other states and in Alaska. The deposits of Canada are found principally in Ontario, British Columbia, and Yukon. The American product is considered the most valuable, since it yields a larger proportion of refined oil per barrel and sells about ten per cent. higher than that produced in competitive countries. The annual production of the United States is about 168,500,000 barrels, and has a value of \$120,500,000. Much of this product is consumed in the manufactures and for household uses, while a large per cent. is exported annually. It is equally serviceable for lighting and heating.

PETUNIA (pě-tū'nī-à), a genus of plants of the nightshade family, which are native to



SINGLE FLOWERING PETUNIA.

the warmer parts of America. The leaves are entire and somewhat resemble those of tobacco, especially in having the sticky surface and in emitting a disagreeable odor when crushed. The plants are perennial herbs, and the flowers

are either single or double. They are cultivated extensively in gardens and in greenhouses, where they are grown chiefly as annual plants, since they bloom early. The *Countess of Ellesmere* is a choice species with a deep rose-colored flower. Many other favorite species have been developed by florists.

PEWTER (pū'tēr), an alloy of several kinds of metals, made chiefly of tin and lead. To these metals others are sometimes added, such as copper, which makes the alloy harder and sonorous; antimony, which hardens and gives a silvery luster; and zinc, which serves to cleanse the alloy. No regular proportions are necessary, but a fine product is obtained by using 17 parts of antimony to 100 parts of tin. The best grades contain about one-fifth of lead, the remainder being tin, and in this proportion they are used for plates and dishes. Vessels to contain wine and vinegar are usually made of 82 parts tin and 18 parts lead. Pewter is used for spoons, mugs, plates, and other household utensils. It is employed for many purposes in the arts, especially by engravers and lapidaries.

PFORZHEIM (pförts'hīm), a city of Germany, in the grand duchy of Baden, at the confluence of the Enz with the Würm, 21 miles southeast of Karlsruhe. It is on the northern border of the Black Forest. The principal buildings include a Gothic church, the public library, the townhall, an industrial school, and the government building. It has manufactures of jewelry, chemicals, leather, machinery, and electrical apparatus. The streets are well improved with stone and macadam paving. Communication is furnished by steam and electric railways. Population, 1905, 59,389.

PHAËTON (fā'è-tōn), a kind of carriage for pleasure driving. It has a low body and wheels, is drawn by one or two horses, and is somewhat smaller than a buggy. Vehicles of this kind are used extensively for driving in parks, especially the *spider phaëton*, which somewhat resembles a carriage.

PHALANX (fā'lānks), the order of battle in which the heavy infantry of Greece was formed. It consisted of a series of unbroken lines several ranks deep, usually from eight to sixteen ranks, and the men were armed with lances from eight to fourteen feet long. The Spartan phalanx was eight ranks deep, while the Theban and Macedonian were much deeper.

PHANEROGAMOUS PLANTS (fān-ēr-ōg'ā-mūs), or *Phanerogams*, the name of a division of the vegetable kingdom, including the flowering plants. These plants are called *phanogams*, by some writers, to distinguish them from the *cryptogams*, but the more general

name used at present is *spermatophytes*. To this division belong nearly all of the plants that are useful to man and fully 100,000 species have been described and classified. They reproduce by seeds that contain an embryo, hence differ greatly from the cryptogams, which reproduce by spores composed of simple cells that do not have an embryo.

PHARAOH (fā'rō), a name applied by the Scriptures and many Hebrew writers to the rulers of Egypt. It is used as if it were a proper name, but it is only an official title, as *shah* is a title of the Persian rulers, *khan* of the Tartars, and *csar* of the Russians. The title corresponds to the *Ph-Ra* found on the monuments of Egypt, which signifies the sun. It is quite difficult to determine the particular monarch to whom reference is made by the use of this title, but generally the application is to the Egyptian king under whom Joseph flourished, and the line under whom the oppression of the Israelites and the exodus took place.

PHARISEES (fār'ī-sēz), a school or sect among the Jews, which possessed much influence during the ministry of Christ. The chief aim of this sect was to preserve the sacred religion of their fathers by resisting all Grecian and other foreign influences. Writers agree that the name was derived from *perushim*, a word meaning separatists, which was used to distinguish them from the priestly aristocracy known as the *Sadducees*. The Pharisees represented a national party of great strength in politics and religion at the time of Christ, and they are mentioned in connection with many of the events associated with Christ and recounted in the New Testament. Their fundamental principle involved the support of both law and sacred tradition, holding that Moses on Sinai came into possession of both written and unwritten law, which he passed to the elders and prophets through Joshua.

The unwritten law of the Jews included the traditions that operated to explain the written law, and in addition to the traditions received from Moses there were others established by the prophets, by wise men, and by decisions of the Great Synagogue. The Pharisees believed that the dead would be resurrected and enjoy future immortality, while the Sadducees thought that the Scriptures did not warrant such a conclusion, and they rejected many of the traditions held by the Pharisees. The *scribes* were teachers and doctors of law that arose from the Pharisees. They were classed as the most learned of the Israelites, and to them were intrusted many positions of importance by the Hebrews and by foreign rulers of later times. In the ad-

ministration of the law the Pharisees were more liberal than the Sadducees, but their devotion to law and tradition led them to foster exactness in details and lose spiritual life and energy. This tended to lead to self-glorification, though the real Pharisee was one "who did the will of his Father in Heaven, because he loved Him." As a class they were learned and pious, and most of the writers and commentators of their times belonged to this sect. In the teachings of Christ they are represented as proud, intolerant, and hypocritical.

PHARMACOPOEIA (fär-mâ-kō-pē'yâ), the name applied to a book of formulas and directions for the preparation and use of drugs in the treatment of diseases. Such a book may be compiled either by individuals or by a commission under the direction of the government. Most works of this kind consist of two parts, a list of drugs and the tests for determining their purity, and a collection of receipts or prescriptions to compound them for the treatment of diseases. A national pharmacopoeia is in use in nearly every civilized country, but those of France, Germany, and the United States are the most extensive. In nearly all cases these books are prepared by national conventions, at which the medical colleges and societies are represented by delegates. The first work of the kind was prepared in 1542 at Nuremberg, Germany, and revisions of this and others have appeared from time to time. Conventions are held from time to time at Washington, D. C., to revise the pharmacopoeia in use in the United States. The first edition was published in 1820 and successive issues have appeared about every ten years. It is required that pharmacists and physicians be well acquainted with this work, both for the good of the medical practice and because it is authorized by the legislatures of states and the laws of Congress.

PHARMACY (fär'mâ-sÿ), the branch of medicine that treats of the preparing, compounding, and preserving of drugs and other substances for medical purposes. The substances used by a pharmacist include numerous preparations derived from the animal, vegetable, and mineral kingdoms; hence it is necessary that one engaged in pharmacy should possess a knowledge of zoölogy, botany and mineralogy, and that he be skilled in determining the chemical constituents of drugs. In most European countries the general government exercises authority in regulating and supervising the pharmaceutical practice, but in the United States such authority is vested in the several states. Pharmacy has been elevated to a high standard in America, where, as a whole, it is more efficient

than in the states of Europe. Many accredited schools and colleges of pharmacy are maintained, or departments of pharmacy are devised in the institutions of higher learning, at which students receive training in chemistry, botany, materia medica, and allied branches of study. It is required in most instances that applicants for admission to practice pharmacy must be graduates from an acknowledged school, while in others a critical examination under a board of pharmacy is necessary before being admitted to practice.

PHAROS (fā'rōs), the ancient name of a small island off the coast of Egypt, near the city of Alexandria. It was connected with the mainland by a mole and was famous for its lighthouse which was considered one of the seven wonders of the ancient world. This lighthouse, or Pharos, was erected by Ptolemy I. and his son, Ptolemy Philadelphus, and was finished about 282 B. C. It had a square base measuring about 100 feet on a side and, according to some writers, was 400 feet high. In 1303 it was destroyed by an earthquake, having stood intact about 1,600 years. The island has been modified by the action of the elements so as to form a peninsula. It is now partly occupied by the city of Alexandria.

PHARYNX (fār'īnks), the muscular, membranous sac located between the lower part of the mouth and the oesophagus. It is wider above than below and is suspended from the base of the skull, opening below the oesophagus and larynx. The pharynx has seven openings, four above and three below the soft palate. The former consists of two openings leading forward to the nostrils and the two Eustachian tubes to the middle ears, and the latter include one to the mouth, one to the larynx, and one to the oesophagus. It is essential in modifying or producing the higher tones of the voice and in swallowing.

PHEASANT (fēz'ant), a genus of birds found originally in Asia, but brought to Europe at an early date in history. They were introduced to North America from Europe. The pheasants include a number of species and with them are usually associated the numerous allied birds, all of which are highly prized as game

birds. In all species the bill is short and curved, the skin surrounding the eyes is destitute of feathers, and the male has a spur on the tarsus.



GOLDEN AND SILVER PHEASANTS.

The males of the *common pheasant* have beautiful plumage and attain a length of three feet from the tip of the bill to the end of the tail, fully half of this comprising the tail. In the female the plumage is less beautiful and the tail is much shorter. Most males have the plumage variously colored, ranging from greenish-purple and brown to golden-red with shades of black, while the females have yellowish-brown plumage.

Pheasants may be domesticated, in which state they breed freely, and they interbreed with the common fowl, guinea fowl, grouse, and other birds of this class. In a wild state they roost largely on the low branches of trees, or in the undergrowth, and feed on seeds, insects, worms, berries and tender parts of plants. The name is sometimes applied to the ruffed grouse and the partridge of North America, the lyre bird of Australia, and other birds, but it applies more correctly to the common pheasants of Asia described above. Foremost among the European species is the *English pheasant*, in which the male is provided with beautiful plumage, shaded chiefly with red, black, and orange. The female, which is somewhat duller, lays from ten to fifteen eggs, usually in a thicket or dense hedge. The *golden pheasant*, *impeyan pheasant*, and *argus pheasant* are other distinct species.

PHI BETA KAPPA, a Greek letter society, founded in 1776, having chapters in many Amer-

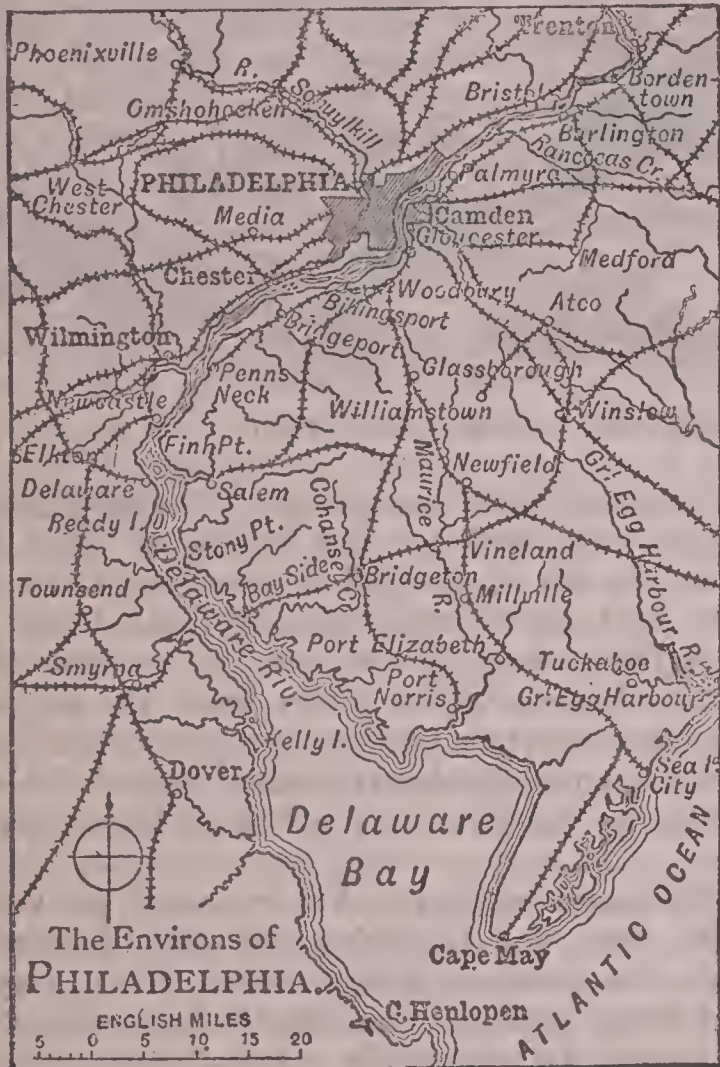
ican colleges and universities. It is named from the letters of its motto, *Philosophia Biou Kubernetes*, meaning in English, "Philosophy is the guide of life." The society was organized by undergraduates of William and Mary College, at Williamsburg, Va. At present the membership is 18,500. The chapters are governed by the national council of twenty senators and delegates from the various chapters. Meetings are held triennially, in the years 1907, 1910, etc.

PHILADELPHIA (fīl-à-děl'fī-à), the largest city of Pennsylvania and the third in population in the United States, being exceeded

beyond the Schuylkill to Cobb's Creek and northward to the line of Montgomery County. The streets are platted with much regularity and those running north and south are parallel to Broad Street, while those running east and west are parallel with Market Street. In some places the regularity is broken by the rivers and by outlying sections, especially in the northwestern part and along the Schuylkill. The streets running north and south are numbered, the numbers beginning with the one nearest the Delaware, while the east and west streets are named. The buildings in each block are numbered consecutively from one to 100, each block beginning with a new hundred, and the directions north, south, east, and west are indicated by letters, hence it is easy to find the location of any particular building. Some of the streets of the older part are narrow, but the newer sections and the residential portion have wide thoroughfares. At present the city has about 1,650 miles of streets, of which more than half are substantially paved with asphalt, brick, or stone. The part of the city lying beyond the Schuylkill is known as West Philadelphia.

From the fact that Philadelphia was settled by William Penn and many people belonging to the Friends, it is popularly called the *Quaker City* and the *City of Brotherly Love*. Sometimes it is referred to as the *City of Homes*, since a larger proportion of small houses occupied by their owners is found here than in any other city of America. As a whole the architecture is substantial, but many of the older buildings are of red brick and ornamented with marble trimmings. In the newer residential sections are many fine homes, built largely of granite and limestone, and the residences are beautified by fine parkings and avenues of trees. Germantown and Chestnut Hill, both in the northwestern part of the city, are among the many beautiful and attractive suburbs. The rivers are crossed by substantial stone and steel bridges, connecting the different parks and suburbs for easy access.

BUILDINGS. The city has two classes of noted buildings, those associated with the early history of the country, and those that may be classed among the large modern structures. Independence Hall, located on Chestnut between Fifth and Sixth streets, was commenced in 1731 and completed in 1735. This structure was the scene of many noted events in the Colonial and Revolutionary period. It was the meeting place of many sessions of the Continental Congress, and here the Constitution of the United States was framed. The Old Lib-



only by New York and Chicago. It is coextensive with Philadelphia County, with an area of 130 square miles, and is 135 miles northeast of Washington, D. C. The city is pleasantly located on the west bank of the Delaware, immediately above where it is joined by the Schuylkill, about 50 miles from the mouth of the Delaware. Its extent from north to south is about 23 miles, the width is from five to ten miles, and the general elevation above sea level varies from 24 to 443 feet.

DESCRIPTION. The city was originally platted on a narrow tract of land between the Delaware and Schuylkill rivers, where the leading business and industrial centers are located. At first the growth was largely confined to a tract lying along the Delaware, but later it extended

erty Bell, which rang out the news of the adoption of the Declaration of Independence, and many documents and articles of furniture dating from the time of Washington are in this building. Carpenter's Hall, a structure of red brick with black glazed headers, on Chestnut Street between Third and Fourth, was the first meeting place of the First Continental Congress, in 1774. On Arch Street, above Fourth, is the historical house of Betsy Ross, who here made the first American flag. Christ's Church, on Second and Market streets, stands in the cemetery that contains the remains of Benjamin Franklin and other noted personages. Other structures of an early date include the Girard National Bank, built for the first bank of the United States; the London Coffee House, at the corner of Front and Market streets and frequented by the prominent men in Revolutionary times; and the Old Swedes' Church, erected in 1700.

The more recent buildings of the city are chiefly of stone, in which the modern steel frame is employed. These include the city hall, known locally as the Public Buildings. This structure covers over four acres and furnishes accommodations for the county and Federal courts and the county and municipal officers. It was erected and equipped at a cost of \$25,250,000. The United States mint, on Spring Garden Street; the customhouse, on Chestnut Street; and the post office, covering an entire block, are among the larger public buildings. At Thirteenth and Locust streets is the elegant building of the Pennsylvania Historical Society, one of the foremost associations of its kind in America. The arsenal is near the Schuylkill, a short distance below South Street. Among the large modern structures may be mentioned the Drexel building, the Commonwealth Trust building, the Real Estate building, the Land Title Annex, the Detz building, the Arcade building, the Masonic Temple, the Provident building, the Odd Fellows' Hall, and the Y. M. C. A. building. The Board of Trade has its headquarters in the Bourse building, which contains a commercial library and museum. Hand-some railroad stations are maintained by the Reading and the Pennsylvania railways, that of the latter company having a train shed over 700 feet long. Among the principal hotels are the Walton and the Bellevue-Stratford, both located near the city hall.

CHURCHES AND INSTITUTIONS. All the leading Christian denominations are well represented. The principal ecclesiastical structures include the Holy Trinity (Episcopal), the Baptist Temple, the Roman Catholic cathedral, the

First Presbyterian, the Kenneth Israel Synagogue, and the Friends' Meeting House. It is the seat of the University of Pennsylvania, which is at the head of public instruction in the State. The elementary and high schools are thoroughly organized and with them are affiliated manual training schools and normal schools for teachers. Girard College, Drexel Institute, and the Roman Catholic high school are among the noted educational institutions. Many of the religious organizations maintain secondary schools. A number of educational and scientific associations are well represented. In addition may be mentioned the Franklin Institute and the Academy of Natural Sciences.

The public library has about fifteen branches in different parts of the city and to it belong about 260,000 volumes. Benjamin Franklin organized the library movement in 1731 and the collection gathered through this source is in the hands of what is known as the Library Company, which has about 200,000 volumes. Other collections include those of the Carpenters' Company, the Drexel Institute, the American Philosophical Society, and the seminaries and collegiate institutions. Many hospitals and charitable institutions are maintained, including the Pennsylvania Hospital, the Municipal Hospital, and the charities founded under the direction of the Methodists, Roman Catholic, Episcopal, Lutheran, Presbyterian, and Jewish churches. Stephen Girard left large endowments in support of orphans and these now amount to about \$17,500,000, the income of which is distributed under the direction of a municipal committee.

COMMUNICATION. Philadelphia is the focus of many railways and extensive electric lines. The Pennsylvania, the Philadelphia and Reading, the Baltimore and Ohio, and the Lehigh Valley railways are among the principal roads that enter the city. Ocean vessels enter the harbor on the Delaware River, which has been deepened and has a frontage of eighteen miles within the city. Boats of light draft ascend the Schuylkill for some distance. Urban and inter-urban communication is furnished chiefly by a system of electric street railways, which have lines that approximate 500 miles within the city. With this system are connected many inter-urban electric railways. A subway system of four tracks extends from the Schuylkill to the Delaware and an elevated extension furnishes transportation along Market Street. The city is well lighted with gas and electricity and has extensive systems of sanitary sewerage and waterworks.

PARKS. About 4,000 acres are included in the

parks. Fairmount Park, on both sides of the Schuylkill, is the finest pleasure grounds. It is divided by the river into East Park and West Park, the former containing 633 and the latter 1,320 acres. The Wissahickon Valley Extension, located along the Wissahickon, contains 1,010 acres and has much natural scenery of great beauty. Many fine monuments and objects of historical interest are seen in Fairmount Park. These include the cottage of William Penn, formerly located near the river on Letitia Street, which is the first brick structure erected in the city. Morris's Hill, the original Fair Mount, is an elevated tract of five acres. Lemon Hill contains the building in which Robert Morris resided at the time of the Revolution. Washington Monument by Siemering of Berlin, Germany's stands at the Green Street entrance to the park. It was erected by the Cincinnati Society at a cost of \$250,000. Within the park are statues of Grant, Lincoln, Goethe, Schiller, Humboldt, Joan of Arc, Columbus, and Garfield. Many small streams and lakes ornament the park and it is beautified by numerous drives and boulevards. The chief points of interest within the city may be reached by a trolley line. In addition there are many smaller parks, such as League Island Park and Bartram's Gardens, which contains a fine botanical collection. The squares include Central Square, Independence Square, and Penn Treaty Square, the last mentioned being the site of the elm under which it is said Penn made a contract with the Indians.

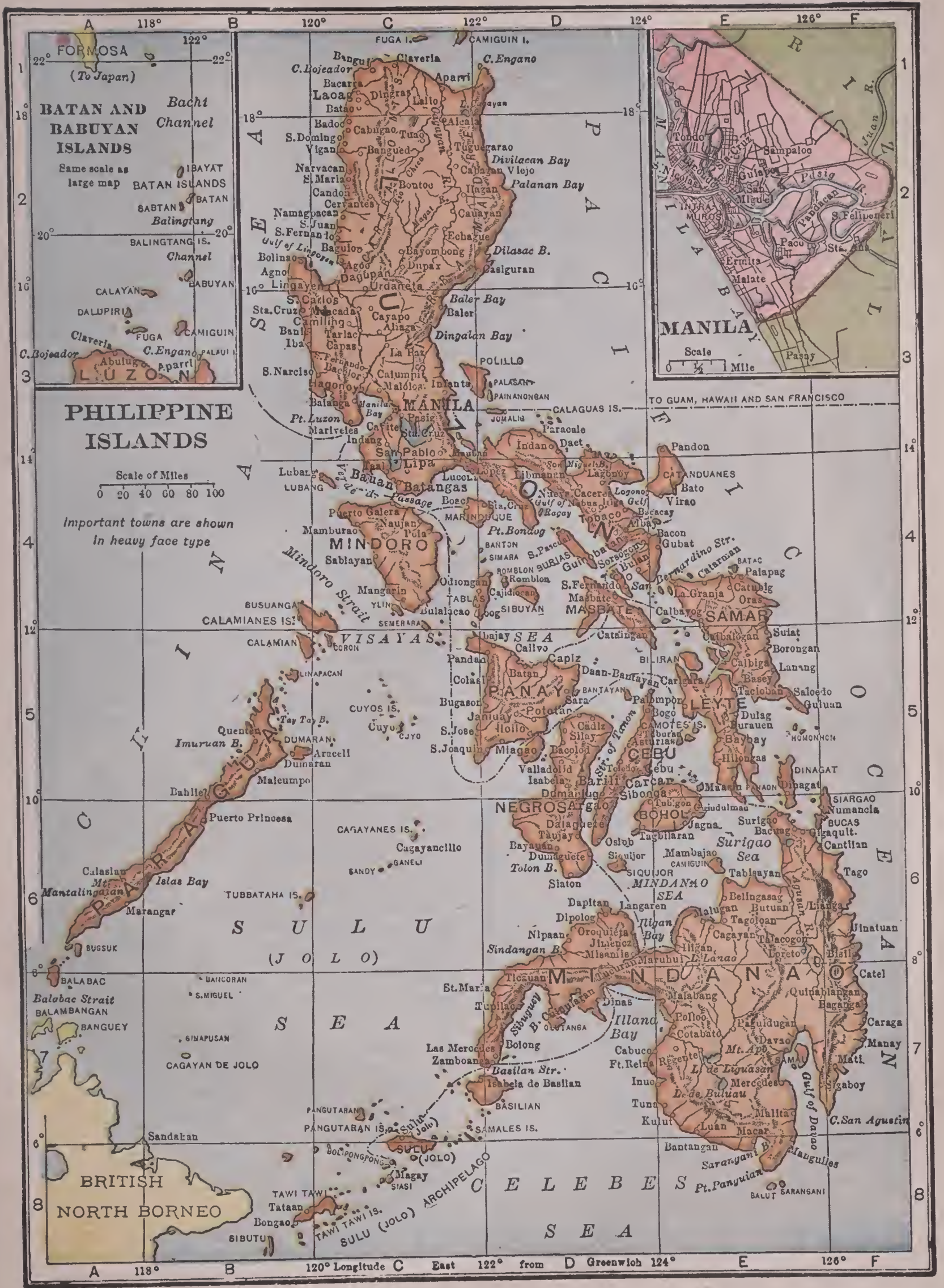
MANUFACTURES AND COMMERCE. In the output of manufactures the city holds third rank, being exceeded only by Chicago and New York. It was the leading manufacturing center until 1890. In the output of leather it holds first place and is second in the manufacture of cigars and clothing. However, the products from its foundries and machine shops rank highest in value among the products of the city, which is due largely to an abundance of iron and coal within easy reach. The Baldwin Locomotive Works, on North Broad Street, is one of the largest establishments in America. The Cramp shipyard, near Port Richmond, is a large enterprise and has completed some of the best vessels made in the United States. In the output of woolen and cotton goods, chemicals, and blank books the city takes a high rank. Other manufactures include clothing, carpets, hosiery, boots and shoes, paper hangings, furniture, spirituous liquors, and lumber products. The city has vast printing and publishing establishments. It has a large domestic and foreign trade in grain, live stock, fruits, packed meats, lumber, and cotton and woolen goods.

HISTORY. The first settlements on the site of Philadelphia were made by Swedes, but William Penn founded the city in 1682, and it became the capital of Pennsylvania the next year. In colonial times it ranked as the most noted center of civil interests for the colonists, and there assembled the Continental Congress of 1774, so famous in history. On July 4, 1776, the Declaration of Independence was adopted in Philadelphia; on July 9, 1778, the Articles of Confederation were signed; and in 1787 the Constitution of the United States was prepared. Philadelphia was the capital of the Federal Union from 1790 to 1800, and the capital of Pennsylvania from 1683 until 1800. The first American bank was established here in 1781 and the first United States mint was founded in 1792. The Centennial celebration of the independence of the colonies was held in Philadelphia in 1876, and in 1882 the bicentennial of the landing of William Penn was observed. In 1683 Philadelphia had about 80 houses and a population of 500. The census returns made since the adoption of the Constitution give the population as shown in the following table:

YEARS.	POPULATION.	YEARS.	POPULATION.
1790.....	28,522	1860.....	565,529
1800.....	41,220	1870.....	674,022
1810.....	53,722	1880.....	847,170
1820.....	63,802	1890.....	1,046,964
1830.....	80,458	1910.....	1,549,008
1840.....	93,665		
1850.....	121,376		

PHILAE (fī'lē), an island of the Nile, located near the boundary between Nubia and Egypt, between the first cataract and Assuan, about five miles south of the latter. By the Egyptians it is called Menlak, meaning the place of the cataract. The island is chiefly of granite formation and is noted for its ancient architecture, dating from about 377 B. C. It has several celebrated structures, but the principal temple, built by Ptolemy II., is the most noteworthy. It was dedicated to the goddess Isis and contains representations of the story of Osiris, including her birth, achievements, and death. This structure was 435 feet long and 135 feet broad, and still constitutes one of the best preserved ruins of Egypt. The island has several other temples founded by the sovereigns of the Ptolemy line and by the Caesars.

PHILIPPICS (fī-lip'piks), a name originally applied to a series of celebrated orations spoken by the Greek orator, Demosthenes, against Philip, King of Macedon, father of Alexander the Great. The number of orations is usually given as three. Their special purport was to arouse the Athenians for defensive organization against the growing power of Mace-



don. The name was afterward applied to fourteen orations delivered by Cicero against the dangerous and malicious designs of Mark Antony, and since it has come to signify any severe written or oral invective.

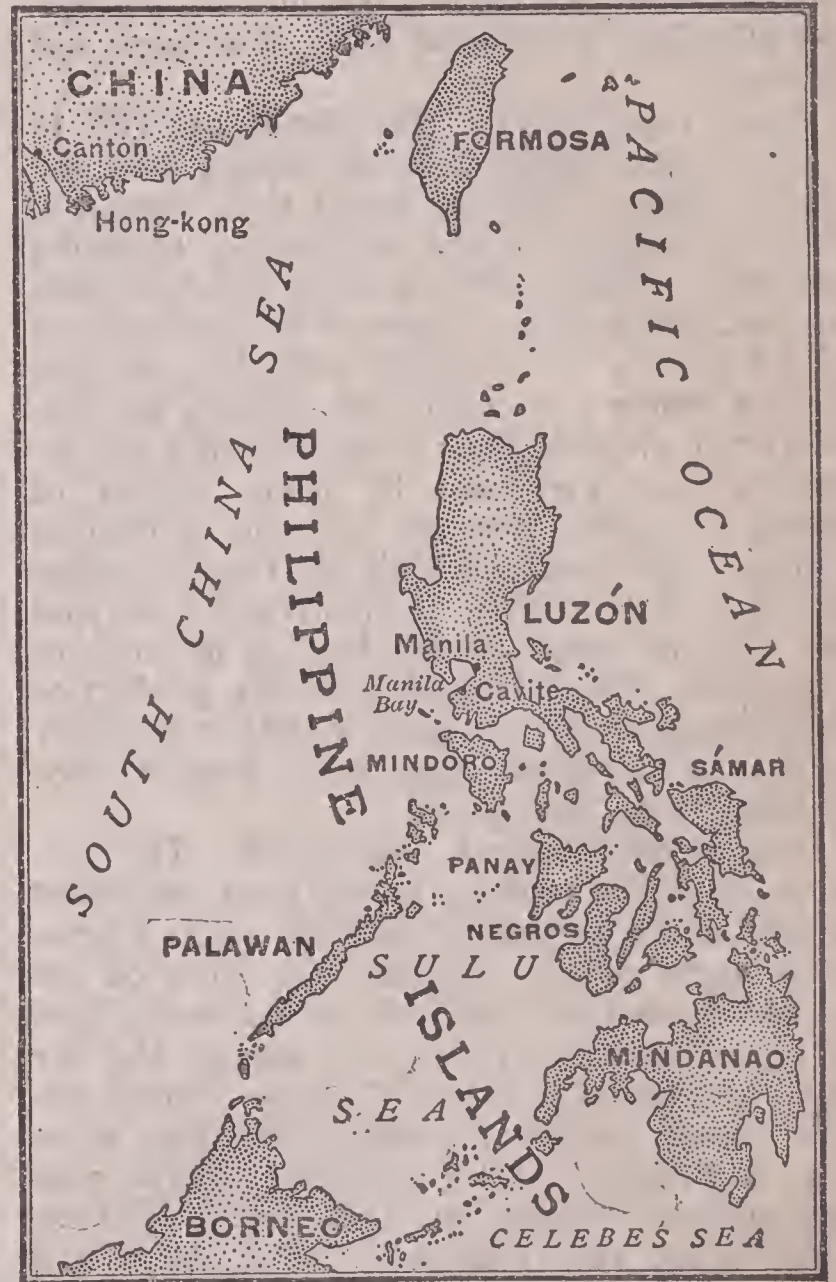
PHILIPPINES (fil'ip-ĩnz), or **Philippine Islands**, a group of islands in the Malay Archipelago, situated southeast of Asia, including 3,141 islands and islets. The total area is about 115,026 square miles. Many of the islands are small and comparatively worthless, but as a whole the group possesses remarkable richness in natural resources, and occupies a position of value in trade. The principal islands are Mindanao, Luzón, Palawan, Sámar, Panay, Mindoro, Leyte, Negros, Cebú, Masbate, Bohol, and Romblón. Twenty-one other islands are of fair size, ranging from 100 to 250 square miles.

DESCRIPTION. The islands are of volcanic origin and are a part of the vast oceanic plateau which is partly elevated above the surface of the sea. They are surrounded by comparatively shallow waters, which exceed a depth of 200 feet only in a few places. The surface is diversified by mountains, thus making a large part of the area not inhabitable and tending to centralize the inhabitants in the more fertile parts. In general the ranges extend from south to north, showing the outlines of a continuous mountain system that formerly towered at great elevation above the sea. The highest peaks approximate 10,000 feet, but Apo, in Mindanao, the culminating summit, is 10,312 feet high. Between the mountains are narrow plains, which broaden somewhat near the coast. Most of the highlands are near the interior of the islands and slope toward the coast, but Leyte has no elevated mountains. Only a few of the volcanoes are active at present, though twenty have had eruptions within the historical period, and fully fifty have well-marked volcanic characteristics. The coast lines are generally irregular and afford excellent harbors. Earthquakes are frequent and in many cases destructive.

The rivers are short and rapid. Mindanao, one of the largest islands, has two rivers of considerable length, the Agusan and the Pulanqui. The former flows north into the Surigo Sea, while the latter has a course toward the southwest into Lake Liguasan, whence it flows toward the northwest into Illana Bay. The Cagayan drains the northern part of Luzón. In the southern part of that island is the Pásig, which unites Laguna de Bay with Manila Bay. This stream is the most important for commercial enterprise, affording transportation facilities from Manila, on Manila Bay, to Pásig, Santa

Cruz, and other ports on Laguna de Bay. A number of the streams are used for irrigating purposes in regions where the rainfall is insufficient. Luzón has two lakes of considerable size, Laguna de Bay and Bonbom, or Taal, both being fed by numerous springs and streams. Mindanao has a number of lakes, including Lanao, Liguasan, and Buluan. Mindora, Leyte, and Sámar have many small rivers, but the lakes are not important.

The Philippines, being located within the tropics, have a climate naturally favorable to a



vegetable growth. It is diversified in the different islands, owing partly to variations in altitude and area, and partly to the predominating influence of prevailing winds. Three seasons mark the year more or less distinctly. These include the temperate and wet from June to October, the temperate and dry from November to February, and the hot and dry from March to May. In some sections the rainfall is constant and heavy in July and August, reaching about 114 inches in some localities. Along the eastern coast the precipitation is not excessive, being shut off to some extent by the

mountains. The temperature ranges from 61° to 97° during the year, though in July and August it remains almost stationary between 79° and 85°. Terrific storms sweep across the islands at intervals. They are cyclones of wind and rain, known as *typhoons*, but occur most frequently in the northern section, where life and property are frequently endangered. The climate is generally healthful to those acclimated and in some localities it is highly favorable to Europeans, though other parts are subject to malaria. Smallpox, leprosy, tuberculosis, and venereal and skin diseases are the most prevalent ailments, but there is considerable percentage affections of typhoid fever, diarrhoea, and dysentery.

FLORA AND FAUNA. The islands are rich in vegetable life, which assumes varied and distinctive forms. Valuable forest trees abound in different sections of the archipelago, including the ebony, cedar, ironwood, sapan wood, banyan, bamboo, and banana. Some of the trees are so hard that they are cut with difficulty, and this class of timber is exceptionally valuable for furniture and shipbuilding. Some localities are interlaced and garlanded by many species of shrubs and vines that are common in tropical regions. Blossoms and fruit are found hanging together on the trees in the cultivated fields and the yield of crops of this kind is in constant succession. Hemp is the best known product of the Philippines and the name manila is generally applied to the commodities made from it, such as twine, rope, and paper.

Few native mammals are found. The carabao, or water buffalo, is the most important animal, and is valued for its flesh and as a beast of draught and of burden. The milk of the female is used as food and for making a kind of butter, known as *ghee*. It is thought that the humped variety of cattle is native. Other native animals include crocodiles, civet cats, monkeys, and reptiles. Many species of birds of song and plumage abound, and huge spiders and tarantulas are very common. Insect life is well represented in all the islands. Among the birds are the snipe, jungle fowl, curlew, pigeon, hornbill, and humming bird. Oysters, crabs, and fishes are well represented.

MINING. The islands have an abundance of mineral wealth, much of which has been known for centuries, although the developments are only of comparatively recent date. Coal is found in large fields in the principal islands and gold is mined in Luzón and Mindanao. Copper is found in the northern part of Luzón and iron occurs in Cebú, Luzón, and Panay. The volcanic regions are rich in sulphur and many localities

have deposits of salt and gypsum. Silver occurs in connection with lead. Other minerals are quicksilver, saltpeter, arsenic, petroleum, and natural gas. Granite and limestone suitable for building purposes are abundant. Coal is at present the most important mineral product, being used extensively as fuel on locomotives and steamboats, and the quantity produced consists largely of carbonized lignite. The output of the mines is greatly limited for the want of transportation facilities.

AGRICULTURE. The leading industry is agriculture, but the methods of farming are crude and primitive. Farming implements were very inferior until the islands became a possession of the United States, when farm machinery of a superior grade was introduced for the first time. Agriculture is confined almost entirely to the region elevated less than 700 feet above the sea. Nearly all the cultivated plants common in Southeastern Asia thrive. About 5,000 native species of plants have been classified by botanists, showing that the flora is very extensive. Manila hemp, the fruit of a wild plantain, is considered the most valuable of the native plants. Luzón has the largest area of tilled land, while Masbate possesses the most extensive interests in live stock. Hemp is the leading product, the annual yield having a value of about \$25,500,000. It is followed by the yield of sugar, which is obtained chiefly from sugar cane. Tobacco has a high rank, both in quality and yield, and in the volume grown annually the islands are exceeded only by Cuba. Other products include coffee, rice, cotton, chocolate, coconut, corn, and cacao. The tropical fruits are abundant, especially the pineapple, banana, orange, lemon, and pomegranate.

Cattle represent the largest interests in the live-stock industry, and the grades are becoming improved under American influence. The carabao ranks next to cattle. Although horses are reared quite extensively, the grades are small, ranging between the pony and the saddle horse. Cattle with a small hump are grown for beef, and swine and poultry are favorite animals among the natives. The government has introduced alfalfa as a means of encouraging the live-stock industry and it is found a highly profitable product. Goats and sheep were introduced by the Spaniards and are grown in small herds.

MANUFACTURES. Cloth is the leading manufactured product. Until recently it was made exclusively in small establishments, but modern cotton spinning machinery has been installed in Manila and other cities, and is rapidly displacing the household methods. A large quan-

tity of mats, carpets, hats, and rugs are made of strip bamboo. Cordage made of hemp is produced extensively, both for domestic use and for exportation. Pipe tobacco and cigars are manufactured extensively, for which purpose modern machinery has been introduced. Other manufactures include salt, confectionery, pot-

bacco, lumber, and fruits. The imports include cotton textiles, flour, glass, liquors, and machinery. The three leading ports are Manila, Cebú, and Iloilo, but customhouses are maintained in three other ports, those of Apparri, Jolo, and Zamboanga. The telephone and telegraph are used extensively and an adequate

postal service is maintained by the government.

GOVERNMENT.

The govern-

ment is administered under American control. Executive authority is exercised by the Governor General, Vice Governor General, and six other commissioners, all being appointed by the President of the United States subject to confirmation by the Senate. These officials constitute the commission, which has certain legislative functions. The departments of the government are presided over by certain of the commissioners, three of whom are native. An assembly of two chambers has general authority to exercise legislative functions. The upper chamber is composed of the commission referred to above, while the lower chamber is constituted of from 50 to 100 delegates elected by popular vote. The legislative franchise is restricted to those who held public office under the Spanish government, who speak, read, and write English or Spanish, or who have property valued at \$250.00 or pay no less than \$15.00 in taxes. Annual sessions are held by the Legislature. Judicial authority is vested in the supreme court, the courts of first instance, and the municipal courts, but all important causes are subject to review by the Supreme Court of the United States.

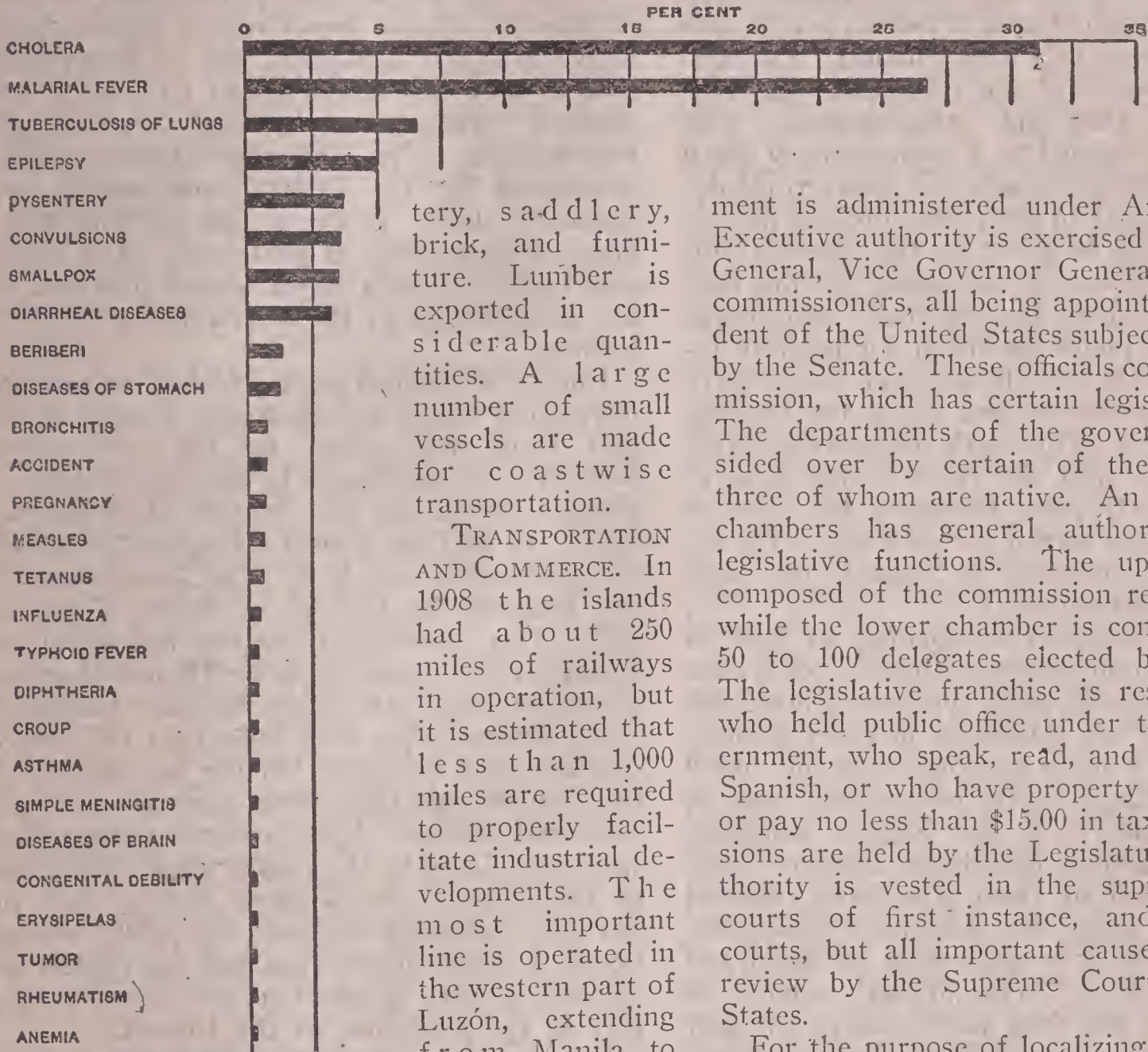
For the purpose of localizing the government, there have been established provinces, and these are subdivided into *pueblos*, or townships. The executive officers of the Province are a governor, district engineer, treasurer, superintendent of schools, and an elective official, but the administration is largely under the provincial board, which consists of the governor, treasurer, and elective official. Both the governor and the elective official are elected by the provincial assembly, and the other officials are either appointed or are elected by a direct vote. Government in the townships is administered as under the municipalities, which form the unit of local government.

EDUCATION. When the Spaniards occupied the Philippine Islands, in 1565, they found the natives not wholly illiterate. The ancestors of the present Christian population wrote their di-

tery, saddlery, brick, and furniture. Lumber is exported in considerable quantities. A large number of small vessels are made for coastwise transportation.

TRANSPORTATION AND COMMERCE. In 1908 the islands had about 250 miles of railways in operation, but it is estimated that less than 1,000 miles are required to properly facilitate industrial developments. The most important line is operated in the western part of Luzón, extending from Manila to Lingayén. The requirement is to

Diagram to show the causes of deaths in the Philippines.



operate the short lines from the coast to the interior rather than to extend railways lengthwise of the larger islands, since the transportation problem involves moving the products from the interior to the coasts. Traffic is promoted mainly by steamers, which carry a large coastwise trade. Highways of a superior grade have been constructed, but only a few sections are equipped with roads of a high grade. Much of the interior trade is carried on carts drawn by carabaos.

The exports somewhat exceed the imports and the foreign trade is largely with Great Britain, Germany, China, Spain, and the United States. Manila hemp is the most important export and it is followed in order by sugar, to-

affects in syllabaries of Hindu origin, while the Mohammedan peoples of Mindanao and Sulu were beginning to use Arabic characters, in which their literature is still preserved. The early Spanish missionaries taught the people to use the Roman alphabet in place of the Hindu syllabaries. Ability to read and write the native dialect in this way has been widely spread. The census of 1903 found over a million people able to read and write in a native dialect. Unfortunately the census did not distinguish the Filipinos able to read and write Spanish. This knowledge is confined to a comparatively small class of Filipinos, although successive royal decrees, beginning at an early date, ordered that instruction should be given in the Spanish language by the *curas*, or *sacristans*, of the missions. About 1863 the Spanish government made the first public provision for primary instruction. Town schools for both sexes were decreed and provision was made for training Filipino teachers. This work succeeded steadily, though slowly, until the close of the Spanish rule, when nearly every Philippine town had at least one primary school for each sex. The instruction was sometimes in Spanish, but more often in the native dialect.

Since the American occupation, in 1898, a comparative comprehensive public school system has been organized; public primary schools for boys and girls are conducted in every municipality and in a large proportion of the 13,000 *barrios*, or villages. All instruction, even in primary schools, is in the English language. The teaching is done by Filipino teachers, there being over 6,500 of them who have received their training since the American occupation. This primary work is supervised by about 400 American teachers. The primary course is brief, covering only four years, and is followed by a three years' intermediate course. Forty high schools are maintained, one in the city of Manila and one in each province, as well as the following insular schools in the city of Manila: the Philippine Normal School, the Philippine School of Arts and Trades, the Philippine School of Commerce, and the Philippine School for the Deaf and Blind.

The administration of the entire public school system is closely centralized, general authority being vested in the Director of the Bureau of Education, whose office is in the city of Manila. Each Province has a school superintendent, appointed by and subject to the Director of Education. These public schools are provided for by three classes of revenue: an insular appropriation for the Bureau of Education, appropriations by provincial governments for high

school, and municipal school funds, supplied largely by land tax. The total school fund from these sources for the fiscal year ending June 30, 1908, amounted to \$3,047,930.20. Public school pupils for the same year numbered 496,676, of whom 1,643 were secondary pupils, 17,780 intermediate, and 467,203 primary.

Large attention is given to industrial training. In primary schools pupils receive instruction in native arts and industries, and in intermediate schools they are instructed in tool work, mechanical drawing, agriculture, hygiene, and housekeeping. The Philippine Medical School, established by the Federal government, was opened in 1907. It has a fine building and a highly trained corps of professors. The Philippine Legislature in a recent session provided for the incorporation of the University of the Philippines.

Under the Spanish régime higher, or superior, instruction was in private hands, though in certain cases was aided by the government. Schools were established by the sons of Spanish colonists within the first decades after the conquest. In 1601 the Jesuits established in Manila the College of San José. The Dominican Order founded the College of Santo Tomas in 1619. This subsequently became the Royal and Pontifical University of Saint Thomas Aquinas. Provision was early made for the training of Jesuit priests, who were both sons of Spanish colonists and Filipinos. In the last century of the Spanish rule there were seminaries in each Episcopal diocese. Two important institutions were established by the Jesuits after their return to the islands, the *Normal School* and the *Ateneo*. Although the plan of public instruction is a comprehensive one and has rapidly developed, private instruction still plays a large part in the education of the islands.

INHABITANTS. The native inhabitants appear to have descended from a number of races, since they include brown, black, and yellow classes of people. Fully nine-tenths of the population belong to the brown race, but they are mixed more or less with other peoples. They include principally the Tagal, Visaya, Ilocano, Vicol, Pampango, Cebuano, and Pangasinan branches. The native blacks belong to the Negro type, commonly called *Acta*, and are small in stature. They are thought to be the aborigines of the islands, while the other races are thought to have immigrated at an early period of the Christian era. Another class known as Moros is thought to have invaded the archipelago about the 15th century, shortly before the Spanish conquest. The yellow peoples are of a Mongoloid type and are a mixture of the

Chinese, Siamese, and Japanese. A small per cent. of the people belong to the red or American race, having been taken there by the Spanish in the 17th century, when vessels carrying the flag of Spain sailed regularly between Manila and Acapulco, Mexico.

About thirty distinct dialects are spoken in the archipelago, but the number is much larger if all of the local variations are taken into account. Some of the languages are primitive and crude, while others show a high degree of precision and culture. At present the tendency is to unify and develop the leading languages at the expense of the others, and English is taken up readily by the younger classes. The leading dialects include Visaya, Tagalog, Cagayan, Ilocanos, Vico, Pagasinan, Pampango, and Igorrote. Roman Catholicism was introduced by the Spaniards and is the predominating religion, but the leading Protestant denominations have secured a large following through effective missionary work. Many of the natives in the Sulu Islands are Mohammedans, and the Buddhist faith is representative in some sections. Some of the wild tribes in the south, especially the Moros, conduct a form of Pagan worship.

Manila, in the southwestern part of Luzón, is the capital and largest city. Other cities of importance include Albay, Batangas, Bauan, Lipa, Taal, Cebú, Balayan, Laoag, Iloilo, and Zamboanga. Luzón is the most populous island, but Cebú has the largest number of inhabitants to the square mile. In 1903 the total population was 7,635,426.

HISTORY. The Philippines were discovered in 1521 by Magellan, who visited many parts of Mindanao and in the same year lost his life in a war with the King of Cebú. Spain immediately began to promote colonization of the islands, but a permanent settlement was not founded until 1565, when a colony was planted on the island of Cebú. The islands were officially annexed by Spain in 1569, but all of the islands were not conquered until the early part of the 17th century. Manila was founded in 1571 and was made the seat of government. Christian missions were established soon after in a number of the islands. The Chinese invaded the archipelago in 1602 and almost succeeded in destroying Spanish influence, which was likewise threatened by the Dutch. During the 18th century the islands remained in the hands of the Spanish, except that they were captured by the British during the Seven Years' War, but they were restored to Spain in 1763 by the Treaty of Paris. The cultivation of tobacco as a government monopoly was introduced in 1788, with the view of making the

colony self-supporting, and by this means the extensive resources became known.

Spain remained in undisputed possession of the islands, except that a number of attempts to establish a native independent government were made, until the beginning of the Spanish-American War, in 1898. The last armed resistance against the Spanish had been organized in 1906, under the direction of Emilio Aguinaldo and other native leaders. This insurrection had been subdued after a desultory war of nearly two years and Spain was to pay the leading malcontents the sum of \$800,000, but only half of this sum was ever paid. This caused the insurrection to break out again in April, 1908, and Aguinaldo held a conference with Consul-General Pratt, the United States representative at Singapore, and it was agreed that he should cooperate with Commodore Dewey, who was in command of a fleet. Aguinaldo received a supply of arms from Commodore Dewey for the insurgents, who promptly rallied to the support of their leader. The Spanish fleet was destroyed at Manila on Aug. 13, 1898, and many points inland were occupied. The Treaty of Paris ceded the islands to the United States, but Spain received a cash payment of \$20,000,000.

A dispute between Aguinaldo and other leaders of the insurrection against Spain now arose with the American authorities on account of a misunderstanding. The Filipinos had organized a government and adopted a provisional constitution and Aguinaldo appealed to the nations for the recognition of the independence of the Philippines. A revolt, known as the Filipino Insurrection, against American authority, began in February, 1899, when hostilities broke out at Manila. This was followed by an intimation that the United States would annex the islands, which policy was characterized by many Americans as the beginning of imperialism and contrary to the spirit of the American republic. Nearly two years were consumed in subduing the opposition, hence much expense and bloodshed were involved. The prospects of acquiring territory with extensive natural resources prompted the Americans, rather than a conciliatory policy like that pursued in Cuba.

President McKinley sent a commission to the islands in January, 1899, for the purpose of investigating the conditions and endeavoring to induce the natives to accept American rule. This commission issued a proclamation as a means to explain the intentions of the government and proceeded to organize a party favorable to the Americans. Little progress was made by the American army until the latter part of 1899, when the native army was driven to

the mountains, where a guerilla warfare was conducted for some time. Aguinaldo was captured in March, 1901, and the insurrection was ended. The government throughout the war was military, but large districts were soon pacified and civil government was established. The cost of the war to the United States was about \$175,000,000. William H. Taft was at the head of the government from 1900 until 1904, when he was succeeded by Gen. Luke E. Wright. In 1906 Henry C. Ide was made Governor and he was succeeded soon after by Gen. James F. Smith.

The first general election was held in 1907, when 80 members of the legislature were chosen, the total vote being 87,803. William H. Taft, then United States Secretary of War, personally opened the first session. The trade with the United States, up to and including 1909, increased materially since the American occupation was consummated.

PHILIPPOPOLIS (fil-ĭp-pŏp'ŏ-lĭs), a city of Bulgaria, capital of Eastern Rumelia, on the Maritza River, eighty miles southeast of Sofia. It is on the railroad between Sofia and Constantinople, and is connected by several steamboat lines through the Maritza River with the Mediterranean. The surrounding country produces fruits, cereals, and vegetables. Many of the buildings are one-storied, but it has some fine structures, such as the public library, the Greek cathedral, and many Christian and Mohammedan places of worship. It has a large trade in grain, attar of roses, rice, hides and merchandise. Among the manufactures are wine, earthenware, clothing, cigars, and machinery. A large per cent. of the inhabitants are Bulgarians, but there are many Jews, Armenians, Greeks, Turks, and Gypsies. It belonged to Turkey previous to 1878, when it was occupied by the Russians, and in 1885 Eastern Rumelia became a part of Bulgaria. Since then it has been improved by the introduction of modern utilities. Population, 1905, 45,707.

PHILISTINES (fĭ-lis'tĭnz), the name of a people formerly resident in the lowlands of Palestine, on the Mediterranean coast, occupying the region from near Joppa to the Egyptian desert south of Gazo. They are mentioned in the Bible as coming in conflict with the Israelites in the age of the Judges, and are spoken of as a warlike colony at the time of the exodus. It was largely on their account that Moses selected a circuitous route in passing from Egypt to Canaan, the people fearing to encounter them in battle. Their territory consisted of five principal cities or provinces, which were governed by princes, and included Ashdod, Askelon,

Ekron, Gath, and Gaza. In the time of Eli they overwhelmed the Israelites, when they captured the ark. King Saul came in conflict with them and slew himself in the Battle of Mount Gilboa. David and Solomon battled against them and the latter finally annexed their territory, but later they were emboldened by the internal strife of Judah, when they again rebelled against Israelitic supremacy.

In the reign of Ahaz the Philistines formed an alliance with the Syrians and Assyrians, to harrass the Israelites, but their whole country was again subjected by Hezekiah. The writings of the prophets make it certain that they were a menace to the Jews, but it is reasonable to assume that at different periods intermarriages and social connections between the two nations were of common occurrence. They appear to have been a civilized people, were devoted to agriculture and commerce, and possessed more than ordinary skill in warfare. Residing near the Mediterranean, they developed a considerable trade in manufactures. Their name is from a Semitic root meaning "to wander." The Septuagint calls them aliens. In later times their country became merged into Palestine and all traces of their former dialect were lost.

PHILLIPSBURG (fil'lĭps-bŭrg), a city of New Jersey, in Warren County, on the Delaware River, fifty miles northwest of Trenton, opposite Easton, Pa. It is on the Central of New Jersey, the Lackawanna, and the Pennsylvania railroads. The features include the public library, the townhall, the high school, and several fine churches. Among the manufactures are silk goods, ironware, clothing, machinery, locomotives, and farming implements. The surrounding country is agricultural and dairying and contains productive deposits of limestone and iron ore. It was settled in 1749 and incorporated in 1861. Population, 1910, 13,903.

PHILOLOGY (fĭ-lŏl'ŏ-gĭ), the branch of study that treats of human language. It traces the origin, development, and general structure of the different languages and involves all that speech discloses as to the nature and history of man. The study of language in connection with history and literature is commonly called *classical philology*, while the scientific investigation of the laws and principles of a language or a group of languages, as involving the comparison of different languages with each other, is usually called *comparative philology*. It is not the aim of the philologist to study languages so as to be able to read and speak them, but he examines them with scrutinizing care as if they had a different source, and later brings the points of

likeness and dissimilarity into convenient forms, that they may be classified and grouped. Languages have a well-defined law of growth and life, changing to meet the needs of individuals in communicating with each other.

Every discovery and invention, as well as every change in society, exercises a modifying influence upon the language of a people, hence the languages are continually undergoing changes by certain words becoming *obsolete*, while newer terms spring into common use. It is possible for man to communicate without uttering sound, which is now the case with those who are deaf and dumb. It is likewise possible that written characters may be employed to convey knowledge to others even without employing vocal sounds. The latter method was utilized in placing hieroglyphics and written symbols on monuments and other durable forms for the purpose of conveying intelligence to future generations, though it is scarcely possible that a race ever existed which employed written characters exclusively to convey ideas among the living, but instead practically all employed both vocal sounds and written characters.

It is probable that in the beginning language originated largely from sounds heard in nature. This conception of the building of a language necessarily limits the early stage to a very small sphere, and as society developed and institutions were founded it grew into more or less complexity, reaching its highest stage in the highest civilizations. As a science, philology dates from a comparatively recent time. The Greeks were the only ancient people who gave the origin of language any consideration, but their development of the science was necessarily limited, since they were acquainted with only their own language. The first advance in philological study was brought about by bringing Sanskrit to the notice of European scholars, who observed a peculiar similarity between it and Greek. Franz Bopp (1791-1867), a German scholar, is the undoubted founder of study in the Aryan languages and he was succeeded by such eminent writers as the Grimm Brothers, Schlegel, and Wilhelm von Humboldt. It will thus be seen that the science dates practically from the early part of the last century. Since then many able writers have added a vast fund of information to the literature of the science.

Different classifications of languages are adopted by various writers, but in the main they usually agree upon three classes, the monosyllabic, the agglutinate, and the inflectional. The *monosyllabic class* embraces a group of languages whose words are composed of one syllable, of which the Chinese is the typical lan-

guage, and to it are allied the languages spoken by the Tibetans, Siamese, Anamese, and Burmese. *Agglutinate languages* include those in which the word elements are so united as to retain their separate identity as modificatory syllables and usually, but not frequently in some tongues, a part of their significative power as independent words. The words are not inflected when filling different offices and suffixes are not added, but entire words are used in combinations, as steamboat, mankind, and locksmith. The Turanian languages are agglutinate. To this class likewise belong all the languages of Europe and Asia that are not included with the Aryan, the Semitic, and the cognate dialects of the Chinese.

The *inflectional languages* belong to two distinct families, the Semitic and the Indo-Germanic or Aryan. They are peculiar in that words are joined together and made into sentences, not by means of a set of small secondary and auxiliary words, but by means of changes made in the main words themselves. Nouns, pronouns, and adjectives are inflected by declension, verbs by conjugation, and adjectives and adverbs by comparison. Fast, faster, fastest; -love, loved, loving; and man, men, are familiar examples of inflection. The Semitic and Aryan groups of languages are so different in their grammatical framework that it has been impossible for science to establish a relationship between the different groups, though it is impossible to affirm or deny that both came from a common source. The Semitic languages include the Hebrew, Arabic, Chaldee, Syriac, Aramaic, etc. Max-Müller divided the Indo-Germanic languages into the following eight classes: Indian, Iranian, Greek, Italic, Celtic, Illyric, Slavonian, and Teutonic. See **Languages**.

PHILOSOPHY (fīl-ōs'ō-fy), a term which may be defined as embracing the general principles that furnish the rational explanation of anything, or as the scientific system that embraces the general principles or laws under which all the subordinate facts relating to some subject are explained. The name is said to have been suggested by Pythagoras, who, when complimented on his wisdom, said that he was not wise, but a lover of wisdom, the deity alone being wise. Thus philosophy means the love of wisdom, being derived from the Greek *philosophia*=love of wisdom. The term came into general use in the time of Socrates, who first termed any seeker after truth a *philosopher*, meaning a lover of wisdom. Thus, the subject of philosophy included all investigations concerning both mind and matter. It may be said

that the history of philosophy has its beginning with the Greeks, since the philosophical investigations of the East only served to induce study. After years of investigation, Oriental notions were systematized and incorporated with the accepted opinions of Greece. However, study was largely speculative, since the philosopher made up a theory and then endeavored to accommodate facts to it.

The whole period of Grecian philosophy extends from the time of Thales of Miletus, about 600 years B. C., to about 500 A. D. Among the Greek philosophers are the most eminent thinkers and students of antiquity, who not only gave intellectual impetus to Greece and Rome, but carried their learning to Alexandria and promulgated theories from which modern scholars have drawn inspiration and profit. The two schools of philosophy before the time of Socrates are known as the *Ionian* and the *Eleatic*. The principal representatives of the former include Thales, Anaximander, Anaximenes, and Pythagoras, and of the latter, Parmenides, Xenophanes, and Zeno. Socrates introduced a religious spirit with scientific and scrutinizing methods and opposed the teachings of the so-called *Sophists*. Plato was a disciple of Socrates, but became identified with a system of idealism. Plato reasoned from the general to the particular under a system of deduction, and later Aristotle introduced inductive reasoning by proceeding from the particular to the general.

Stoicism, Epicureanism, and Skepticism were the three prominent schools of philosophy of later Greece. Rome borrowed largely from Greece and may be said to have had no distinct schools, aside from *Eclecticism*, of which Cicero is the most noted representative. *Neo-Platonism* was the last phase of ancient philosophy. During the Middle Ages Scholasticism represented a form of speculative philosophy, by which it was sought to harmonize philosophy with Christianity. The Scholastics were noted particularly because of their placing especial stress upon the importance of a thorough study of Greek and other ancient languages at the expense of the newer and more practical.

The history of modern philosophy begins with the early part of the 16th century, at the time of the Reformation, and the two early schools are known as *Empiricism* and *Idealism*. The Empiricists have their strongest early representative in Bacon, who, in 1620, published his "Novum Organum," in which he exemplified the inductive method of studying nature. It was his view that the philosopher should make the benefits to mankind a direct object, and, instead of wasting time on ingenious theories about

mind and matter, he should gather facts by watching the phenomena of life and seek to reach the general law by reasoning from effects back to their causes. This work exercised a wide influence in establishing modern methods of investigation, but the value of this method had been proven long before by Ptolemy, Archimedes, and Galileo. The *Idealists* were represented by Descartes, who held views opposite to Bacon's, and believed that philosophical research should be based largely upon rational theories formed by mental speculations.

Later philosophers gave inquiries relating to the mind of man greater consideration. This caused more highly specialized lines of study to be undertaken and the term philosophy came to be applied variously. Among these philosophers may be named Kant, Leibnitz, Fichte, Hegel, Schelling, Spinoza, Herbart, Richter, Darwin, Spencer, Haeckel, and many others. It is now held to be the office of philosophy to submit propositions to a critical analysis and discover why things are as they are, hence the philosopher endeavors to reach a conclusion as to the ultimate nature of the real. It must involve the element of its possibility, since any theory of the universe having an impossibility as a central fact is at once false and absurd.

PHLOX (flōks), a genus of plants with opposite leaves and beautiful flowers. The numerous species are mostly herbaceous, but some are shrubby plants. Nearly all are tall, erect, and perennial. The flowers appear in clusters at the upper end of a stalk and are white, blue, purple, lilac, or crimson. Most of the species are native to North America, the only exceptions being a few that are found in Asia. Among the familiar species are the *creeping pink* of the South and the *sweet William* found in the central part of North America. The latter blooms in the spring and early summer and has bluish or lilac colored flowers. *Drummond's Phlox* is a favorite species and is cultivated extensively. It is an annual and blooms profusely until frost comes.



PHLOX.

PHOEBE (fē'bē), or **Pewee**, a small bird of the flycatcher family, found in many parts of North America. It frequents gardens and orchards and is called *pewee*, from its call.

The head is brown and the general color is olive-green. It constructs a nest of mud and moss, which is attached to rocks and cliffs, or frequently to the eaves of houses and the piers of bridges. The eggs are white and usually two broods are reared in a season. In autumn these birds move southward to spend the winter.

PHOEBUS (fē'būs), an epithet commonly applied by the Grecians to Apollo, which had special reference to the youthful beauty and purity of that deity. In like manner they frequently applied the name Phoebe to Artemis, the moon god. The Roman poets and many modern writers apply the names *Phoebus* and *Phoebe* to the sun and moon respectively.

PHOENICIA (fē-nīsh'ī-à), a country of ancient times, situated on the eastern coast of the Mediterranean Sea. It stretched along the coast a distance of about 125 miles, beginning in the south a little below the Carmel promontory and extending north to the Island of Aradus. The average breadth was about twenty miles.

DESCRIPTION. The soil in the valleys is generally of alluvial origin, being formed largely from the deposits of streams descending from the mountains along the eastern boundary, while adjacent to the sea are extensive sand dunes. Two plains characterize the surface, one at Eleutherus in the north and another inland from Acre, but the mountains trend to within a few miles of the coast at several intermediate points. The narrow coast plain is noted not only for its fertility, but because of having been a favorite route for caravans from remote antiquity. Few indentations characterize the coast, but in former times a number of excellent harbors were maintained. These are now silted up and scarcely available for large vessels of modern construction. A number of small islands lying off the northern shore were included with ancient Phoenicia. The mountains were not particularly productive in mineral wealth, though amber and several other minerals were secured, and the forests possessed timber of remarkable value. However, only small remnants of the once famous cedars of Lebanon remain. An abundance of streams flow from Lebanon to the sea, providing excellent drainage and an ample supply of water power. This country, now held by the Turks and populated with a general mixture of peoples, was once the seat of a great historic people, who built the powerful cities of Tyre and Sidon, constructed highways and aqueducts, and exerted for centuries an extensive commercial and military influence in Asia, Europe, and Africa.

HISTORY. The Phoenicians have a history which extends through a period of more than

2,000 years, but it has not been definitely settled as to their original seat, nor as to the time when they formed settlements on the Mediterranean. They were Semites by race and their language shows that it, like that of the Jews, belonged to the northern Semitic group. Herodotus, the Greek historian, considers the vicinity of the Persian Gulf to have been the original seat of the Phoenicians, while other writers think they had their prehistoric origin in the region of the Dead Sea and that they emigrated to the coast because of earthquakes. They called themselves Canaanites and their land was known as Canaan, but the latter name extended also to the regions occupied by the Israelites. When the Israelites invaded Canaan, no marked change was made in the geography of Phoenicia. It had been assigned to the tribes of Asher, Dan, and Naphtali, but they conquered only a small part of it, and the relations maintained between the Israelites and the Phoenicians were mostly those of friendship. They not only conducted commercial intercourse between each other, but evidences exist that the two peoples maintained social relations to at least some extent. This is proven by a treaty made between Hiram, King of Tyre, and David, and by the marriage of Ahab to a princess of Phoenicia.

The ancients generally thought that the Phoenicians were the inventors of navigation, though this is not at all certain. However, it is true that their ships excelled those of the Greeks in speed. They possessed vessels of excellent construction and had officers whose skill in manning, loading, and directing the vessels was unrivaled. They were pioneers in planting colonies with the view of enlarging trade. For this purpose they founded successful settlements in Cyprus, Rhodes, and the islands of the Aegean Sea. Later they passed through the Strait of Gibraltar and founded colonies on the western coast of Spain and Portugal and on the northwestern coast of Africa. Their voyagers cruised on the coasts of Hindustan and among the East Indies, which they reached from the Red Sea. In Northern Africa they founded Carthage, which was their most powerful settlement. Ultimately they brought Spain into subjection and long rivaled the imperial power of Rome. It appears that their government at the time of the exodus of the Israelites was administered exclusively by chiefs or kings, each being limited in the exercise of large powers in a particular city or town. Later Sidon became the seat of influence over all other states, but this distinction finally passed to Tyre.

Hiram was the last powerful King of Tyre. He was succeeded in 947 B. C. by his son, Ba-

leastartus, who died seven years later. The reign of Hiram was the golden age of Phoenicia, when the manufactures, commerce, and educational institutions were the most brilliant. His administration includes a period with as much splendor and prosperity as that of Solomon among the Israelites. Shalmaneser, King of Assyria, invaded Phoenicia about the middle of the 8th century, after that country had been disturbed by internal strife and invasions, but, after laying an unsuccessful siege on Tyre for five years, he concluded a peace favorable to the Phoenicians. Two centuries later Phoenicia was conquered by the Assyrians, subsequently it became a part of Babylonia under Nebuchadnezzar, and finally Cyrus the Great annexed it to the Medo-Persian Empire. During this time the cities retained a large part of their former independence. When Alexander the Great made his memorable invasion of Asia, the last vestige of independence passed away. Since 65 B. C. it has been a part of Syria.

PEOPLE. The Phoenicians were not only skillful manufacturers of woolen and cotton fabrics, but they excelled in producing metal ware, jewelry, utensils, ornaments, ivory products, and earthenware. Tyre was noted as a producer of dyes from shellfishes and wood, and Sidon developed vast enterprise in the manufacture of glass. Their mines were constructed for convenience both in workmanship and sanitary regulations, and their architecture showed great inventive skill. Fishing, agriculture, farming, and fruit growing developed into vast enterprises. Later these arts were introduced to the colonial possessions. Some writers attribute to them the invention of arithmetic, lineal measurements, a graduated standard of weight, and writing, though others think they merely introduced these arts from the Babylonians to the nations of the Mediterranean. That their language was closely allied to Hebrew is evidenced by their proper names and by numerous tablets relating to the sacrificial ritual, for the reason that they contain many words found in the Old Testament. The alphabet consisted of 22 letters and the words were written from right to left. Their worship was a form of nature worship, or pantheism, and the sun, the moon, and the five planets then known were the objects of special adoration. Baal and Astarte were their two principal deities, the former representing the male and the latter the female. Human sacrifices were offered at an early period to their god Il, who corresponded somewhat to the Moloch of the Ammonites. Only fragments of their literature and inscriptions remain.

PHOENIX (fē'nīks), the capital of Arizona,

county seat of Maricopa County, on Salt River, about fifteen miles above its junction with the Gila River. It is on the Southern Pacific and the Santa Fé, Prescott and Phoenix railroads. The surrounding country has extensive mining interests and produces grain and fruits. Among the noteworthy buildings are the county courthouse, the city hall, the high school, the capitol building, the insane asylum, and the agricultural station. It has a public library, an Indian school, and the Sacred Heart Academy. The industries include machine shops, stock yards, and grain elevators. It was settled in 1870 and incorporated in 1881. Population, 1910, 11,134.

PHOENIX, a mythical bird of Egypt, represented as a species of plover with red and golden plumage, and often described as having human arms. The bird has been mentioned in history in various connections and has been associated with the Sothiac cycle by some writers, who supposed it to return every 500 years. Herodotus and others recount that the bird, at the age of 500 years, transformed itself into a new being by kindling a fire of aromatic gums and wood and burning up the old. The Phoenix has been used as a symbol of immortality by the Egyptians, and it appeared upon the coins of Constantine in 334 A. D. The Jewish rabbins supposed it to be alluded to in the Old Testament, particularly in Job xxxix., 18, and in Psalm ciii., 5.

PHOENIXVILLE (fē'nīks-vīl), a borough of Pennsylvania, in Chester County, on the Schuylkill River, 26 miles northwest of Philadelphia. It is on the Pennsylvania and the Philadelphia and Reading railroads. The features include the public library, the high school, the hospital, and a public park. It is the seat of the Phoenix Bridge Company, which employs about 2,500 men. Among the manufactures are needles, hosiery, silk, shirts, nails, hardware, pottery, and machinery. The surrounding country produces cereals and fruits. Phoenixville was settled in 1792 and incorporated in 1849. Population, 1900, 9,196; in 1910, 10,743.

PHONETICS (fō-nēt'īks), or **Phonology**, the science of elementary sounds uttered by the human voice, showing their functions, their interchanges, and their relations one to another. Voice is modulated into speech by the lips, tongue, teeth, and palate. Many animals have *voice*, but man alone has *speech*. It is possible to teach the raven and other birds to speak by rote, but man alone associates profound meaning with the word sounds. Speech is a modification of the vibrations generated by an outward passage of air between the vocal cords of the larynx, the modification taking place as the vocalized

sound passes through the cavities of the mouth and nose. The power of speech is controlled by the nerve centers that act upon the centers of voice, and these nerve centers are seated on the left side of the brain. Articulate speech is prevented when the nerve centers controlling it are injured, but vocalization is not necessarily stopped, neither is the expression of thought by writing or by signs prevented.

Articulate sounds are divided into vowels and consonants. The English language has 26 letters, but there are 40 elementary sounds, this being due to the fact that a number of the letters have more than one elementary sound. *Vowels*, or *vocals*, consist of pure tone only. They are generated in the larynx and are made with the vocal organs open. A nasal quality is acquired when the back entrance to the nostrils is closed. The vowels include *a*, *e*, *i*, *o*, *u*, and sometimes *w* and *y*. The *consonants* are formed entirely in the parts above the vocal cords, the outward current of air being modified in various ways in its course through the throat and mouth. The six classes of consonants include labials, linguals, linguo-dentals, linguo-nasals, palato-nasals, and palatals. *Labials*, or *lip sounds*, are made or modified by the lips; *linguals*, or *tongue sounds*, by the tongue; *linguo-dentals*, or *tongue-teeth sounds*, by the tongue and teeth; *linguo-nasals*, or *tongue-nose sounds*, by the tongue, the sound passing through the nose; *palato-nasals*, or *palate-nose sounds*, by the palate, the sound passing through the nose; and *palatals*, or *palate sounds*, by the palate.

English spelling and pronunciation are extremely difficult, owing to the large number of silent letters. The use of letters and combinations of letters as substitutes for other letters, and the combination of letters to represent sounds for which there are no single representatives, make it difficult for students to acquire easily the power to speak the language. Scholars who claim to be able to spell all the words in the ordinary vocabulary are comparatively few in number. These conditions have caused a number of writers to propose the substitution of a practical alphabet for English and for other languages possessing similar difficulties. These writers have suggested that the new alphabet should supersede the ones at present in use, or that radical improvement should be made, whereby it would become a less difficult task to teach and learn to read, write, and speak the language. Thus far little progress has been made in securing the adoption of such reforms in English spelling, and the only changes brought about are in isolated cases where silent letters have been omitted. The most prominent

of these are such words as *program*, *catalog*, *oxid*, *paraffin*, *decalog*, etc., but many writers refuse to recognize even these reasonable and moderate reforms.

PHONOGRAPH (fō'nō-gráf), an instrument for recording and reproducing the vibrations of sound. It was invented by Thomas A. Edison in 1877 and has been improved until now instruments of great perfection and utility are in extensive use. The phonograph depends upon the principle of acoustics that sound from a given source spreads in a series of waves, and that its intensity at any distance depends upon the pitch and volume of the original note. This is the underlying principle of the telephone, in which the vibrations of the diaphragm are given out with such rapidity as to constitute a faithful reproduction of what was spoken into the transmitting telephone. In the phonograph a record of sound vibrations is obtained, whether of the human voice or any other agency, and these vibrations are reproduced mechanically at any future time. The three principal parts consist of the sound receiver, the recorder, and the reproducer.

The *sound receiver* of the early phonographs consisted of a tube having a metallic diaphragm at one end, at the outer surface of which was a sharp point or stylus, and at the other end of the tube was an open mouthpiece. The *recorder* consisted of a cylinder, usually four inches in diameter, and over it a sheet of tinfoil was placed. When words were to be recorded, the sound receiver was adjusted so the point of the stylus passed lightly over the tinfoil and the cylinder was turned rapidly, the apparatus for moving it having a screw as an axis, so as to give motion that was sidewise as well as circular. A series of indentations in the tinfoil were caused by the sound vibrations in the diaphragm, and the continuous movement of the instrument had the effect that the stylus traversed the tinfoiled cylinder from end to end. Thus prepared, the next step was to call into action the third part, the *reproducer*. This was done by again bringing the cylinder under a stylus attached to a diaphragm, and, as the cylinder revolved, vibrations were produced similar to those created by the voice when making the record, this resulting from the stylus being affected by the inequalities in the indented tinfoil. Many of the instruments now in use are of this construction and still retain practically all the principal mechanical features enumerated above.

In 1889 Edison replaced the tinfoil by a wax composition, and later introduced the wax cylinder. Other improvements include constructing

the diaphragms of glass and placing a sapphire point on the stylus. Instead of the cylinder being turned by hand, it is now moved by clockwork and the larger instruments are rotated by an electric motor. A trumpet or funnel serves to facilitate utterance into the instrument when the record is made, as well as when it is reproduced, or the communication may be heard through tubes having tips to fit the ears. The wax composition attached to the cylinder is so constructed that it may be used several times by shaving off the record and placing another on in the usual way. A kind of phonograph known as the *graphophone* has a wax-covered cylinder instead of one made entirely of wax. Emile Berliner is the inventor of the *gramophone*, which employs a disk that revolves on a horizontal plane. The disk is made of hard rubber. This instrument is now in very extensive use.

The purposes for which a phonograph may be used are numerous. It is employed to a limited extent by business men in making records for typists, who afterward write the communications on typewriters. However, it is used most extensively for taking speeches, musical selections, songs, essays, and orations to be heard for amusement or instruction. It is noteworthy that, when reproducing at the same rate of speed as when uttering the communication, the sounds are identical to the original. By using a funnel it is possible to make them sufficiently loud to be heard at some distance from the instrument. Cylinders containing records may be kept for a long time, hence it is possible for persons to enable their posterity to hear the exact sound of their voice.

PHONOGRAPHY (fō-nōg'ra-fy). See **Shorthand**.

PHOSPHATE (fōs'fāt), a generic term used in chemistry to denote a salt of phosphoric acid. It is an essential element in the chemistry of plant and animal life, entering in different proportions into the tissues of living organisms. Phosphate of soda, basic phosphate of magnesia, and phosphate of lime are the most important. Many of the poorer agricultural lands need to be fertilized by supplying phosphatic manures for the production of crops. Where such is the case, the phosphates are placed in the soil with the planted seeds. They consist principally of ground bones, phosphatic guano, bone ash, and mineral phosphates. The United States produces more phosphate than any other country. At present the annual output is 1,650,000 tons, which has a value of \$5,125,000. Florida, Tennessee, and South Carolina yield large quantities.

PHOSPHORESCENCE (fōs-fōr-ēs'sens), the property possessed by some bodies that enable them to emit light without giving off sensible heat. This phenomenon is due in some cases to chemical action and in others to physical. It is induced in certain mineral substances by exposure to a strong light, to friction, to heat, or to electricity. Nearly all bodies are phosphorescent after exposure to strong light, but this form of the phenomenon is of brief duration, in many instances less than a second. Some animals and certain classes of plants become phosphorescent when in a state of decay, especially certain species of fishes and various kinds of wood. Many species of the jellyfishes are phosphorescent and certain parts of the seapens, fireflies, glowworms, and numerous deep-sea fishes possess this property. It is possessed by many forms of fungi, some liverworts, and algae. In the tropical seas and some of the temperate climates phosphorescent lights appear on the surface of the water at night, being produced by the bodies of certain microscopic animals. The hairs of the cat and many other animals give off light if rubbed in the dark when warm. Heavy friction on rocks, salt, and sugar produces the same effect. Certain fishes have the property of converting nervous energy into electricity when disturbed.

PHOSPHORIC ACID (fōs-fōr'ik), the principal acid formed by the element phosphorus and found native in the form of calcium salt. In the laboratory it may be obtained by burning phosphorus to convert it into an oxide and then boiling in water, or by oxidizing phosphorus with nitric acid. Phosphoric acid is found in the ashes of bones and may be obtained on a large scale from bone ash by treating with sulphuric acid, then filtering and evaporating. In a pure state it is a colorless crystalline substance. The most important uses of this product are in medicine, in the form of a solution or diluted acid. It is prescribed in treating softening of the bones and diseased conditions of the mucous membrane.

PHOSPHORUS (fōs'fōr-ūs), one of the elements, which was discovered by Brandt, of Hamburg, in 1669. It is nonmetallic, is almost colorless, and forms a waxlike solid. At ordinary temperatures it may be readily scratched by the finger nail. The density compared with water is 1.83. It melts at 180°, boils at 550°, and, owing to a slow oxidation, is luminous in the dark. Water will not dissolve it, but it is soluble in most oils. Being highly inflammable, it must be handled with much care when exposed to air, and for safety against spontaneous combustion it is necessary to keep it under

water. It is set on fire in the open air by the friction resulting from pressure between the fingers and by the hand when rather highly warmed. Phosphorus has an energetic affinity for oxygen, and, when united with it in burning, the flame becomes more vivid. It is very poisonous, and, when poisoning by it is not quickly followed by death, usually fatal forms of diseases of the heart, liver, kidneys, and tongue are produced.

Phosphorus is found in a state of combination in the soil, in unstratified rocks, and in many parts of the bodies of plants and animals. The larger part of this element sold in the trade is obtained from the bones and urine of animals. In preparing it from bones, they are first burned and treated with two-thirds of their weight of sulphuric acid diluted with water. The liquid portion is then evaporated, and, after mixing with charcoal, the remaining portions are desiccated by heating in an iron vessel. The dry mass is then placed in a stone retort, in which it is heated, and the phosphorus is conducted through a worm into water, where it is collected for use. Phosphorus is used for making matches, in preparing vermin poisons, and largely for medicine. It unites with most of the metals and forms *phosphides*. The compounds of phosphoric anhydride with basic bodies are known as *phosphates*. *Amorphous phosphorus* is a reddish-brown modification of phosphorus obtained by heating common phosphorus to about 450° in air-tight vessels. It is used for safety matches.

PHOTO-ENGRAVING (fō'tō-ĕn-grāv'ing), the term applied to a process of engraving, in which certain chemical substances combined with the action of light take the place of the work on an engraver. It is so named from the processes employed, which include photography and a form of engraving by chemicals. The picture or portrait to be engraved is transferred by means of photography to the block or plate, which, when completed, contains a printed surface. See **Photogravure**.

PHOTOGRAPHY (fō-tōg'rā-fÿ), the process of producing pictures by the action of certain sensitive substances under the influence of light. The art had its beginning with the discovery that fused silver chloride darkens on exposure to light. This discovery was made about 1600, but there was scarcely any progress in developing the art until in 1777, when the Swedish chemist, Scheele, found by numerous experiments that the darkening originates from the violet end of the solar spectrum. In 1802 successful experiments were made by Thomas Wedgewood in taking profiles upon paper with

nitrate of silver under the influence of the light of the sun, and shortly after he published his method. However, no process was known for rendering permanent the objects taken in that way until in 1814, when Joseph Nicéphore Niepce (1765-1833), a French chemist, discovered a method of producing pictures on plates of metal covered with a coating of asphaltum and devised the means to secure permanency. This process became known as *heliography*. The present art of photography was discovered by Daguerre in 1839, when he found a method of taking pictures on silver-plated copper plates. The process consisted of exposing the plate for a short time in a camera, and afterward it was developed in a dark room by exposure to mercurial vapors. While his discovery laid the foundation for photography, his methods have gone largely out of use on account of newer and more rapid processes. The so-called *wet-plate process* was perfected by Scott Archer in 1851 and the *collodion dry-plate process*, by Hill Noyes in 1856.

RECENT IMPROVEMENTS. The more recent discoveries include the preparation of collodion emulsion dry plates, the proper care and treatment of dry plates, and the photography of natural colors. The last mentioned, known as *color photography*, is one of the most remarkable discoveries of recent times. It is generally attributed to Mayall, who, in 1887, published some valuable information in regard to securing quite satisfactory results in photographing the natural colors of some objects with which he had experimented. The usual method consists of taking three negatives of the colored object, respectively through screens of green, red, and blue-violet. Positives are now made of these negatives, usually on a clear glass, and they are combined and projected through a magic lantern, when a picture in the natural color is obtained. *Phototelegraphy* (q. v.) is still a newer invention. Other improvements that may be cited include good results by the use of artificial light, the instantaneous process for photographing objects in motion, and the methods of making pictures by the use of the X-ray. The *instantaneous process* requires exposure for only about one-three-hundredth of a second, making it possible to photograph a moving train or a bolt of lightning with good results. The *X-ray method* has added much value to the medical practice, since by its application it is possible to prepare a photograph of a bullet located in the body, or a good view of any foreign substance or abnormal growth with which a patient may be affected internally.

METHODS. Many processes are now utilized

in photography, hence it would be quite impossible to describe in detail all the kinds employed. The more general method is to prepare the photograph on a glass plate that has been sensitized before putting it into the camera. This is done by coating one side of the glass with a thin film of collodion. The collodion is prepared in various ways, usually by a solution of gun cotton in ether and alcohol. The glass plate is next treated in a bath containing a mixture of water and nitrate of silver. It is necessary to put the silver nitrate on in a dark room, and light must not fall upon it until it is exposed to the object to be photographed, for the reason that exposure to light darkens the

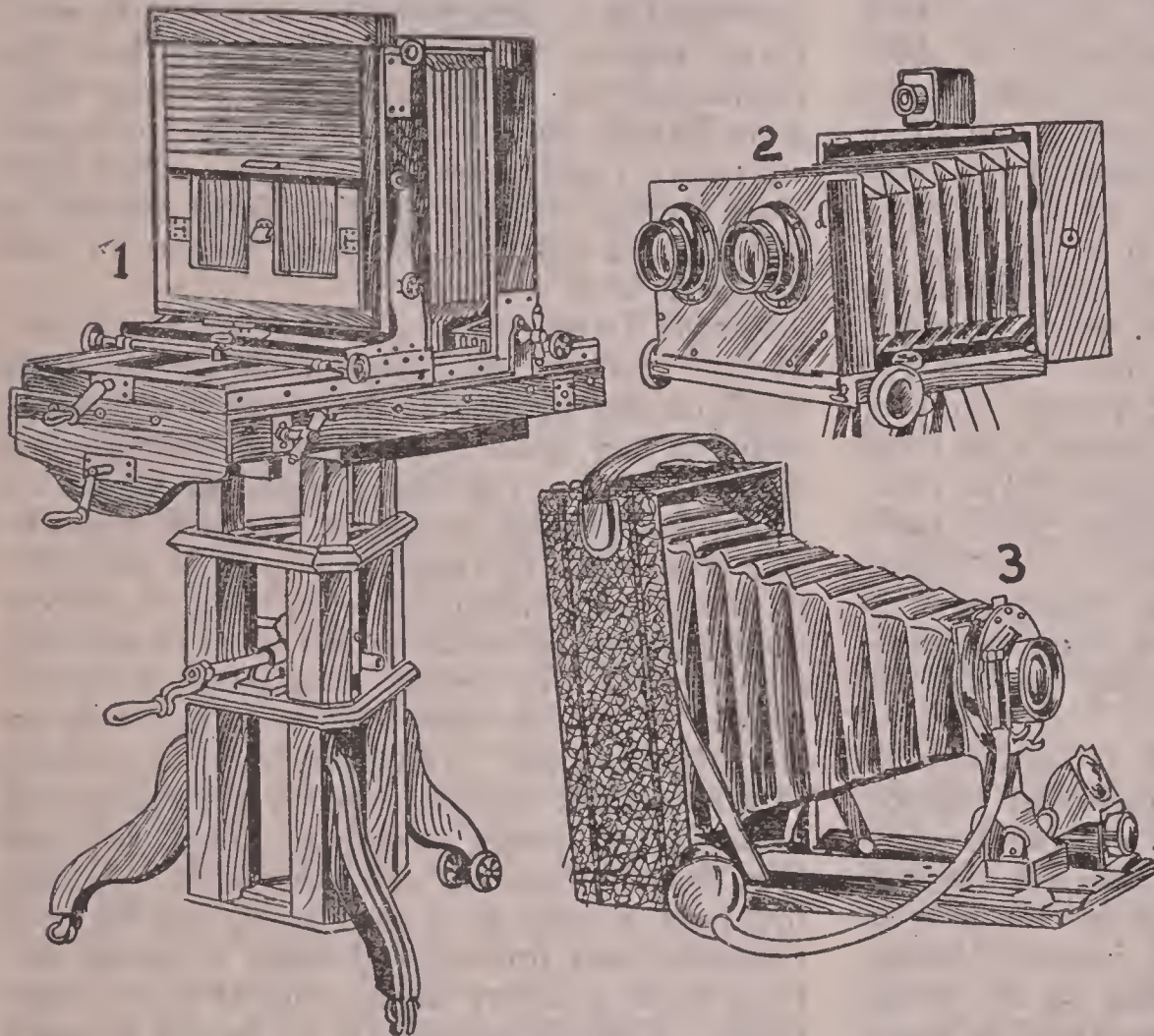
The impression is so delicate that it cannot be seen, but by washing the plate in a solution of pyrogallic acid, or some similar chemical, the negative is developed. When the picture has been sufficiently brought out, the plate is washed in hyposulphite of soda and dried, and the side containing the film is varnished to prevent its being injured by rubbing. After it is carefully retouched by the artist to remove all imperfections it is ready to print the photographs. In this form it is called the *negative*, while the photograph, which is printed from the negative, is termed the *positive*. The paper used for the photograph can be secured in the market, or it may be prepared by coating thin sheets of paper

with a mixture of albumen from the whites of eggs and chemicals. This prepared paper, usually called *print-out paper*, is next treated with a film of silver nitrate, when it is placed in a frame next to the negative and exposed to the light of the sun or to an electric light of much intensity.

The negative differs from the positive in that the dark parts of it represent the light portions of the objects photographed and the light parts, the dark portions. When light is applied to the negative, there are imprints on the paper below exactly opposite, as the light and dark shades are differently affected by the light passing through them, and the paper below, being coated with nitrate of silver, receives impressions to represent exactly the object photographed. The artist is gov-

erned by the intensity of light and the character of the negative in taking the prints. When sufficiently exposed, the picture is taken from the frame, is washed in a solution of soda to take out the silver nitrate not turned brown, and it is then *toned* by washing in a bath containing chloride of gold. It is next fixed by a varnish and pasted to a cardboard. The size of a photograph depends upon the size of the instrument and its distance from the object taken.

Astronomical photography is a comparatively new field of research. By the use of powerful telescopes it is possible to secure excellent photographs of stars and clusters of stars not



PHOTOGRAPHIC INSTRUMENTS.

1, Camera mounted for use; 2, Stereoscopic Camera; 3, Kodak.

film. Since the preparation of plates is a distinct industry, they are obtained ready for use by the photographer. When a photograph is to be made, the glass plate is put into a camera, an instrument in the form of a dark box, with a glass screen, as shown by Fig. 1 in the illustration. The camera is pointed toward the object of which a picture is to be made, and, when properly adjusted, its cover is removed for the purpose of allowing the lens to throw an image of the object upon the sensitized plate. Amateurs usually employ ribbons of film, which have a back of celluloid and are put up in rolls, ordinarily for six or twelve exposures.

visible to the naked eye. The first experiments in this now extended field were made by John W. Draper, of New York City, in 1843. Within recent years the *kodak*, a kind of portable camera; see Fig. 3, has become popular for taking *snap shots* as well as making *time exposures*. Both snap shots and *flash lights* are obtained by instantaneous exposures. A *stereoscopic camera*, see Fig. 2, is used in making views for the *stereoscope* (q. v.). By means of *photomicroscopy* it is possible to photograph microscopic objects for future examination. Besides photography has wrought many improvements in lithography, the name *photolithography* being applied to the reproduction of photographs from a lithographic stone. These improvements and others have revolutionized book and newspaper illustrating and have greatly popularized all classes of periodicals.

PHOTOGRAVURE (fō-tō-grāv'ūr), the art of producing by photography plates for printing. The earliest attempt to prepare engraved plates by this process dates from 1827, when Joseph Nicéphore Nicpce, of Paris, found that light vigorously affects thin plates of bitumen. He soon after coated a number of metal plates with a thin film of albumen and exposed them to an image for several hours by means of a powerful camera obscura. These were next treated with oil of spike to dissolve the parts not affected by exposure to light, which, however, did not affect the other parts. A treatment with strong acids further lowered those parts, thus producing a complete etching plate from which any number of impressions could be taken on paper. Since then many improvements have been made and the art has been productive of results quite equal to a photograph. However, the cost of securing pictures by this process has confined its use largely to the better class of book and magazine work. Many processes are employed successfully for all classes of printing. Usually a photographic film is laid on a metal plate and is exposed to the action of light under a negative. A certain per cent. of graphite is mingled with the gelatin film, which causes the surface to assume a grain corresponding exactly with the lights and the picture. When placed in an electrotype bath, the granular surface conducts currents of electricity and thus takes on a coating of copper. The copperplate prepared in this way may be used in a press for printing on paper, but grades of paper which have a fine surface finish are preferred.

PHOTOMETRY (fō-tōm'ē-trÿ); the science of measuring the intensity of a source of light. Since it cannot be measured in terms of watts,

or an absolute standard, it is customary to compare the intensity with that of a standard of reference, such as a representative source of light, although no completely satisfactory standard has been proposed. An instrument used for this purpose is called a *photometer*. In the Bunsen photometer a sheet of paper supported in a frame is used. This paper has a greased spot, through which the light passes more readily than through any other part of the paper. The paper is placed between two lights and moved backward and forward until a position is obtained at which the spot disappears, which occurs when the paper is equally illuminated on both sides. For instance, if a light is one foot from the screen and another light of equal power is two feet from it, it follows that the former has four times the luminous intensity of the latter. In the Bouguer photometer an upright rod casts a shadow upon a white screen placed behind it. When the light comes from only two sources, such as two lamps placed at different distances from the screen, it is possible to determine the intensity of the light by that of the shadows upon the screen.

PHOTOPHONE (fō'tō-fōn), an instrument by which sound may be transmitted along a beam of light instead of a wire, as in the telephone. Inventors have produced a number of similar instruments called *radiophones*, but the photophone proper has a good representative in the invention of A. G. Bell, completed in 1880. This instrument contains as an essential feature a cell made of the rare metal selenium, which, when acted upon by light, offers more or less opposition to the passage of electricity. It has a plane mirror of silvered glass or mica, from which a parallel beam of powerful light is reflected toward a parabolic reflecting mirror, in the focus of which is a selenium cell, connected with a battery and a telephone. Any sounds which cause the diaphragm to vibrate produce a corresponding variation in the reflected light, and this in turn alters the resistance of the selenium cell to the current of the battery and at the end of the attached telephone becomes audible as vocal sound. The photophone may be used only at short distances, but articulate sounds may be transmitted by sun or any artificial light, even by an ordinary kerosene lamp.

PHOTOTELEGRAPHY (phō-tō-tē-lĕg'rā-fÿ), or **Telephotography**, the art of reproducing pictures or photographic images of visible objects at a distance by electricity. It is due to the discoveries of Arthur Korn of Germany, who perfected the first instrument, known as the *telephoto*, in 1906. The first station to transmit drawings, photographs, and the like by this

method was established at Munich in 1907, since which time the art rapidly assumed commercial importance. Besides the instruments invented by Korn, others are in extensive use, particularly those of Knudsen and Carbonelle.

The principal part of the Korn telephoto consists of a film, which contains the drawing or photograph to be transmitted and is mounted on a cylinder with a screw motion similar to



Picture transmitted by Korn's telegraphic camera.

that of a phonograph. A pencil of light is focused on the film, in such a manner that it falls on a selenium cell, which is connected in a series with a battery and the telegraph line. When the cylinder is caused to revolve, the light which falls on the film varies according to the variations of the film, hence corresponding changes are caused in the current on the line. The current at the receiving end passes through a Geissler tube and causes corresponding fluctuations in the light from this tube, which is focused on a sensitive film mounted on a revolving cylinder similar to the one at the sending station. The Carbonelle instrument employs a metallic stylus, which is brought in contact with a revolving film of varying conductivity, depending upon the density of the

photograph which is printed upon the surface. A similar metal stylus is at the receiving end, hence the photograph is engraved as the films are put in motion when they are brought in contact in series with a battery. Knudsen, in 1908, adapted his phototelegraphic apparatus to operate a linotype composing machine, but it is doubtful whether this method can be made practical.

PHRENOLOGY (frê-nôl'ô-jÿ), the art of determining the mental and moral faculties of an individual and indicating their qualities by measuring the development of the brain upward, forward, and backward from the medulla oblongata, the measurement being by cranial diameters and distances from the openings of the ears. As a doctrine it teaches that the brain is the organ through which the human mind acts, and that a relation exists between the several faculties of the mind and particular portions of the brain. According to this view the brain is not strictly a single organ, but consists of a number of different organs having close interdependence, but each of them is influential in some particular line, or has some special function. It has been held from ancient times that the brain as a whole is the part of the human body through which the mind operates. The first attempts to localize the several faculties were made by Franz Joseph Gall (q. v.). He gave a course of lectures on this subject at Vienna in 1796 and was soon after joined by Johann Gasper Spurzheim (1776-1832), a German physician. The two prepared a chart of the cranium and to each small section assigned the dwelling or location of a certain propensity, sentiment, or inclination.

Later Spurzheim divided the 35 mental faculties enumerated by Gall into *moral*, or *effective*, and *intellectual*. The moral, or effective, faculties were subdivided into *propensities* and *sentiments*. According to his view, the former produce desires, or inclinations, while the latter along with them excite some higher emotion. The intellectual faculties were divided into *perceptive* and *reflective* propensities and all were localized on the skull. In 1807 Gall and Spurzheim visited Paris, where they lectured for a number of years and succeeded in securing the appointment of a commission by the Institute to investigate the system, but this resulted in an unfavorable report, which was drawn by Cuvier, the celebrated naturalist. Soon after Spurzheim visited England, where he found an enthusiastic supporter in George Combe, who is the author of the celebrated work entitled "System of Phrenology." Many specialists have verified a number of the principal claims

made by Gall and Spurzheim. Some of them are well established and have a place in scientific physiology.

Another school of phrenologists base their system on protuberances and depressions of the skull, this particular branch being sometimes called *craniology*. While physiology verifies to a limited extent the claims made by craniologists, their data and conclusions are both general and uncertain, for the reason that the intervening flesh, skin, and hair do not allow an accurate estimate of the protuberances and depressions, and because the hollows on the inside of the skull do not always correspond to the elevations on the outside.

PHRYGIA (frīj'ī-à), the name applied anciently to a large country in Asia Minor, inhabited by a class of people called Phryges by the Greeks. The boundaries varied at different periods, including at one time most of the peninsula, but comprising for the greater period of its history the west central part. Their language was closely allied to that of the Greeks, and they bore a close kinship to the tribes of Thrace and Macedonia. Historians are uncertain as to the early history of Phrygia, but it is thought that the kingdom rose from an older civilization, this being evidenced by a few monuments still remaining. The Phryges engaged in stock raising, mining, and agriculture, giving marked attention to the cultivation of vines and fruits. Laodicea, Apamea, and Colossae were their principal cities, in which they built many temples and monuments, a fact verified by extensive ruins. Phrygia was overrun by the Cimmerians in 670 B. C., when King Midas of Phrygia lost his life, and ten years later the country was made a province of Lydia. The Persians annexed it in 549 B. C., under Alexander the Great it became a Grecian territory, and later it formed a part of the province of Asia under the Romans. The inhabitants were noted for their stubborn resistance to oppression, for advancement in civilized arts, and for the influence exercised by their religion upon the mythology of Greece. At present most of the region is included with the Turkish vilayet of Kodavendighiar.

PHYLLOXERA (fīl-lōx-ē'rà), a genus of lice classed with the aphidae, which feed as parasites on many kinds of plants. The most noted species is an injurious pest to the vine. This form is native to North America, where it was first observed in 1854, but since it has been carried to practically all countries in which

the grape vine is cultivated. It infested the native grapes at the time America was discovered and with the development of grape culture it began to attack the cultivated species, but for many years the cause of grape destruction by this insect was not understood. The insect infests both the roots and the leaves of the vine, as shown in the accompanying figure. The forms infesting the roots are the wingless females (2), which suck the sap by means of an elongated rostrum and cause swellings of the rootlets. These wingless females multiply parthenogenetically; that is, by means of unfertilized eggs without the intervention of a male, but after a few generations winged females are produced.

The winged females feed on the leaves and buds, where they lay two sizes of eggs, from the smaller of which wingless males develop and from the larger, wingless females. After fertilization, the female lays a single egg in the fall, from which a wingless female, the stock mother, is hatched in the spring. The stock mother forms galls on the underside of the leaf and multiplies parthenogenetically with rapidity,



PHYLLOXERA.

1, Roots on which the young are working; 2, female pupa; 3, roots on which the young are beginning to work; 4, leaf covered with galls; 5, winged female.

some of the offspring forming new galls, while others descend to the roots. When the vine is infested by a large number of these insects, the roots become knotted and deformed, and the leaves indicate a diseased condition by turning yellowish, and later life becomes totally extinct. These insects have been distributed in commerce by transporting cuttings and vines. They were particularly destructive in France from 1865 to 1867 and in Germany in 1881, whence they spread in rapid succession to Austria,

Switzerland, England, and the Spanish peninsula. Subsequently they appeared in Australia and many parts of Africa, Asia, and South America. No absolute preventive or remedy is known, though some success has been attained by the use of petroleum tar and by watering the roots.

PHYSICAL GEOGRAPHY. See **Geography**.

PHYSICAL TRAINING. See **Delsarte; Gymnasium**, etc.

PHYSICS (fiz'iks), or **Physical Science**, the science that treats of the phenomena associated with matter in general, including an investigation of the laws governing these phenomena, and treating especially the relations of matter to energy. The two great branches into which the knowledge of nature is classed according to its subject-matter are designated physical science and natural science. *Physical science* is properly limited to an investigation of phenomena that are observed in things without life, though it extends this investigation to living forms when the same phenomena are observed in a living being. *Natural science* is now limited to the study of organized beings and their development. Physics in a narrower sense is equivalent to the branches usually treated under natural philosophy, but the latter was used almost exclusively in this sense until within recent years. As now understood, physics is generally held to treat of the constitution and properties of matter—fluids, mechanics, acoustics, heat, optics, electricity, and galvanism. The changes treated in physics differ from those considered in chemistry, since a physical change is one that does not affect the composition of the molecules, hence it does not alter the specific properties of the substance, while a chemical change is one that implies a rearrangement of the atoms into new molecules and so destroys the specific properties of the substance. Dissolving sugar in water involves a physical change, while burning coal implies a chemical change.

PHYSIOGNOMY (fiz-ī-ōg'nō-mŷ), the art of reading character and the quality of mind by the features of the face. It is founded upon the belief that there is an intimate connection between facial features and expression and the qualities and acts of the mind. This art was supported in the philosophy of Aristotle, who ascribed cunning, daring, bravery, ingenuity, and other traits quite largely according to the features observable in the human face. In 1586 the first authentic work on this subject was published in France by Giambattista della Porta, entitled "Human Physiognomy," in which the

theories were elaborated and applied to representative cases. Sir Charles Bell published his "Essay on the Anatomy of Expression" in 1806, and may be said to be the first who gave scientific study to facial expression as related to the changes of the countenance and the muscles which produce them. Many representative writers who gave thought to psychical subjects in the last century, including Spencer and Darwin, correlated physical action with psychical states. Pieter Camper (1722-1789), the eminent anatomist of Holland, wrote "Discourse on the Face" and Johann Gasper Spurzheim published "Physiognomy in Connection with Phrenology." See **Phrenology**.

PHYSIOGRAPHY (fiz-ī-ōg'rā-fŷ), the science which treats of the physical features of the earth's exterior, including the physical movements or changes on the earth's surface. The scope included in this science embraces climate, life, and temperature and considers the currents of the ocean and the atmosphere. In a wider sense it may be said to cover the whole subject of physical science, since it considers the important phases of botany and zoölogy and includes the elements of astronomy, chemistry, geology, physical geography, and physics. The term is used interchangeably with physical geography in some instances, since it investigates and explains the origin of existing physical features.

Physiography classifies the natural divisions of land and assigns causes for their general outline and differences in elevation above the sea. The forms of the lands are undergoing changes from time to time, since the bottoms of the oceans are being depressed, the continents are eroded, and changes are taking place in the plains, plateaus, and mountains. In many places the rocks that lie above the sea are disintegrating and being removed through the action of winds, rains, and streams. Glaciers and oceanic waves and currents cause important changes, while islands and other forms of land are acted upon by the action of rivers, which cut embankments in some localities and build land masses in others. Both plant and animal life is influenced materially by climate and soil. These phenomena are investigated both as to source and result. The distribution of life upon earth, the agencies that tend to promote growth, and the barriers that obstruct development are all considered in their phases and relations.

The barriers that interfere with the spread of life include the ocean, mountains, deserts, and regions of extreme cold. It is apparent that the polar zones are unsuited for the propagation of life, while barren deserts are likewise a limit-

ing influence, though the presence of valuable minerals in some cases favor habitation. Rugged mountains that reach above the snow line, such as the Alps of Europe, interfere with the spread of life, but furnish a refuge from invasion and in some localities contain mineral wealth sufficient to attract a population that otherwise would be impossible. On the other hand, localities of favorable climate and great fertility induce density of population, such as the favored districts of Western Europe, the valley of the Nile, and the islands of Japan, though such regions are in many cases favored by being located where commerce and manufacturing enterprises can be centered with more than ordinary convenience. Locations at certain altitudes above the sea influence more or less favorably as to climatic conditions, but latitude is equally important, as may be seen from the fact that the more powerful races and nations are confined to the temperate regions.

The configuration of the sea bottom and the depth of the ocean, their causes and influence upon animal and vegetable life, are subjects investigated by this branch of study. They determine to a large extent the oceanic routes of travel and the location of commercial and industrial cities. Though formerly the great centers of trade were located almost entirely upon navigable waters, chiefly inlets from the ocean, the construction of highways, canals, and railways, all resulting from the development of civilization, have tended to spread the habitations of man to the most remote parts of the interior of continents.

PHYSIOLOGY (fĭz-ĭ-ŏl'ŏ-jĭ), the science which treats of the functions and properties of living matter. It is divided into human, animal, and vegetable physiology. Histology, anatomy, hygiene, and chemistry are allied studies, since physiology as a science is dependent in a large measure upon the progress made by the student in these related branches. *Histology* considers the minute structures of the tissues as made known by microscopic studies; *anatomy* treats of the number, structure, and connection of the parts which make up an individual being; *hygiene* is the study of the conditions most favorable for healthful action of the several parts and of the whole; and *chemistry* embraces the study of the nature and properties of every object accessible to man.

LIFE AND GROWTH. *Human physiology* treats of the processes or changes that take place in the organs and tissues of man. The human body develops from a minute cell or ovum called the *embryo*, which consists of a mass of protoplasm containing the germinal vesicle as a

nucleus. The smallest known masses of living matter assume the spherical form and are known as the *cells*. These have a soft, colorless appearance and in the living state consist of structureless material, found by microscopic examination to have slow movements. Protoplasm, consisting of a transparent material, is the life principle and is constituted of carbohydrates, fats, proteids, and water. The functions of granules and nuclei found in the protoplasm are not known definitely, but the protoplasm itself has the power to grow, absorb, move, excrete, secrete, and multiply. It is most easily studied in the simplest of animal life, particularly in the amoeba, a protozoan having a simple protoplasmic body with a nucleus and nucleolus, and effecting movement by the extension of parts of the body. These animal forms constitute the lowest living beings, while mankind is the highest form.

CELLS AND TISSUES. Each living cell is capable of receiving material different from itself as food, though this material must be in a state of fine division, and chemical and physical changes take place until it becomes a part of the cell itself. In this manner the material acquires properties and powers not before possessed by the food. While this growth of cells is much more minute, it is similar to the growth of tissues, of organs, and of the body itself. If a cell receives food material in excess of its wants, or if it has grown to maturity, then new living cell centers begin to form. The new cells have the same tendencies and properties possessed by the parent cells and the rapidity with which tissues, organs, and the body receive new cell formations determines growth; in other words, growth consists of the addition of cells.

Both in the living cell and in the living body there is a ceaseless internal motion and change in material. Old or used materials are removed without intermission, although this ceaseless process is not rapid. On the other hand, new materials are constantly taken in and changed and modified in the organism, and these finally enter into its structure. When changes in the cells or tissues discontinue, local death results, and when changes cease in the entire organism death ensues. Each individual being possesses in its organism a controlling force, usually called the *germ force*, or the *vital force*. This is transmitted from generation to generation, but is modified largely by external and internal conditions. In all the higher types of animals there are five principal tissues—blood, epithelium, connective tissue, nervous tissue, and muscular tissue.

ORGANS AND FUNCTIONS. The physiology of

the different organs of the body is discussed along with the anatomy of such organs in different articles, and it is necessary in this article to call attention only in a general way to the more specific connections between them. The skeleton is constituted of the bones, which serve to protect the delicate organs of the body, to act as levers for the production of motion by the muscles, and to give general form to the body. The skeleton determines the height and breadth of the body. It has 208 separate bones, which are held together, so as to act with the greatest nicety, by the flexible bands called *ligaments*. The bones are constructed with the view of supplying the particular wants in providing strength, rapidity of movement, and surface for the attachment of muscles, by being either solid, hollow, or enlarged at the ends. The skeleton is surrounded by the flesh, which consists of about 500 distinct fleshy masses, called *muscles*, and their size, form, and arrangement depend upon the outline of the skeleton. Motion is produced by the expansion and contraction of muscles when acting upon the bones, and all are held in place by a whitish connective tissue. However, there are some muscles that are not under the control of the will, such as those of the heart, where the motion is said to be involuntary. The muscles are covered by the skin, a tough, close-fitting garment for the protection of the tender flesh. The skin is elastic, thus being adapted to respond to every motion of the body, and not only preserves its delicacy and smoothness by oiling itself, but when worn out is rapidly replaced by a new growth.

Living matter of animal bodies is constituted essentially of the six approximate substances classified as water, salts, fat, proteid, carbohydrate, and oxygen, the three most important constituents being nitrogen, carbon, and oxygen. About forty per cent. of the weight of the body of an adult is made up of muscles, and fifteen per cent. of the skeleton. About 65 per cent. of the whole is water. The blood permeates every part of the body and directly or indirectly nourishes all the tissues. It removes such materials as are not available for further use by carrying them to the excretory organs. The heart is the great central engine that propels the blood, sending it out through the arteries, whence it passes through the capillaries into the veins. These organs convey it to the lungs to be purified and the red oxygenated blood is passed into the circulation. To maintain animal life it is necessary that carbonic acid be continually excreted and oxygen be absorbed. These processes are effected by respiration, *in-*

spiration carrying the fresh air laden with oxygen into the lungs, where it is taken up by the blood, and *expiration* carrying off the impurities of the body. This necessary function of the body is aided by the skin giving off waste matter through the sweat glands and taking in oxygen, while the kidneys filter the blood and separate from it matters which are foreign or useless. The glands separating fluids from the body are sac-shaped cavities.

Among the principal waste products of the body secreted by glands are the sweat and urine. The fluids vital in the process of digestion include the saliva, gastric juice, pancreatic juice, bile, and intestinal juice. The human brain is the center of impulse of the elaborate nervous system and controls and guides the voluntary and involuntary muscles. It is the central organ that directs all movements, and is the seat of the special senses, the taste, touch, smell, sight, and hearing. Each of these senses has a special organ connected with the brain by a particular nerve. The nervous system as a whole conveys to the mind sensations by which it obtains a knowledge of the external world and of the feelings and acts of the body.

FOOD AND NUTRITION. Since the body is constantly giving off waste matter, it is necessary that fresh material be supplied in sufficient quantities. Man would starve within a few days if a constant supply of food materials was not provided, since all the available flesh of the body would be consumed by the oxygen. Different kinds of food must be selected with the view of supplying the various needs of the body, and the time for supplying the food material should be adjusted at proper intervals, otherwise nutrition may not supply the living body with material at the proper time. Digestion is dependent upon the action of the mouth, teeth, tongue, pharynx, esophagus, stomach, and intestines. The food is chewed and mixed with saliva in the mouth, whence it passes through the pharynx and esophagus into the stomach, where it is acted upon by the gastric juice and subjected to the churning motion of the stomach, thus promoting the digestion of the proteids and starchy foods. The mucous coat of the stomach is provided with multitudes of glands, which secrete the gastric juice, a colorless and watery fluid with a sour taste and odor. From the stomach the food passes through the pylorus into the duodenum, where it receives the bile and pancreatic juice and is converted into chyle, a mass with a milky appearance. It next passes through the small intestine, an intricately folded tube about 25 feet long, is acted on by the intestinal juices, and the nutritive portions are

absorbed by the lacteal glands. The movement forward in the small intestine depends upon its peristaltic action, a successive wavelike contraction extending gradually from the upper to the lower part of the canal.

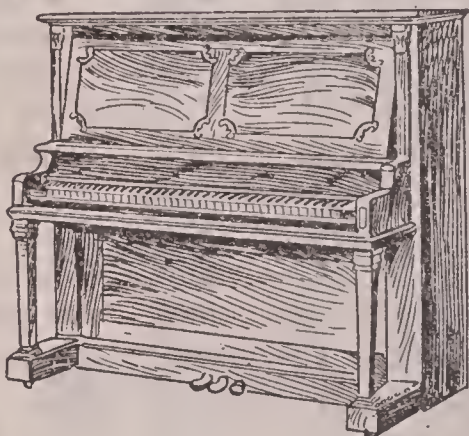
The blood vessels of the alimentary canal absorb the nitrogenous foods and form the portal vein, which goes to the liver, then by means of the hepatic vein it is taken to the ascending vena cava to form a part of the circulating fluid. Nutriment is also taken by the lymphatics, which unite in the thoracic duct, and is conveyed by capillary attraction to the vein under the left collar bone, whence it passes into the left innominate vein and is carried into the circulation. The entire process of digestion requires from two to four hours, this depending on the class of food taken into the body. Digestion is a process of great complexity as compared to the processes of circulation, respiration, and other functions of the body.

PIACENZA (pē-ā-chēnt'sà), a city of Italy, capital of the province of Piacenza, 43 miles southeast of Milan. It is located on the Po River, near its confluence with the Trebbia, and is surrounded by a fertile farming and fruit-growing country. The streets are broad and regularly platted. It has a fine cathedral founded in the 11th century and contains a number of attractive palaces and school buildings. Gas and electric lighting, waterworks, sewerage, and a public library are among the municipal improvements. Communication is furnished by several railways and a system of electric lines. The manufactures include hats, cotton and woolen goods, pottery, wine, and machinery. In the vicinity are extensive marble quarries. Piacenza was known as Placentia to the ancient Romans, who founded it in 219 B. C. It belonged to the Lombard League in the 12th century and later was joined to Parma to form a duchy for the Farnese family. Population, 1906, 36,946.

PIANOFORTE (pī-ān'ō-fōr-tā), or **Piano**, a stringed musical instrument, the sounds of which are produced by blows from *hammers*. The hammers are covered by felt and are moved by levers, being attached to a series of *keys*, which form the *keyboard*. This instrument is probably the most extensively used musical device in the world. Although of comparatively recent date, it may be said to constitute the perfected form of all the ancient instruments which employed strings that were struck by hammers, particularly of the harpsichord and clavichord.

The original pianofortes had strings placed in a small and portable box, on which the operator played by striking them with a hammer held in the hand. It was called the *dulcimer* in this form and is still used in many countries of Europe and Asia. The *clavichord* was an improvement over the dulcimer, in that the strings were plucked with quills. It was eventually superseded to a large extent by the *harpsichord*, an instrument with a more extended compass and often with two or more manuals. The earliest form of the pianoforte was made in the early part of the 18th century and was in many respects inferior to the harpsichord, but it contained the elements by which it could be expanded and from it resulted the modern grand pianoforte.

The instruments of modern construction must necessarily have a heavy frame, since a large number of strings are to be stretched, and these cannot be kept in tune unless the frame is heavily timbered or made largely of cast iron. Strings were made originally of steel wire for



UPRIGHT PIANO.



FLORENTINE GRAND PIANO.

the upper tones and of brass wire for the lower tones, but modern instruments have strings wholly of steel wire. The strings pass over a series of bridges, rising from the sounding board, and the tones depend upon their size and length. Long and large wires supply low tones, while the short and fine are used for the higher tones. Wires for the lower tones are usually made of steel with a double wrapping of fine brass or copper wires. Two common forms of pianofortes are in general use, the *grand piano* and the *upright piano*. The strings in the grand piano lie in the direction of the keys, and in the upright piano the strings are stretched vertically perpendicular to the keys. The grand pianos of modern structure are made with six, seven, or more octaves. As a rule, the larger instruments are used in concerts, since they sup-

ply the necessary compass and strength and furnish every gradation of sound. The *electric piano* was invented by Dr. Eisenmann, of Berlin, in 1891. This instrument is played automatically by means of an electric current. Another recent invention, the *pianola*, is designed to play the pianoforte automatically. It is attached to the instrument and works upon the keys by means of compressed air, a perforated roll of paper limiting the time of each note struck.

PIASTRE (pĭ-ās'tēr), or **Piaster**, a coin used in a number of countries in Europe and Asia. The piastre of Spain is about equal to our dollar. In Italy the government patterned after Spain in coining the piastre, but the value is only about 89 cents, while the piastre of Turkey is a little less than five cents. The piastre used in Egypt has a value of about five cents. In a number of South American states the name is applied to money, but the value differs somewhat.

PIBROCH (pē'brök), a form of music played on the bagpipe, which includes marches and dirges. The martial character of this music has a powerful effect in arousing the military spirit, especially among some of the people of Asia, but the rhythm is irregular and difficult to learn, since the scale of the bagpipe contains sounds unrepresented by any notation.

PICAYUNE (pĭc-ā-ūn'), a word derived from the language of the Caribs and applied to a small Spanish coin which was current in the United States until the Civil War. The value was six and one-fourth cents and it was called *sixpence* in the Northern States. The word picayunish, meaning small and paltry, was derived from it.

PICKLES (pĭk'k'lz), the general name of many kinds of preserved articles of food. The term is applied in particular to different kinds of fruits or vegetables preserved in vinegar, but in a wider sense includes animal substances preserved in salt or brine, such as fish, beef, pork, and mutton. Pickles made of vegetables are eaten as a condiment. They are steeped or par-boiled in brine and then transferred to the vinegar, to which salt, mustard, horse radish, and various spices may be added. It is best to use earthen or wooden vessels to preserve any of these products, since the vinegar and brine tend to corrode metals. The products used most extensively for making pickles include cucumbers, olives, green tomatoes, melons, and limes.

PICRIC ACID (pĭ'krĭk), an organic dye obtained by treating phenol with strong nitric acid, or by dissolving carbolic acid in sulphuric acid and then adding nitric acid. It crystallizes in

scaly crystals, or needles, and is soluble in ether, alcohol, benzol, and sulphuric and nitric acids. The taste is very bitter. Formerly it was used very extensively in dyeing silk and wool and the use of it for this purpose is still considerable, but at present it is employed largely in the manufacture of gunpowder and other explosives. In some countries it is used as a substitute in the manufacture of beer and for many purposes in medicine, especially as a remedy for burns.

PICTS (pĭkts), the race of people who inhabited the northern part of England and the eastern part of Scotland at the time of the Roman occupation. They appear to have come in conflict with the Romans about 296 A. D. and were associated by Roman writers with the Caledonians. Little is known of the language of the Picts, though they are generally regarded of Celtic descent. In 850 the Scots, whose original seat was in Ireland, subdued the Picts and became the predominating influence in Scotland. Remains of architectural structures erected by the Picts have been found in many places in the northern part of Great Britain.

PIEDMONT (pēd'mönt), the most northwesterly principality of Italy, surrounded by France, Switzerland, Lombardy, and Liguria. It is so named because of its situation at the foot of the Alps, *pied* meaning foot and *mont*, mountain. The area is 11,295 square miles. The Po River and its tributaries supply an abundance of drainage. The soil is generally fertile and the climate is healthful. It constitutes one of the most productive parts of the Italian kingdom. Turin is the principal city. Population, 1907, 3,423,854.

PIEDMONT PLAIN, the name applied generally to the region of the United States which lies between the Atlantic coast plain and the Appalachian Mountains. It is narrow and not clearly defined in the New England states, but broadens southward, forming a plain 300 miles wide in North Carolina. The surface is more rugged and eroded with valleys than the low coastal plain, and between the two is a definite line of escarpments known as the *Fall Line*, which indicates where the streams lose their current and merge into estuaries. The Piedmont Plain is an older formation than the coastal plain and contains harder strata of rocks.

PIERRE (pēr), the capital of South Dakota, county seat of Hughes County, near the central part of the State, on the Missouri River. It is on the Chicago and Northwestern Railroad, on a fine site near Old Fort Pierre, at the mouth of the Bad River. The noteworthy buildings



RUMELY STEAM TRACTION ENGINE WITH TWELVE PLOWS.

This machine uses coal for fuel and is capable of pulling twelve plows with facility. A plow drawn by three horses plows an average of three acres per day, while this machine, under favorable conditions, plows about forty acres per day.

include the State capitol, the county courthouse, the high school, and many churches. It has a government industrial school for Indians and is the seat of the Pierre University, a Presbyterian institution. The surrounding country has large farming and stock-growing interests. Among the industries are machine shops, grain elevators, and stock yards. Waterworks and electric lighting are among the public utilities. Pierre was settled in 1880 and incorporated in 1890. Population, 1905, 2,794; in 1910, 3,656.

PIETERMARITZBURG (pē-tēr-mâr'its-bûrg), a city of South Africa, capital of Natal, situated in a fertile plain, on a tributary of the Umgeni River. It is conveniently connected with several seaports and inland cities by railways. The city has a growing trade and contains a number of fine public buildings. Among the features are the townhall, the colonial capitol, the botanical gardens, and the central railway station. The city was founded by the Boers and was so named from Pieter Retief and Geert Maritz. Population, 1906, 31,809.

PIG. See **Swine.**

PIGEON (pĭj'ŭn), a group of rasorial birds which are typified by the familiar domestic pigeon. Although widely distributed, they are



PASSENGER PIGEON.

most abundant in the tropical countries. They include many species, varying greatly in color and habit. Some writers call them *doves* and ordinarily the terms are used interchangeably. The crop is quite large in most species and the bill is hard, with the upper mandible slightly curved at the point. Pigeons have quite large wings and are strong in flight. They perch in trees, but prefer to build their nests on some other elevated objects. The domestic pigeon breeds in barns or in houses specially constructed for them, where their familiar cooing

may be heard most frequently. Both male and female sit on the eggs and they appear to pair for life. Among the familiar species are the *stock*, *carrier*, *pouter*, *tumbler*, *house*, *jacobin*, *fantail*, and *runt* pigeons. The *passenger pigeon* of North America was formerly met with in large numbers, but the excellent quality of its flesh caused hunters to search for it with great eagerness and it is now less common. It has a grayish blue color, somewhat deeper on the head than on the body, and the tail feathers are dusky. Grain, berries, and the tender parts of plants comprise the chief food. It nests in the branches of trees. Pigeon culture is an important industry in many countries, especially in India, China, Persia, Belgium, and Holland. The domestic pigeon is believed to be a descendant from the rock dove. It is reared both for its eggs and its flesh, but particularly for the latter. See **Carrier Pigeon.**

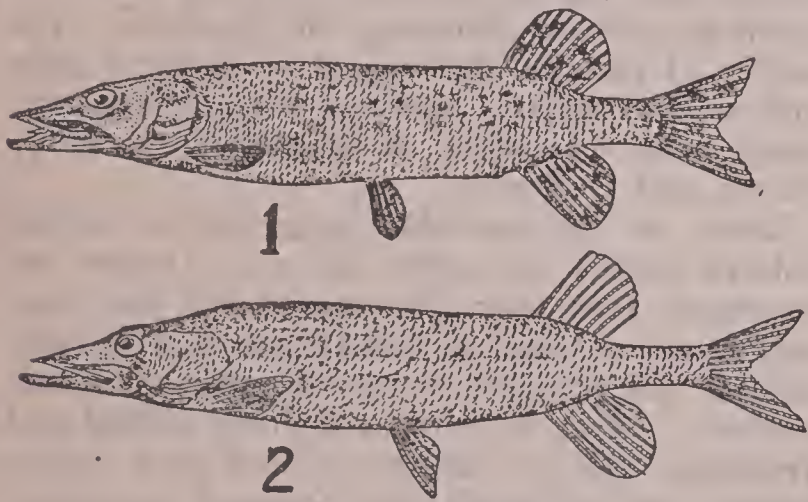
PIGMENTS (pĭg'ments), the coloring materials used in painting and dyeing. They are partly artificial and partly derived from the three kingdoms of nature. The principal kinds of coloring substances are obtained from the mineral kingdom, and mineral coloring matters are usually added to substances derived from animals or vegetables. Most coloring substances used in painting are insoluble and are ground and applied after mixing them with oil or some other liquid, the liquid drying after application without changing the pigments. The modes of painting are named from the vehicle and method used in applying the coloring substances, as *oil colors*, in *distemper*, in *water colors*, and in *fresco*.

Many of the available pigments are native colored earths, as ocher (q. v.). Others are separated from metallic compounds and several kinds of mineral substances, and a large number are prepared artificially from inorganic sources. *Lakes* are prepared from animal and vegetable coloring matters mixed with earthy bodies, and *dyestuffs* are obtained artificially from organic substances. A material used in painting should spread in a uniform coat over the surface, offer resistance to the change and action of weather, dry with reasonable quickness, and possess the property of forming an opaque covering over the surface on which it is spread. In preparing coloring substances for artistic work it is necessary to use better material and grind it to a much greater fineness, for the reason that products made by it need to possess an unalterable tone after long exposure. The substances used for staining glass and porcelain are metallic and possess the property of remaining unchanged when heated.

PIGWEEED, or **Goosefoot**, the name of many plants which belong to the *Amarantus*, a genus of plants native to the tropical and temperate countries. About 100 species belong to the Amaranth family, which includes a number of annuals grown in gardens, such as *prince's feather*, *cockscomb*, and *love-lies-bleeding*. The common pigweed was brought from Europe to Canada and the United States. This species is an obnoxious weed in gardens and fields. It has small greenish flowers on spikes, dull green leaves, and a straight stem. Locally it is sometimes called *beetroot*, since its root has a reddish color. It requires careful cultivation to clear the soil of this weed.

PIKA (pī'kà), the name of several rodent animals, frequently called *conies* or *calling hares*. They have short ears and no visible tail. The skull is very flat and dilated behind and the legs are short. In most respects they resemble the guinea pigs rather than the hares, but like the latter are timid and harmless. Several species are common to high mountains, including the *Rocky Mountain pika* of America. This animal is about seven inches long and subsists on grasses, which it cuts and stores for fodder in the winter. The pika is hunted for its skin and meat.

PIKE, a genus of fishes found in the fresh waters of Europe and North America, so called from the sharp snout and slender shape. Most



1. PIKE. 2. PICKEREL.

species have a long body and flat back, and taper toward the tail with more than ordinary abruptness. Cycloid scales cover the body. The mouth is large, with the lower jaw projecting, and there is a large and powerful array of teeth. The dorsal fin is near the tail, by which it is aided in swimming with greater swiftness than any of the fishes. The *common pike* found in the rivers and lakes of North America occurs likewise in Europe and Asia and is of much value for its edible flesh. It rarely exceeds three feet in length and weighs from

six to twenty pounds. The largest species of pikes attain a length of from three to six feet and live to a very old age. Specimens have been found in which the age was estimated at 250 years. Pikes are very voracious and feed on almost any animal substance that they are capable of swallowing. The *pike perch* is allied to the perch, but resembles the pike in having a long head and body. It occurs in the Great Lakes and many of the streams of the Mississippi valley, where it is caught as a favorite food fish.

PIKE PERCH, the name of a genus of perches found in Europe and America. A number of species have been described, all of which resemble the pike in that they have an elongated body and snout. The *common pike perch* of North America is widely distributed in the waters of Canada and the United States, and locally is known by the names of *wall-eyed pike*; *dory*, *yellow*, or *blue pike*; and *jack salmon*. It is caught in nets and by angling. In size it is usually less than two feet in length, but sometimes reaches three feet and weighs twenty pounds. Another species is the *sauger* or *grey pike*, which is found in the Great Lakes. The body is cylindrical in form and has fins spotted with white.

PIKE'S PEAK, an elevated summit of the Rocky Mountains, situated in Colorado, near Colorado Springs. It was discovered by Gen. Z. M. Pike, in 1806, while making explorations to find the source of the Mississippi. The mountain is rich in gold deposits, has a meteorological observatory, and is 14,134 feet high. Numerous lakes are within its vicinity. A mountain railway was built to its top in 1891, which has a length of nine miles and connects with Manitou Springs, a noted summer resort near its base.

PILCHARD (pīl'chērd), a fish of the herring family. It is about as large as a herring, but is somewhat thicker and the scales are larger. Young pilchards are known as sardines. Vast schools of the pilchard occur in the Mediterranean and the Atlantic coast of Europe, where this fish is caught by means of seines for the market and for preserving purposes. Pilchard fisheries occur on the shore of the English Channel, but not elsewhere in Great Britain. The most important fisheries are off Cornwall, where many thousands of hogsheads are taken annually.

PILCOMAYO (pēl-kō-mä'yō), a river of South America, the largest tributary of the Paraguay. The source is in the vicinity of Sucre, Bolivia. After a circuitous course of about 1,500 miles toward the southeast, it joins the

Paraguay below Asunción. It forms the boundary between Paraguay and Argentina. Forests of great value abound in its valley, but its navigation is obstructed in many places by shallows during the dry season.

PILE, a post of timber or iron driven into the ground, either upon the land or under water, to serve as a foundation of any structure. The simple form of the pile consists of a straight tree, which is pointed at one end and banded at the other to protect it from the shattering effect of the blows by which it is driven downward. An iron socket is sometimes fixed to the lower end, as an aid to permit penetrating hard substances, or a metal cap in the form of a screw is adjusted, permitting it to be sunk into the muddy or sandy bottom by turning. Piles are commonly driven by machines called *pile drivers*, the action of which is the fall of a heavy block of iron raised to a considerable height by horse or steam power. Piles are used extensively in constructing dams, wharves, pikes, and levees.

PILGRIM FATHERS, the name generally applied to the Nonconformists who sailed from Southampton, England, in the *Mayflower*, and landed in the vicinity of what is now Plymouth, Mass., on Dec. 21, 1620. A party of Puritans left England in 1608 because of constant religious persecutions and settled in Holland. As they were unwilling to conform to the customs of Holland, they sent John Carver and Robert Cushman as commissioners, in 1617, to treat with the Virginia Company, then located in England, for territory in America. The whole company sailed from Delft Haven in the *Speedwell* to Southampton, where they embarked in the *Mayflower* for America on Aug. 5, 1620. It was the intention of the passengers, a total of 102, to land near the mouth of the Hudson River, but they were driven farther north by the wind. The leaders of the pilgrims were Carver, Cushman, Bradford, Brewster, and Miles Standish. A compact of government was written and signed before landing and this document is regarded the first written constitution of which there is a historical account. The pilgrims are remembered by a monument at Plymouth, by Forefathers' Day, and by a Pilgrims' Hall erected under the direction of a Pilgrims' Society.

PILLORY (pĭ'lō-rĭ), a wooden frame designed for the punishment of offenders and criminals. This mode of punishment was formerly of common use in England, but it was abolished there in 1837. It was employed principally for the punishment of those guilty of perjury, forgery, libel, petty larceny, and un-

just weights, and for some time it was used in punishing common scolds and brawlers. The *pillory* consisted of a frame of wood, erected on a pillar or stand, and there were movable boards containing holes in which the head and hands of the offender were put. When in this position, the offender was exposed to the pub-



PILLORY AND STOCKS.

lic view and insult, this constituting the principal punishment. Another similar implement, the *stocks*, consists of a frame of timber with holes for the feet, or the feet and hands. A modified form of the pillory is still used in a number of Asiatic countries. It was employed to a limited extent in the early English settlements of America.

PILOT (pī'lūt), an officer licensed by law to conduct vessels in and out of port, or within a particular district, designating the courses to be steered. Pilotage in the United States is controlled by Congress, but the individual states are granted power to make particular regulations. A system of this kind has been found necessary in all countries, since there are always points of difficulty and danger near the shores and where ships are to land, it being the duty of the pilot to superintend the steering of the vessel so that the dangerous channels may be avoided. In many of the large seaports compulsory pilotage has been abolished and some of the states have greatly modified the system, though the larger insurance companies still require the employment of a pilot by a clause in their policies.

PILOT, or **Pilot Fish**, a fish which somewhat resembles the mackerel, but differing from it in having no finlets back of the dorsal fin. The adult is about two feet long, has five cross bands of black, and the general color is grayish-blue. Though not sold extensively in the markets, it is prized for its fine flavor and delicate flesh. Large numbers are associated with sharks in following vessels at sea, by which means they obtain food from the refuse thrown from the ships.

PILSEN (pĭl'sĕn), a city of Bohemia, at the confluence of the Mies and Radbasa rivers, 52 miles southwest of Prague. It is surrounded by a fertile agricultural and dairying country, which contains valuable deposits of coal and kaolin. The city has railroad facilities, good municipal improvements, excellent schools and churches, and a number of public parks. Among the manufactures are clothing, spirituous liquors, paper, leather, machinery, stoves, earthenware, and enameled tinware. Several extensive iron and glass works are in the vicinity. The celebrated Church of Saint Bartholomew was built in 1292. It was occupied by a Prussian army in 1866. The inhabitants are chiefly Germans and Czechs. Population, 1907, 69,790.

PIN, a short piece of wire, having a rounded or flattened head and a sharp point, in common use for fastening together pieces of paper and parts of clothing. Though an article of great utility, a pin represents only a small value and is of comparatively recent invention. It is probable that pins were manufactured by the ancients, but their product was made largely of bones of animals, particularly of fishes. Copper pins came into use at an early period of European history. At the beginning of the 15th century the manufacture of pins from copper, brass, and iron employed a large number of workmen, though they were made exclusively by hand. Modern pin making by machinery dates from 1824, when Lemuel W. Wright, of Massachusetts, invented a pin-making machine, which he soon after patented in America and Europe. The price of pins at once became greatly cheapened, though since then many improvements have been made. It is thought that about 2,500,000 pins are consumed daily in Canada and about 35,000,000 in the United States.

Pins are made of various materials, but most generally of an alloy composed of two parts of copper and one part of zinc. Many devices to manufacture this commodity are in use, all of which are propelled by machinery, and the machines do the work with little more than the supervision by the workman. The metal alloy is cast in bars and these are made into

wire of the proper size. After winding the wire on a large reel, it is hung immediately above the pin-making machine. This machine is supplied with a pair of pincers so adjusted that they are capable of grasping the wire and drawing it from the reel, and the machine cuts the wire into the desired length. It is next sharpened and the point is finished by a revolving cylinder having the effect of a file, and is then carried to a die that partly makes the head. The head is completed in another similar die, and from it is dropped into a box below.

After a large number of pins have been prepared in this way, they are placed in a barrel containing sawdust and revolved rapidly to remove foreign matters from their surface. When taken from the barrel they have a bright appearance and are ready to be put into paper sheets. Mechanical devices are used in papering. All the work of preparing the papers and adjusting the pins is done by the machines. A single machine is capable of making from 125 to 200 pins per minute. The color of pins depends on the kind of material used, but in some cases they are coated with tin by boiling them in weak nitric acid in which pieces of tin are placed. Pins of a black color are intended for mourning and are made from black wire and japanned, while others are made similarly but have heads of glass or porcelain.

PINCHBECK (pĭnch'bĕk), an alloy of copper and zinc, usually made to resemble some of the baser alloys of gold. It contains about twenty parts of zinc and eighty parts of copper, and is used to some extent in making watch cases and other articles in imitation of gold.

PINCHERS (pĭnch'ĕrz), a tool with two handles and two grasping jaws that work on a pivot. It is used for gripping things which are to be held fast, for cutting wire, and for drawing nails. Those used for cutting wire are called *nippers* and small pinchers are known as *pliers*. The latter are sometimes modified for punching holes in paper and leather, being constructed so one of the jaws has a hollow punch with a cutting edge.

PINE, the name popularly applied to any tree of the genus *Pinus*. The trees of this group are distinguished by their woody cones and numerous two-seeded scales from the spruces, larches, firs, cedars, and other trees of the same family, but of a different genus. The leaves are evergreen and needle-shaped, and vary in length from about an inch to more than a foot. They grow in small clusters of from one to five, according to the species, and are sheathed at the base by thin, chafflike scales. The leaves are so shaped at the inner and outer faces that they

make a solid cylinder when pressed together. Pines are confined exclusively to the Northern Hemisphere, where they grow in extensive



CONES OF PINES.

groves in America, Europe, and Asia, but a distinct species is found in the Canary Islands. They thrive most abundantly in the temperate and cold regions and are rarely found in the Torrid Zone. In size they range from mere shrubs to stately trees fully 300 feet high. The pines are found mostly in groves and extensive forests.

The pine forests of the tropical regions are confined to the elevated mountains, while in the northern and colder climates they grow vigorously at sea level, though those confined to the Arctic zone are mere shrubs. Seventy species have been described, of which 35 are native to North America, but only about six of these have more than local importance for lumbering purposes. The *white pine* is the most important of all the American species, and is found in abundance in the regions of the Great Lakes and the Saint Lawrence. This valuable tree extends far northward in Canada. It reaches a height of from 75 to 150 feet, measures about 12 feet around the lower part of the trunk, and in the larger forests it is beautiful for its straight grain and soft and light timber. Another lofty tree, the *loblolly pine*, has long leaves and is widely distributed in North America, but its timber is comparatively of little value. The *Norway pine* is of next importance and is found in the forests of Minnesota, Wisconsin, and Canada, where it is called *Canadian pine*. Its wood is heavy and resinous and is harder and more elastic than the white pine.

The *yellow pine* is found mostly in the Southern States, from southern New Jersey to Texas, and is known in the markets as *Georgia pine*. There may be said to be two species of the yellow pine—the *short-leaved* and the *long-leaved*—both of which have wood of a dark yellow to an orange color. However, the long-

leafed is the most desirable for general building. The *Oregon pine* ranges from British Columbia to Mexico. This species grows in great forests and often attains a height of 300 feet. Its wood is hard and durable, has a yellowish color, and is valuable for all kinds of construction purposes. Several species yield large quantities of tar, turpentine, pitch, and resin, particularly the Norway pine and the yellow pine. The pine forests of Europe are most extensive in the Alps, the Pyrenees, and the Vosges, and there are vast forests in Russia and the Scandinavian peninsula. Large forests of pines occur in the Himalayas and other sections of Asia. The *Scotch pine* is a native of Western Europe and has been naturalized and planted extensively in America as an ornamental tree, being a favorite both on account of its excellently colored foliage and spreading branches.

PINEAPPLE, or *Ananassa*, a tropical plant much esteemed and cultivated for its fruit. It is so named because the fruit somewhat resembles in appearance the cone of the pine. The plant consists of a central axis with a tuft of rigid leaves springing from the roots to the upper part. A single spike of flowers appears at the upper end of a short flower stem, where a single fruit develops. The pine-



PINEAPPLE.

apple is propagated by a tuft growth that appears at the upper part of the fruit. This plant is native to the tropical parts of America. It is from ten to twenty inches high and grows wild in Brazil and other South American countries. Many of the species have been widely naturalized and are cultivated extensively. They may be grown successfully in hothouses, but their culture for commercial purposes depends upon a warm climate and an abundance of moisture. Large plantations of pineapples are produced in the Hawaiian Islands, the West Indies, the Philippines, and the southern part of the United States.

PINE BLUFF, a city in Arkansas, county

seat of Jefferson County, on the Arkansas River, 41 miles southeast of Little Rock. It is on the Saint Louis, Iron Mountain and Southern, the Saint Louis and Southwestern, and other railroads. The place is beautifully situated on an elevated bluff and is surrounded by a rich farming country. The noteworthy buildings include the county courthouse, the Merrill Institute, the opera house, the high school, and the State normal school for colored students. Among the manufactures are flour, lumber products, cotton-seed oil, cotton goods, leather, and machinery. It has an extensive trade in cotton, tobacco, and cereals. Electric street railways, waterworks, pavements, and sewerage are among the public utilities. Population, 1900, 11,496; in 1910, 15,102.

PINES, Isle of, an island of the West Indies, situated thirty miles south of Cuba, in the Caribbean Sea, constituting the principal island of the Archipelago de Los Canarreos. It is 61 miles long by 55 miles wide. The area is 982 square miles. The coast has several prominent indentations and near its shore are numerous smaller islands. It is in effect two islands, connected by a marsh. In the northern part the surface is diversified by a number of mountains and in the southern it is low, flat, and sandy, but there are plains of great fertility. It is visited as a health resort because of its favorable climate and mineral springs. The products include tobacco, cattle, cotton, cereals, vegetables, and fruits. Excellent forests are abundant, including pine, cedar, mahogany, and other woods. Rock-crystal, marble, and other minerals are obtained in the mountains. The local seat of government is at Nueva Gerona, but it has been a dependency of the province of Havana, Cuba, for many years. Columbus discovered the Isle of Pines in 1494. The inhabitants include 267 Negroes, 198 foreign whites, and 2,480 native whites. Population, 1909, 3,276.

PING PONG, a game played on a table or board, which is marked to a scale modeled after the court used in lawn tennis. It is, in fact, a modified form of lawn tennis, but is adapted to be played indoors. The rackets, though small, resemble in form and style those of lawn tennis, and the ball is usually a light sphere of celluloid. The table should be about four feet wide and eight long, but in practice the size differs somewhat. The system of scoring is the same as in lawn tennis, but only a single service is permitted. This game was first called *gossima*, but the name was changed to ping pong in 1900. It is played to a considerable extent in Canada and the United States,

but is particularly popular in France and England.

PINK, an extensive genus of plants, many of which have long been cultivated in gardens for their flowers. The numerous species, about 300, include both annuals and perennials. Florists generally group the pinks into three general classes—the *flakes*, *bizarres*, and *picotees*. A



PICOTEE PINK. CARNATION PINK. GARDEN PINK.

familiar species is generally known as the *garden pink*, or *peasant's-eye*. Many species have been grown as ornamental plants for ages and have been greatly improved by propagation. Those most extensively cultivated and best known are the *garden pink*, *clove pink*, and *carnation*, while the *sweet William* is sometimes classed with the clustered flowering plants of this class. Pinks are native to the regions of the Mediterranean, but a single species is found in the west central part of North America. Those now cultivated in gardens have been acclimated by importation from Europe.

PINNACE (pī'nās), a large boat carried by ships, usually from 28 to 32 feet in length. It is somewhat larger than the cutter and smaller than the launch, and is rowed by six or eight oars. The name is sometimes applied to a single-masted vessel having oars or sweeps. A vessel of this class is capable of carrying from sixty to eighty tons and is employed by some nations for coast defense.

PIPE, an apparatus used by smokers of tobacco and other narcotics. It has two essential parts, the bowl and the stem. The former is the receptacle in which the substance is burned and the latter serves to draw the smoke into the mouth. Many kinds of pipes are in use and the materials from which they are made differ greatly, but usually clay or wood is used in constructing the cheaper grades. The finest pipes are made of meerschaum, a kind of compact magnesium stone, and of carved briar

wood. The manufacture of pipes from meerschäum has reached its highest perfection in Vienna, where German manufacturers engage extensively in the enterprise, while large quantities of pipes are made with bowls of porcelain. Pipestems are usually made of different material from the bowls, in many cases of wood, bone, ivory, or amber, and usually these materials form the mouthpieces. Pipes made of costly material are trimmed with gold and other precious metals and the most expensive are set with fine stones. The American Indians made pipes of baked clay and soapstone and in most cases prepared the stems of wood. Pipes made wholly of baked clay were of frequent manufacture among primitive peoples. Many of the relics found with the remains of the moundbuilders include specimens of such pipes. Smoking tobacco in pipes is much more common in Europe than in America, the American smoker preferring to use cigars.

PIPE, an artificial tube or conduit used to convey liquids, such as gas, steam, water, and petroleum. A variety of materials are used in the construction of pipes, but they consist principally of lead, iron, gutta-percha, and clays. In size they differ greatly, ranging from one inch to five feet in diameter, though the larger sizes are principally of vitrified clays. Lead pipes are usually small and are employed chiefly for conveying water or steam for short distances. Mains used in waterworks are largely of iron, while sewage and drainage are constructed through pipes or tiles made of fire clay.

Petroleum is conveyed great distances through pipe lines and often under high pressures, though sometimes by the force of gravitation. The first line of this kind in America was constructed from the oil fields in Pennsylvania to Pittsburg, the pipes having a diameter of four inches and the lines a length of 55 miles. A line was soon after built from Beaumont to the refineries at Port Arthur, Tex., and later a line was constructed from the oil fields of Oklahoma to the refineries at Port Arthur. Many of these lines are extensive. An 8-inch pipe line from Lima, Ohio, to Chicago has a length of 205 miles. The line from Olean to New York City is over 300 miles long, while the one from Colgrove to Philadelphia has a length of 235 miles. In 1908 there were about 40,000 miles of pipe lines for transporting gas and mineral oils in the United States. Similar lines are utilized in Canada, Italy, and Russia. The last mentioned country has thirty pipe lines of vast extent, some of them having 8-inch pipes. Pipes of this kind are made of iron,

commonly in 18-foot lengths, and are connected by sleeve couplings with tapered threads. They are usually laid two feet below the surface and the oil or gas is pumped through the lines. Where they cross hills and mountains, as is frequently the case, it requires pumps of high pressure.

PIPEFISH, the name of a genus of fishes common to the warmer seas, but sometimes entering the adjacent fresh waters. These animals are peculiar for their tubular snout and long, slender body, which is covered with closely fitted bony plates. Adults attain a length of three feet, but the body is very thin and slender. About 150 species have been described, including several that are only a few inches in length. These animals are related to the sea horse, which they resemble in that the male has a brood pouch on the ventral side of the tail. In this pouch the young are carried for some time after they have been hatched, and even return to it during danger when they are of considerable size. Some of the species spend much of their time with their head downward in the water, stirring the sand with their snout, which they do most frequently among the blades of eelgrass. See **Hippocampus**.

PIPIT (pĭp'it), or **Titlark**, a group of birds classed with the perchers. In many respects they resemble the lark. Many species have been described and some are widely distributed. The two species common to North America are the prairie lark and the American titlark, both of which sing while pursuing a circuitous flight through the air. The best known species of Europe are the rock, sea, and field pipits, but closely allied birds are common to many parts of Asia and Africa. They nest on the ground and are easily distinguished by their simple and clear song.

PIQUA (pĭk'wà), a city of Ohio, in Miami County, on the Miami River, 87 miles north of Cincinnati. It is on the Cincinnati, Hamilton and Dayton and the Pittsburg, Cincinnati, Chicago and Saint Louis railroads, and on the Miami and Erie Canal. The principal buildings include the city hall, the high school, the Schmidlapp Library, and many churches. Among the manufactures are flour, carriages, corrugated iron, hardware, furniture, woolen goods, and linseed oil. The surrounding country is agricultural and dairying. Electric street railways, pavements, waterworks, and street lighting are among the improvements. Population, 1900, 12,172; in 1910, 13,338.

PIQUET (pê-kět'), or **Picket**, a game of cards played by two persons, who use all the cards except those with two, three, four, and

five spots. Each player receives twelve cards, either two or three being dealt at a time, and the talon or stock is then placed upon the board. The one who first receives his hand has the right to draw from the board five cards in their natural order and he must discard the same number, but at least one of the cards drawn must be discarded. From the cards drawn and dealt he is enabled to arrange his hand with reference to the various scores, after which he is followed in drawing and discarding by the dealer, who may take all the other player has left. Tricks are taken in the usual manner by the same suit. Immediately after dealing the cards, before any are discarded, the player who has no face card scores ten points. Points are also counted by the player who has the greatest number of cards of any one suit, who has four cards of equal value in four different suits, and who takes the greater number of tricks. The game is 100 points.

PIRACY (pī'rā-sy), the practice of robbery on the high seas and which, if committed upon land, would constitute felony. Many of the nations have adopted statutes that make persons guilty of piracy who in any way aid pirates, or conduct trade with them. Most civilized nations regard persons who forcibly convey or remove others as slaves guilty of piracy. The penalty for conviction is a long term of imprisonment, but formerly the penalty was death, which extended not only to the principal, but to all those implicated as aids or supporters of pirates. Piracy is older than human history. Accounts of daring deeds of sea rovers have come down to us from ancient peoples through tradition and history.

The Phoenician colonists regarded piracy an honorable occupation and made it a prolific source of profit. This was likewise the view taken by the early Grecians and Romans. Great bands of pirates had their seat for centuries in various regions bordering on the Mediterranean. Pompey was given command of a large military and naval force by the Roman government for the purpose of subduing the pirates who infested the sections adjacent to Rome. The Northmen were the most noted pirates of Europe and commanded the northwestern coasts from the 7th to the 11th centuries. It was partly for protection against the sea rovers that the Hanseatic League was formed by European cities. Southern Europe was harassed by pirates from Algeria and other regions of North Africa up to the early part of the 19th century, and many vessels came in contact with them while sailing the Indian and Atlantic oceans.

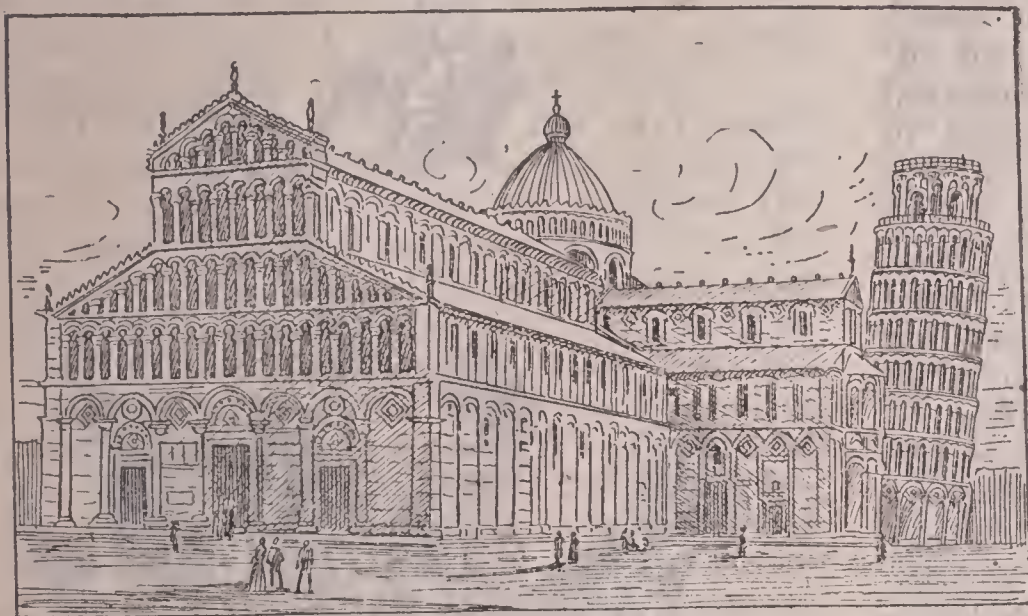
The American colonists were preyed upon by pirates in the 17th and 18th centuries. These pirates had their seat in the swampy regions of Florida and in the islands southeast of the United States. A pirate named Teach, and sometimes called *Black Beard*, was one of the most noted outlaws of this period. He preyed upon the Spanish possessions in the South and had trade relations with citizens of the United States as far north as Philadelphia, but was finally expelled from North Carolina by Governor Johnson. A London company sent Captain Kidd to subdue the pirates in 1696. He soon after adopted the practice and terrorized the eastern coast of North America, but was finally apprehended and executed in 1701. In 1841 the United States declared the slave trade a form of piracy and it was recognized as such by England, Germany, Russia, and Austria. The system of international treaties among civilized nations has overcome piracy almost entirely, though it is still practiced to a limited extent in Southeastern Asia.

PIRAEUS (pī-rē'ūs), a city of Greece, situated five miles southwest of Athens. It is the seaport of that city. The site is on a peninsula of the same name and on the shore of a harbor formed by the Saronic Gulf. It is renowned as the seaport of ancient Athens and was connected with it by the famous Long Walls. The Romans under Sulla destroyed the city in 86 B. C., and during the long possession by Turkey it formed only a mass of ruins. Since then it has developed extensive manufactures and an important foreign trade. It is connected with Athens by a railway and its harbor has been greatly improved. The modern city dates properly from 1834. It has fine public buildings and many substantial residences and business houses. Population, 1906, 70,306.

PISA (pē'sà), a city of Italy, capital of a province of the same name, on the Arno River, 44 miles west of Florence. It has well platted and paved streets and is connected with Leghorn, Florence, and other cities by an extensive railway system. Once a city of great wealth and renown, it still contains a number of evidences of its former prosperity. Among the most noteworthy buildings is a cathedral dating from the 11th century, in which there are paintings by a number of Italian masters. It has a dome of great beauty. Near this cathedral is the famous Leaning Tower of Pisa, a remarkable structure built in the 12th century by the German architect, Willheim of Innsbruck. This tower leans about fourteen feet from the perpendicular, is 180 feet high, and has eight stories. Upon its flat roof is an open gallery

from which the surrounding country may be viewed.

Opposite the cathedral is the Church of Saint John, a remarkable building completed in 1162, in which the finest sculpture of Nicola Pisano (1226-1273) may be seen. Another building of much renown is the Campo Santo, dating from 1228. Pisa has a splendid library of 125,000 volumes, which is situated in the university, an institution attended by 1,200 students. Connected with the university are a fine campus,



CATHEDRAL AND LEANING TOWER OF PISA.

a botanical garden, and a museum of natural history. It has electric street railways, gas and electric lighting, and systems of sewerage and waterworks. The manufactures embrace cotton and woolen goods, ribbons, silks, utensils, clothing, earthenware, and machinery.

Pisa was founded by the Etruscans, but later became a part of Rome. Roman occupation dates from the 2d century B. C., but it retained its own municipal government for many years. In the 11th century it was organized as a republic. At that time its splendid works of art were constructed and its vast buildings and fortifications were erected. The German emperors governed it after the fall of the republic. At this time it had 150,000 inhabitants, but it gradually fell into decay. The decline was due to the extended contentions between the Guelphs and the Ghibellines, and at one time its inhabitants numbered less than 10,000. It was made a part of the kingdom of Italy along with the remainder of Tuscany in 1860. Population, 1906, 62,405.

PISCES (pĭs'sēz), the twelfth sign of the zodiac, which is entered by the sun on Feb. 20. Formerly it corresponded to the constellation of Pisces (the fishes), but the constellation is now mostly in the sign Aries, owing to the precession of the equinoxes. It contains no promi-

nent stars, but includes a number of interesting double stars. See **Zodiac**.

PISCICULTURE (pĭs-sĭ-kŭl'tŭr). See **Fish Culture**.

PISIDIA (pĭ-sĭd'i-ă), an ancient country of Asia Minor, which occupied a region north of Pamphylia. The northern boundary was formed by Phrygia. The surface of this region is mountainous, including the loftiest ranges of the Taurus Mountains. It is drained by the Cestus and Eurymedon rivers, and contains a fresh-water lake about thirty miles long. The lake and rivers are noted for their fisheries. The inhabitants were long noted as sturdy mountaineers, who resisted with great energy the encroachments and incursions of foreigners. Xenophon mentions the Pisidians in his "Anabasis," and subsequently they were referred to by the leading Grecian historians. Alexander the Great came in contact with them when conquering Western Asia, but the Romans completely crushed their power and made them a part of the imperial territory. Their most noted cities included Antioch, Termessus, Selge, and Sagalassus. The sites of these cities have yielded many remarkable relics.

PISTOL. See **Revolver**.

PITCAIRN ISLAND, an island of the South Pacific Ocean, situated between Australia and South America, in the southeastern part of the Polynesian Archipelago. It is about one mile wide and two and one-fourth miles long. The surface is fertile, though the coasts are high and rocky, and there is an abundance of timber. This island, first visited by Carteret in 1667, is of itself unimportant, but it is celebrated on account of its becoming the dwelling place of a number of mutineers. In 1789 the British ship *Bounty* was sent from India to the West Indies, but when it reached Tahiti, one of the Caroline Islands, where a supply of breadfruit trees was to be gathered, the season for taking them up had not arrived. For two months the crew was idle and during this time became demoralized and soon after mutinied. The captain and those who would not join them were put off in a boat and set adrift on the ocean. After 46 days they reached inhabited land. However, the mutineers returned to Tahiti and nine of these with a number of native men and women sailed from Tahiti in 1790 and formed a settlement on Pitcairn Island, which was then uninhabited.

An Englishman named Alexander Smith

changed his name to John Adams, and became recognized as the leader of the little colony. Several of the Tahitians were murdered as the result of quarrels, but the others remained on the island, and Adams directed educational and Christian instruction. It was thought that the *Bounty* and its occupants had been lost at sea until in 1808, when Captain Folger with the American ship *Topaz* discovered them, but Adams was the only one of the mutineers who was then alive. However, there were a large number of fine farms and houses on the island, and the descendants of the mutineers had advanced remarkably in educational and industrial arts. A British vessel visited the island in 1831, when the inhabitants numbered 87, and in the same year transferred them to Tahiti, but they returned to Pitcairn within a year. In 1856 they numbered 194, and it was found that the island was too small to support that number. They were accordingly removed to Norfolk Island, but about forty soon after returned. The population at present is about 125.

PITCH, a product obtained by boiling tar until the volatile naphtha is driven off. It may be obtained from wood and coal tar, stearine residue, bone tar, and petroleum. Pitch has a dark color and brilliant luster and is solid at ordinary temperatures. It is used extensively for closing up seams in shipbuilding, for keeping wood from decay and iron from rusting when exposed to the weather, and for making artificial asphalt. A grade produced in Finland is called *Burgundy pitch* and has medical properties. The term *mineral pitch* is sometimes applied to asphalt.

PITCHER PLANTS, a group of plants which have their leaves or petioles formed like pitchers, in which more or less fluid is stored. Botanists classify them into two general divisions, known as the American and East Indian pitcher plant families. The *American pitcher plants* include five or six species, found mostly in the eastern part of the United States, California, and Canada. A familiar species, the *sarracenia*, is found in the eastern part of the continent and elsewhere. The *East Indian pitcher plants* include a large number of species and are found widely distributed in Australia, the East India Islands, and Southern Asia. These plants are inclined to be shrubby or herbaceous and grow best in low or swampy regions. Each leaf is prolonged and forms a cuplike vessel resembling a pitcher, and over the top extends a lid that may be regarded the true leaf blade. The plant secretes the fluid. This fluid attracts insects, such as flies and beetles, and they are often found drowned in it.

Darwin classed these plants among the insectivorous, for the reason that the drowned insects are dissolved and absorbed by the plants as nutritious matter. Pitcher plants are cultivated to some extent in hothouses for their flowers and foliage.

PITH, or **Medulla**, the cylinder of soft, spongy tissue in the center of the stems or branches of exogenous plants. The stems of young plants are composed entirely of pith and bark, but later the woody fiber develops, and



EAST INDIAN PITCHER PLANT.

the pith is reduced until it forms only a small cylinder in the developed stem. Pith is composed of cellular tissue, which in young plants contains starch, but later air takes its place. The cells are smallest at the circumference. There is a connection between the pith and the bark by the *medullary lines*, these serving to convey secretions from the bark to the interior.

PITTI PALACE, a celebrated structure in Florence, Italy, now used as a royal residence. It is one of the largest and most imposing palaces of the world and is in the early Renaissance style, after plans made by Brunelleschi in 1740. It was constructed for Luca Pitti, a member of the Pitti family, who was then magistrate of the Republic of Florence. This palace contains a valuable art collection, including noted paintings of Titian, Raphael, Giorgione, Rubens, Murillo, Dürer, and Rembrandt.

PITTSBURG (pits'bûrg), a city of Kansas, in Crawford County, 55 miles northeast of Independence and 130 miles south of Kansas City. It is on the Kansas City Southern, the Saint Louis and San Francisco, and the Atchison, Topeka

and Santa Fé railroads. The surrounding country has valuable deposits of coal and zinc and produces cereals and fruits. The chief buildings include the public library, the high school, the opera house, and a branch of the State Normal School. Among the manufactures are metalware, cigars, brick, clothing, earthenware, and machinery. It has a large trade in farm produce and coal. The zinc works employ about 1,000 persons. Pavements, waterworks, sanitary sewerage, and electric street railways are among the public utilities. It was first settled in 1876 and was incorporated in 1880. Population, 1904, 14,368; in 1910, 14,755.

PITTSBURG, the second city of Pennsylvania, capital of Allegheny County, at the confluence of the Monongahela and Allegheny rivers, which unite to form the Ohio. It is 450 miles east of Chicago, 254 miles northwest of Philadelphia, and 275 miles west of New York. At the river level the altitude is 702 feet above the sea, but a large part of the site is elevated considerably above the river and stretches over an undulating and, in places, hilly region. The older part of the city is in a peninsula formed by the two rivers and at this place the streets are narrow and somewhat irregular, but the larger part of the business section and nearly all the residential quarters are regularly platted, the streets crossing each other at right angles. All the residential sections are beautified by parkings and avenues of trees. The city proper covers an area of about 35 square miles, but near it are many outlying suburbs, though a number of such districts have been absorbed by the city recently.

BUILDINGS. The architecture is largely of stone, which is quarried within easy access of the city. The Allegheny County courthouse, on Grant Street, is one of the finest buildings of the kind in the country, costing about \$4,125,000. The post office, on Smithfield Street, is a fine structure and contains a number of Federal offices, including the district and circuit courts of the United States. The Frick Building, a granite structure twenty stories high, finished in marble and mahogany, is one of the finest office buildings in the world. Other prominent buildings include the Carnegie, the Arrott, the Park, the Empire, and the Peoples' Bank for Savings. The Trinity Church (Episcopal), the First Presbyterian, the Church of the Ascension (Episcopal), the Saint Paul's Cathedral (Roman Catholic), the Christ Methodist Episcopal, and the Sixth United Presbyterian are among the leading ecclesiastical buildings. The Henry, the Lincoln, and the Schenley are among the finest hotels.

EDUCATION. Pittsburg has an extensive system of public schools, which is under the supervision of a central board of education. It is the seat of the Western University of Pennsylvania, which maintains the departments of law, medicine, pharmacy, and dental surgery. The Carnegie Institute, established in 1901, is well equipped for instruction in technology. Other institutions include the Pittsburg College of the Holy Ghost, the Pennsylvania College for Women, the Pittsburg Female College, and the Shadyside Academy. The Carnegie Free Library, completed in 1895, has a fine museum and an art gallery. With it are affiliated several collections of books that were founded previously, the entire number including about 200,000 volumes. Many charitable and private educational institutions are maintained. The West Penn, on Twenty-eighth Street, is the largest hospital in the city. Other institutions of this kind include the Passavant, the Mercy, the Charity, the Free Dispensary, and the Florence Crittenton Home.

PARKS. About 1,250 acres are included in the parks within the city, and a number are maintained in the district lying near the city limits. Schenley Park, a tract of 440 acres, was acquired in 1890. It contains the Phipps Hall of Botany and the Phipps Conservatory. In Highland Park, a tract of 441 acres; are several fine statues and the zoölogical gardens. A number of small parks, such as McKinley, Central, Grand View, and Herron Hill, are located in convenient parts of the city. Highland and Schenley parks are connected with the more populous parts of the city by Grant and Beechwood boulevards, and other fine drives extend through the residential centers. Allegheny, Homewood, Southside, and Calvary are among the principal cemeteries.

COMMUNICATION. Pittsburg is the focus of many trunk railways, including the Pennsylvania, the Baltimore and Ohio, the Erie and Pittsburg, the Wabash, the Pittsburg and Western, and the Pittsburg, Cincinnati, Chicago and Saint Louis railroads. Fine stations are maintained by a number of the lines and the Pennsylvania system has a large union depot. Communication within the city is facilitated by an extensive system of electric railways, which has branches in all parts of the city and connections to many suburban and interurban points. Numerous railway and wagon bridges cross both the Allegheny and Monongahela rivers, thus connecting the main business section of Pittsburg with the portion lying south of the river and with the parts located west of the Allegheny, which was formerly the city of Alle-

gheny. The streets are well paved, largely with brick, stone, or asphalt. An extensive system of drainage is maintained. The waterworks are owned and operated by the city. Gas and electric lighting, an efficient fire department, and the system of police service are well organized.

COMMERCE AND MANUFACTURES. The city has a large trade in minerals, merchandise, and machinery. This trade is carried partly on the Ohio River, but principally by the extensive lines of railroads that center here. Coal and coke furnish the largest tonnage and in quantity exceed the trade in these commodities of all cities of the world. Pittsburg developed large interests in glass and iron making at an early date. Nearly one-fourth of the entire output of pig iron in the country is obtained from the city. From its extensive interests in iron and blast furnaces it is popularly called the *Iron City*. Among the principal manufactures are wire, nails, rails, steel plate, stoves, electrical machinery, railway cars, and furniture. The city produces large quantities of boots and shoes, tobacco and cigars, malts and spirituous liquors, pottery and brick, shot and lead pipe, paper and paper pulp, and clothing. It has a number of large petroleum refineries.

HISTORY. Pittsburg occupies the sites of Fort Duquesne and Fort Pitt, built respectively by the French and English. The former was erected in 1754 and was attacked by the British under General Braddock, who was defeated with heavy losses. In 1758 the fort was attacked by an army under General Forbes, who captured it and changed the name to Pittsburg, in honor of William Pitt. Fort Pitt was built by General Stanwick in 1759 and constituted a strong means of defense during Pontiac's War. A blockhouse of brick was erected by the British under Colonel Bouquet in 1764, on the point of land near the junction of Allegheny and Monongahela, and this is now owned and preserved by the Daughters of the American Revolution.

Washington visited Pittsburg in 1770, when the village contained about twenty small houses. Continental troops had possession of it during the Revolutionary War and lots began to be sold quite extensively in 1784. After 1785, following the opening of the Northwest Territory, Pittsburg grew rapidly. A new impetus was given when the Pennsylvania Canal was opened, in 1834, and railroads began to build soon after. In 1903 the Legislature enacted a law to permit a number of municipalities to unite with Pittsburg and to make the city coextensive with Allegheny County, thus forming Greater

Pittsburg, which, in 1910, had a population of 533,905. In 1900 the city proper, before annexations were made, had a population of 321,616.

PITTSFIELD (pĭts'fĕld), a city in Massachusetts, county seat of Berkshire County, on the Housatonic River, 150 miles west of Boston. It is on the New York, New Haven and Hartford and the Boston and Albany railroads. The site is an elevated plateau surrounded by hills. Several picturesque lakes are in the vicinity. It has a beautiful site on an elevated plateau. Among the manufactures are paper, shirts, electric machinery, brass castings, shoes, cotton and woolen goods, silk textiles, and utensils. It is the seat of a training school for nurses, an old woman's home, and the Hospital of the House of Mercy. Among the noteworthy buildings are the county courthouse, the Crane Art Museum, the public library, the Berkshire Savings Bank, and many fine churches. The municipal facilities are modern and include public lighting, street railways, sanitary sewerage, and waterworks. It was settled in 1743, when it was known as Boston Plantation, and was incorporated in 1761 under its present name. Population, 1910, 32,121.

PITTSTON (pĭts'tŭn), a city of Pennsylvania, in Luzerne County, on the Susquehanna River, 105 miles northwest of Philadelphia. It is on the Erie, the Central of New Jersey, the Delaware and Hudson, the Lehigh Valley, and other railroads. The place is surrounded by a region rich in anthracite coal. It is connected by two bridges with West Pittston, a suburb on the west bank of the Susquehanna, which has a population of 6,048. The noteworthy buildings include the public library, the city hall, the high school, and a number of fine churches. Among the manufactures are hardware, terra cotta, hosiery, lumber products, engines, paper, and leather. It has an important trade in coal and merchandise. Pittston was platted in 1770, when it was named in honor of William Pitt, and was chartered as a city in 1894. Population, 1900, 12,556; in 1910, 16,267.

PLAGUE (plāg), or **Glandular Pestilence**, an epidemic disease attended by violent fever. It is characterized by burning carbuncles in the glands of the groin and armpits, from which it is sometimes called the *bubonic plague*. In general, it is now believed to be almost identical with the most severe forms of typhus fever. It is produced by the absorption of a poison generated by decaying animal matter combined with heat, moisture, and bad ventilation. Its spread is hastened by humid heat, poor sanitary regulations, and insufficient water, food, air, and light. The plague has been generated in

many regions by the famines caused by the ravages of locusts and the poisonous infection of the air resulting from the decay of their bodies. Persons exposed to it become seriously affected within a few hours to three weeks, and, like other malignant fevers, it has various stages, death resulting within a period of a few hours to three days. Patients who survive the fifth day usually recover under favorable medical treatment.

The first symptoms are restlessness, followed by shivering, rise of temperature, and serious pain in the head and back. Glandular swellings appear in about 24 to 36 hours, these being mostly in the neck, groins, and armpits, and after breaking open give rise to suppuration and the oozing of blood from the surface. The disease is highly contagious. No remedy has proved reasonably successful, the best preventive being to avoid the disease by careful observation of wholesome sanitary rules. Many proofs can be cited that the plague ravaged different countries in most ancient times, the first on record in Europe being in Athens in 430 B. C. Josephus recorded a disastrous plague in Jerusalem in 72 A. D., and in 164-180 it spread over a large part of the Roman possessions. Another widespread plague visited Rome in 262, when the daily mortality was 5,000 persons. It appeared in most of Europe as a result of the Crusaders returning from Asia, when it became known as the *black death*. In the period from 1347 to 1350 about one-half the population of Europe was destroyed.

The city of London has been particularly unfortunate in being visited by the plague. Estimates place the loss of lives at London in 1603 at 36,270; in 1625, at 35,500; in 1636, at 13,485; and in 1665, at 68,650. Other notable ravages of the plague cost Marseilles 60,000 lives in 1720; and Messina, 43,500 in 1743. In 1771 it visited Russia, the Scandinavian peninsula, Germany, and many other regions of Europe. A disastrous plague appeared in Egypt in 1844, and another raged in southeastern Russia, Arabia, Persia, and Tripoli in 1878-79. The improvements effected within recent times in the sanitary regulations of cities, such as supplying pure water, extensive sewerage systems, and adequate lighting of buildings, have had wholesome effects in preventing the appearance of the plague. It is likewise counteracted by additional hospital facilities and advancement in medical science.

PLAIN, one of the great natural divisions of the land, the others being plateaus and mountains. The term plains includes all portions of land areas that are less than 1,000 feet above

sea level, while the remaining portions of the land masses are usually classed as plateaus and mountains, though some writers extend the name to include level or undulating regions of greater altitudes. Many of the great plains are adjacent to the coast, rising gradually from the sea and extending inland until they merge into plateaus. North America has two extensive plains, extending north and south through the continents, being divided a short distance south of the Canadian line by the Height of Land. The portion lying north is included in the Arctic plain and the part lying south, extending from Minnesota to the Gulf of Mexico, is almost entirely in the Mississippi basin. Along the Atlantic coast is a narrow coastal plain, which is separated from the Appalachian Mountains by the Piedmont plain. On the western coast of North America the plain is very narrow or entirely absent, the land rising quite abruptly from the shore and merging into the Coast Range and other mountains.

The largest of the extensive plains is in the northern part of Eurasia, being included chiefly in Siberia and European Russia. It is comparatively narrow in the eastern part, where ranges of the Stanovoi Mountains trend near the shore of the Arctic, but it gradually widens toward the west, where it includes a large part of Germany and Austria-Hungary. Much of the interior of Africa is included in the central plains, such as the Sahara and the Sudan. The great plains of South America are in the basins of the Amazon and the Rio de la Plata, but the former is much the larger and more important. Australia is principally an elevated plateau, and the only plain of considerable extent is in the basin of the Murray and the region of the lakes in the southern part. Many great plains formerly were the beds of lakes or the floors of shallow seas, hence these are commonly called *marine plains*. Other plains were formed by various causes acting through long periods of time. Lowlands covered with ice and snow, as in Greenland, are usually called *ice plains*. Those formed by the extensive outflow of lava, as in southern Idaho, are designated *lava plains*. Where large rivers build broad tracts of land by the deposit of silt, as in the deltas of the Ganges and the Mississippi, they give rise to *flood* or *fluvial* plains. The lowlands that have been above the sea for a long period, as a great part of the Sahara, are acted upon by the winds and other climatic conditions causing erosions, and thus finally develop into what is known as *plains of inundation*.

The great plains are highly important to man in commerce and the industry, since the soil in

most cases is highly fertile. This gives rise to agricultural development, which is confined largely to the regions classed as plains. This circumstance, together with the fact that they contain the most important navigable streams and have a surface well adapted to the building of railways, has caused them to contain the greatest density of population. Extensive fields of bituminous and lignite coal and deposits of lead, zinc, and iron ores are among the minerals. Large areas are covered with valuable forests and extensive regions are noted for their growth of blue grass, blue stem, and other nutritious grasses.

PLAINFIELD, a city of New Jersey, in Union County, twenty miles southwest of New York City. It is on the Central of New Jersey Railroad and is a favorite place of residence of many New York business men. The noteworthy buildings include the public library, the city hall, the high school, and the Muhlenburg Hospital. Among the manufactures are clothing, carpets, oilcloth, carriages, printing presses, dye, machinery, cigars, and edged tools. The surrounding country is agricultural and fruit growing. It was settled in 1684 and organized as a city in 1869. Population, 1910, 20,550.

PLANE, in geometry, a real or imaginary surface in which, if any two points are taken, the straight line which joins them lies wholly in that surface. *Plane geometry* treats of the nature and properties of figures and *plane trigonometry*, of plain triangles, or those which lie entirely in the same plane.

PLANE, a tool used by carpenters and joiners for cutting the surface of wood, either to make it smooth or have the shape correspond to that of the cutting edge of the plane. Planes used to cut only flat surfaces are called *bench* or *surfacing planes*, while those for shaping and forming are known as *grooving* or *molding planes*. They are formed of a solid block of hard wood, called the *stock*, which has a wedge-shaped hole cut from the upper to the lower side, in which is adjusted the plane iron or chisel. A wooden wedge is used to secure or fasten the chisel, which is kept sharp for cutting. A handle of wood or iron is attached to the back part of the plane, thus enabling the workmen to push it with force when in use. *Jack planes* are about fifteen inches long and are used for the rougher work, while *jointers* are from two to six feet in length and serve in giving straightness and accurateness to the surface.

PLANETOID (plăn'ët-oid). See **Asteroid**.

PLANE TREE, a genus of forest trees which are generally known as *buttonwood*. A

number of species are widely distributed. The buttonwood native to North America is one of the largest deciduous trees in the continent and is found in the forests skirting the rivers of the central part. Along the Ohio River the trees of this class have a diameter of from ten to fourteen feet and are without branches to a height of from fifty to seventy feet. The leaves are palmate and alternate and the wood is fine-grained. When seasoned, it assumes a dull red color and takes a good polish, but its liability to decay when exposed to the weather renders it of comparatively small value for many purposes. The plane tree of Europe is quite similar to that of North America and was a favorite among the Greeks and Romans for ornamental and shade purposes. It is still planted in many European cities, fine specimens of it being numerous in Constantinople, Rome, Vienna, Berlin, London, and Paris. The plane tree thrives best in an alluvial soil when well watered.

PLANETS, the celestial bodies that revolve around the sun and receive light and heat from it. They are divided into primary and secondary, the former revolving around the sun and constituting the planets proper, while the latter pass around the primaries and are known as *satellites*. Both planets and satellites are dark bodies and the light they give off is merely reflected sunlight. Both shine with a steady radiance. The fixed stars give off a twinkling light, but the planets appear brighter than most stars, because they are nearer to the sun and to us. The planets are usually divided into inferior and superior, the *inferior planets* being Mercury and Venus, whose orbits are within that of the earth, and the *superior planets*, Mars, Jupiter, Saturn, Uranus, and Neptune, whose orbits are greater than the earth's orbit. Those named above are classed as *major planets* to distinguish them in reference to their great mass, the regularity of their arrangement, and their nearly circular orbits. The *minor planets* include several hundred bodies which are invisible to the naked eye. They revolve around the sun between the orbits of Mars and Jupiter.

Only five of the major planets were known to the ancients, namely, Mercury, Venus, Mars, Jupiter, and Saturn; the earth was not classed as a planet at that time. William Herschel discovered Uranus in 1781. The existence of Neptune was determined theoretically by John C. Adams (1819-1892) and Leverrier, under the so-called Bode's Law, but it was discovered by Galle, in 1846. Mercury, Venus, the earth, and Mars resemble each other in some respects, particularly in their size, density, and weight. Jupi-

ter is the largest of the planets and is about 1,200 times greater in volume than the earth. In 1859 M. Lescarbault, a French physician, claimed to have discovered a planet which was afterward named Vulcan, but astronomers do not generally admit the existence of such a body. The writers who claim that such a planet exists estimate the distance from the sun at 13,000,000 miles and its periodic time or year, at twenty days. All the major planets are treated in special articles.

Below is a table showing the important features of the major planets:

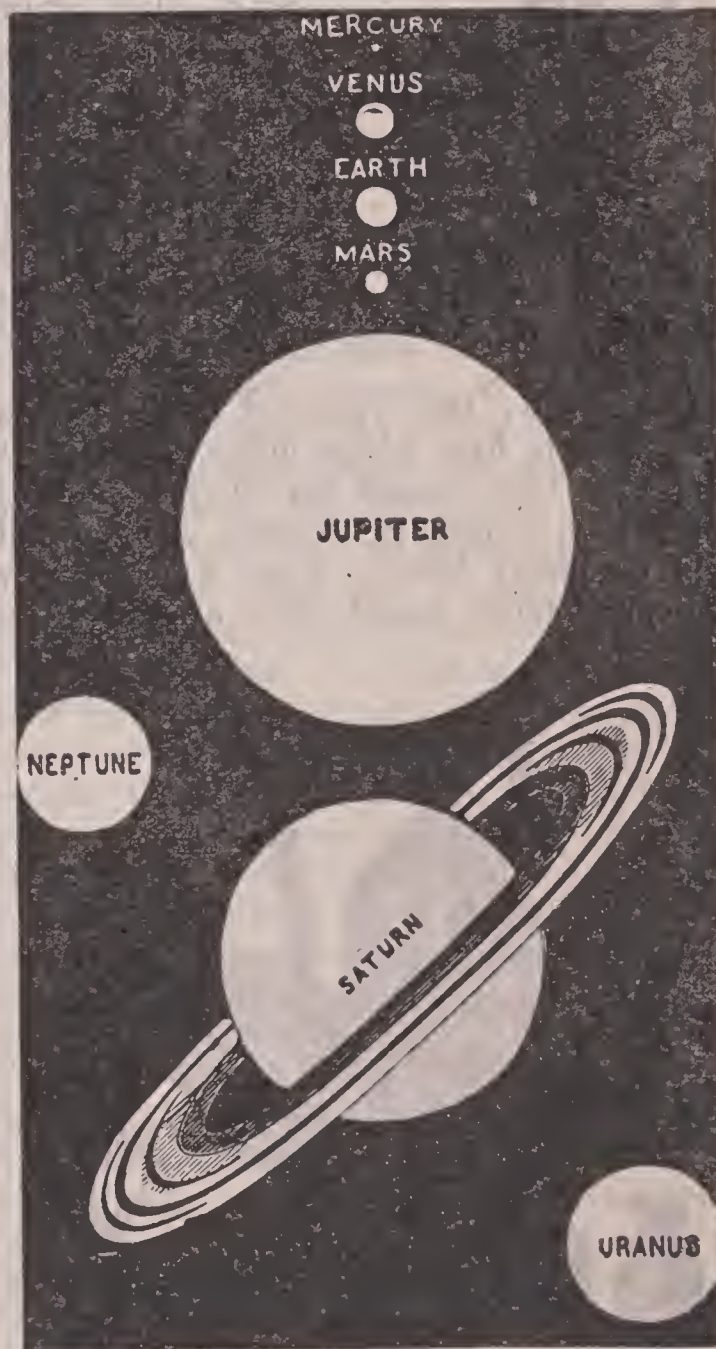
NAME.	Mean distance from the Sun in millions miles.	Meandiameter in miles.	Sidereal period in days.	Axial revolution in hours, minutes and seconds	No. of Satellites.
Mercury.....	35.5	3,200	87.96	Uncertain	0
Venus.....	67.2	7,700	224.70	Uncertain	0
The Earth.....	92.9	7,925	365.25	23 56 4	1
Mars.....	139.8	4,300	686.95	24 37 22	2
Jupiter.....	475.5	86,000	4,232.58	9 55 ..	7
Saturn.....	886.0	71,000	10,759.22	10 14 24	9
Uranus.....	1,781.9	31,900	30,686.82	Uncertain	6
Neptune.....	2,751.6	36,750	60,181.11	Uncertain	1

PLANTAGENET (plăn-tăj'ê-nět), the surname of a line of kings of England, who occupied the throne about 300 years. The name is thought to have originated from Geoffrey, Count of Anjou, who wore a sprig of bloom (*plante de genet*) in his bonnet. He married Maude, a daughter of Henry I., and thus became the founder of the Plantagenet dynasty. The first representative on the throne was Henry II., who succeeded the Norman dynasty in 1154, and Richard III. was the last, being succeeded in 1405 by a representative of the house of Tudor. The different kings reigned as follows: Henry II., in 1154-1189; Richard I., in 1189-1199; John, in 1199-1216; Henry III., in 1216-1272; Edward I., in 1272-1307; Edward II., in 1307-1327; Edward III., in 1327-1377; Richard II., in 1377-1399; Henry IV., in 1399-1413; Henry V., in 1413-1422; Henry VI., in 1422-1461; Edward IV., in 1461-1483; Edward V., a youth of thirteen, who died in the Tower in 1483; and Richard III., in 1483-1485. The Plantagenet family was divided into the Lancaster and York branches in 1400, the former being known as *Red Rose* and the latter as *White Rose*, and from their union in 1485 the house of Tudor originated. See articles treating of the above kings.

PLANTAIN (plăn'tân), a genus of plants distributed abundantly in all parts of the world. They include about 100 species and are most abundant in the temperate regions. Many of

them form common weeds. The *greater plantain* is widely distributed in the United States and Canada. It is a perennial with broad leaves and cylindrical spikes, bearing a large number of seeds of value as bird food. The spikes are gathered in many countries for their seeds, which are used for feeding caged birds. The roots and seeds are employed for treating wounds and in a preparation for dysentery and diarrhoea. See illustration on following page.

PLANTAIN, a class of tropical plants allied to the banana, which are native to the East Indies. The plants consist of long, overlapping



COMPARATIVE SIZES OF THE PLANETS.

leafstalks, and bear a stem from four to twenty feet high. The leaves in several species grow to a length of six feet and a breadth of two feet, and the fruit is delicious and thoroughly wholesome. It grows in clusters weighing from forty to sixty pounds, each separate plantain of the cluster being about one inch in diameter and somewhat longer than a banana, differing from the latter in not having purple spots on

its stem. When roasted and eaten before maturity, it resembles the potato in taste, and the powdered dried fruit is quite similar to that of rice. Many inhabitants of tropical regions subsist



PLANTAIN TREE.

almost entirely on this fruit. Several species are particularly valuable for the fiber of the leaf-stalks. The *abaca* or *Manila hemp* is derived from a species of the banana and the plantain and is one of the finest and strongest fibers known. It is used largely in making cloth and cordage. Medical properties are derived from the root. The sap is useful in treating cholera.

PLANTS, the organized bodies endowed with vegetable life, which differ from animals in the important respect that they have neither feeling nor voluntary motion. The higher forms of plants have a root, a stem, leaves, flowers, and fruit, though there are noted modi-



PLANTAIN.

fications of these. In the lowest forms plant life may be reduced to a single cell. Besides, in the lower members of the vegetable and animal kingdoms it is quite difficult to distinguish a plant from an animal, as some of the mimosas that are sensitive to touch, but are classed as plants, while the sea anemone is an animal, but it is firmly fixed to a particular place. A study

of nature reveals to us that no abrupt transitions in forms of life occur. For this reason it is strictly in line with nature's laws that the humbler members of the two kingdoms should be closely allied. It was long a debatable question whether sponges are animal or vegetable forms, though now they are considered compound animals, while many of the infusoria that once ranked as animals are now classed as plants.

Plant life generally subsists upon nourishment taken directly from the mineral kingdom, but there are notable exceptions in the parasitic plants that subsist on the juices of other plants, while animals take in nourishment principally through the intervention of plants or other animals. It is quite probable that the vegetable and animal kingdoms had their beginning with forms similar to those resembling both, and that through successive generations a great divergence resulted which finally brought forth forms unlike each other and vastly different from the original. That both kingdoms are interdependent may be observed in the different elements required for successful growth. Plants on the one hand require an atmosphere laden with carbonic acid, and in taking in this essential element they constantly throw off oxygen, while animals depend on constantly breathing oxygen and giving off carbonic acid. The atmospheric conditions are at present so fittingly adjusted to both forms of life that it would be quite impossible for either to exist for long periods of time without the other, and that these conditions were not always so is demonstrated by the beds of coal and other strata deposited in the Carboniferous Age. The cross fertilization of many species of plants depends upon the work of birds and insects which carry the pollen from flower to flower.

The life of both plants and animals depends upon light, moisture, temperature, and gravitation, but plants need also fertile soil. *Chlorophyll*, the green coloring matter of plants, is due to sunlight. The heat required to mature plants is dependent upon the character of the plants themselves, and they may not only be naturalized in different soils and climates under natural laws, but they may be artificially propagated and improved by the agency of man in countries far remote from their nativity. The law of gravitation causes the roots of plants to grow downward and the stems upward, but moisture largely modifies the growth and direction of the roots. As a general rule, the roots are equal to the branches in strength, since the action of the wind would otherwise cause the larger plants to fall. In a soil moist at the top

the roots usually are near the surface, and in soil moistened only to a limited extent near the surface they penetrate farther downward, though these are conditions governed quite largely by the nature of the different kinds of plants.

The organs of a plant are its root, stem, and leaves. The *root* is divided into smaller branches called *rootlets*. The *stem* is the part that grows upward and bears the leaves and flowers. *Leaves* are either opposite or alternate and constitute the foliage. Flowers, fruit, and seeds are the organs of reproduction. Plants are classed as *annuals*, *biennials*, or *perennials*, and in structure may be herbs, undershrubs, shrubs, or trees. *Evergreen* plants retain foliage the entire year, while *deciduous* plants shed their leaves at a certain season. The assimilative power and growth of plants are suspended in winter, and in this respect plant life resembles the hibernation of animals. The closing of flowers and the folding of leaves at night in some plants suggest their sleep. That this is an essential element has been successfully demonstrated by keeping an electric light constantly near a plant, thereby causing it to ultimately lose its vigorous growth. Plants, like animals, sooner or later die, but propagate their kind by the production of the germs of new life. The number of known plants has been estimated by writers to include from 115,000 to 120,000 well marked species, but the actual number is probably much greater.

PLASTER OF PARIS. See **Gypsum.**

PLATA (plá'tá), Rio de la, an extensive estuary of South America, situated between Argentina and Uruguay, formed by the Uruguay and Paraná rivers. The breadth at Buenos Ayres is 29 miles and at its entrance into the Atlantic, between Maldonado and Cape San Antonio, 150 miles. It is 200 miles long, but in many places shallow water hampers navigation. An immense volume of water is carried through the estuary, since the drainage comes from an area of 1,250,000 square miles, and about one-fourth of the produce of South America is shipped through it. The principal cities and ports on its banks are Buenos Ayres and Montevideo. Juan Diaz de Solis first discovered it in 1515, but its present name was given to it by Sebastian Cabot. Floating islands are met with at some distance in the sea and at several places in the estuary.

PLATAEA (plá-tē'á), a city of ancient Greece, about six miles south of Thebes, in Boeotia. It had a fine site at the foot of the northern slope of Mount Cithaeron, and between it and Thebes the Asopus River formed a natural boundary. The city is thought to have

been built by the Thebans, but there was continual strife between the two territories. In 519 B. C. the Plataeans formed an alliance with Athens, and in 480 B. C. their city was destroyed by the Persians because they had assisted the Athenians in the Battle of Marathon. The following year Aristides and Pausanias won a victory over the Persians at Plataea, in which the latter under Mardonius were completely scattered. It was besieged by an army of Spartans and Thebans in the Peloponnesian War, and, after defending itself for two years, was compelled to surrender in 427 B. C., when the city was destroyed and a large number of the people were slain. Those escaping found safety in Athens, but later returned to rebuild the city. Plataea had considerable importance as late as the 6th century A. D. Its ruins are near a village called Kokhla.

PLATEAU (plá-tō'), an elevated tract of land, ranging higher than a plain. The large surfaces known as plateaus are associated more or less closely with systems of mountains, located either between the upper ranges or extending as highlands from the foothills. The plateaus of Asia, especially Tibet and Pamir, are the most extensive and highest in the world. Next to these range the Andean plateau of South America and the Rocky Mountain plateau of North America. In Central Asia the land masses have a general altitude of from 10,000 to 14,000 feet, but these are cut deeply by the streams. The Colorado plateau, located between the Sierra Nevada and the Rocky Mountains, ranges in height from 6,000 to 9,000 feet, while the plateau known as the Great Plains, located in the western part of the Mississippi valley, immediately east of the Rocky Mountains, is from 3,000 to 6,000 feet above the sea level.

The arid regions are confined largely to the plateaus, owing to the fact that the surrounding mountains interfere with precipitation. These are frequently cut by canyons into tablelands, or by streams so as to form bluffs, as in the Bad Lands of North Dakota and South Dakota. In other localities the surface is sculptured by denudation so as to resemble mountains, as the Catskills of New York. The soil of many plateaus is highly fertile, but the larger regions of this class are included in the arid belt, hence the soil is too dry to produce without irrigation. However, the streams are usually in deep channels, hence it is difficult to conduct water to the general levels by artificial channels. Many high plateaus have an abundance of rainfall, hence are covered with nutritious grasses or valuable forests, as in the western part of Canada and the United States.

PLATING. See **Metallurgy.**

PLATINUM (plăt'î-nŭm), a grayish-white metal found in the metallic state in rounded granules distributed through sandy deposits, and alloyed with the platinum metals. In the native state it occurs only in small, irregular grains from the size of a pinhead to that of a pigeon's egg, though there are instances in which the deposits have weighed as much as twenty pounds. However, the native platinum is not pure, and, besides containing traces of gold, iron, and copper, it is alloyed with several other metals which it resembles in certain properties, which are called the *platinum metals*. These embrace iridium, paladium, rhodium, ruthenium, and osmium. It is very heavy and is separated from sandy deposits by washing in a stream of water in the same manner that gold is separated from sand. Platinum is very malleable and ductile, has a brilliant luster, and, while the heaviest of ordinary metals, is least expanded by heat. Its high degree of infusibility and resistance to the action of chemical reagents makes it a valuable metal for vessels used in chemical laboratories, where evaporating dishes, crucibles, and capsules are used that are made chiefly of platinum. It enters largely into the stills used in evaporating sulphuric and nitric acids.

The alloys of platinum are not numerous, but with silver it forms a fusible white alloy, which, however, blackens by working and is attacked by nitric acid. It melts in the oxyhydrogen flame and in the electric furnace. At a white heat it becomes soft and can be forged and welded like iron. The air does not affect it at any temperature. Its principal use is for apparatus in the chemical laboratory and all this apparatus is made as thin as is consistent with strength, for the metal is quite rare and costly. Its property of resisting the effects of ordinary heat renders it of value in electrical supplies. The platinotype process in photography, discovered within recent years, has opened a wider field and a larger demand. Platinum is found in various parts of the United States, but Trinity and Shasta counties in California have been the principal sources of supply. It occurs in Oregon, Canada, Peru, Brazil, Colombia, the West Indies, and Borneo.

PLATT-DEUTSCH (plăt'doich), or **Platt-German**, a German dialect spoken in North Germany, principally in the lowlands from Russian Poland to the boundary of Holland. It is popularly called *Low Dutch* by English-speaking people, and is a distinct language that came down to the present time from the Old Saxon. The Flemish and Dutch languages are classed

with the Low German, but, since they have a considerable literature and are associated with different political governments, they are usually regarded as distinct languages. They include a number of different dialects, but all of them show a remarkable agreement with the Dutch, German, Flemish, English, and Scandinavian in their system of consonants. Formerly the Low German was spoken in a large region south of the North Sea, particularly before the Reformation, but since then the High German has steadily superseded it as the modern classical language. The High German is now taught in the schools and the Low German is spoken in the home of the peasants, but the former is gradually gaining territory. A literature of much interest has been written in the Low German and within recent years it has been enlarged and popularized by Fritz Reuter and Klaus Groth.

PLATTE (plăt), a river formed at North Platte, Neb., by the confluence of the North Platte and South Platte rivers. After a course of about 400 miles toward the east it joins the Missouri at Plattsmouth. Both the North and South Platte rivers rise in the Rocky Mountains, the former having a length of about 800 miles and the latter about 500 miles. The channels of these rivers are wide and sandy, and during the melting of the snow on the mountains, in May and June, they are well filled with rapidly flowing and sand-colored water, but in the other seasons of the year extensive sand bars appear. Neither of these rivers is navigable. The entire basin of the Platte includes about 300,000 square miles. Its valley is broad and fertile in the eastern part, but in the foothills and mountains are precipitous bluffs on both sides. They are chiefly of a mixed limestone and sandstone formation.

PLATTSBURG, a village of New York, county seat of Clinton County, on Lake Champlain, at the mouth of the Saranac River, 165 miles east of north of Albany. It is on the Delaware and Hudson Railroad and is attractive as a summer resort. The principal buildings include the public library, the county courthouse, and many churches. It is the seat of a State normal school and of the Roman Catholic Summer School of America. Among the manufactures are flour, wagons, machinery, canned products, and utensils. The surrounding country is agricultural, and contains deposits of iron. It was first settled in 1784. Near by, off Valcour Island, occurred the first naval battle of the Revolution, on Oct. 11, 1776. Population, 1905, 9,898; in 1910, 11,138.

PLATTSMOUTH, a city in Nebraska, coun-

ty seat of Cass County, on the Missouri River, 21 miles south of Omaha. It is situated immediately south of the Platte River, on the Missouri Pacific and the Chicago, Burlington and Quincy railroads. The place has a large trade in cattle, grain, lumber, and merchandise. It has extensive railroad machine shops. Among the manufactures are carriages and wagons, canned fruits, tobacco products, flour, machinery, and earthenware. The principal buildings include the county courthouse, the high school, the opera house, and many churches. It has public waterworks and sanitary sewerage. Population, 1900, 4,964.

PLAUEN (plou'ən), a city of Germany, on the Elster River, 65 miles south of Leipzig. It is situated in a beautiful and fertile valley and has railroad conveniences. The manufactures include muslin, cotton goods, cambric, leather, embroidered goods, paper, and machinery. It has a beautiful palace, a gymnasium, and many educational and benevolent institutions, and is beautified by a number of gardens and parks. The municipal facilities include telephones, electric lighting, and pavements. A large majority of the inhabitants are Protestants. Population, 1905, 105,381.

PLAYS. See **Drama.**

PLEBEIANS (plē-bē'yānz), or **Plebs**, one of the two great classes into which the Roman people were divided, the other being the *patricians*. The latter class held all the offices of the government and enjoyed the privilege of governing the affairs of the nation, while the plebeians were not only denied these, but were forbidden to intermarry. Though the plebeians bore the brunt of fighting, they were denied the right of using the spoils of war. The contest between the two classes for the enjoyment of equal civil rights constitutes a large part of the civil history of Rome. In 268 B. C. the Hortensian law was finally established, under which the two hostile classes were recognized as one general body of Roman citizens with equal rights. This law provided practical equality in the rights of property. With representation of these classes in the legislative branch of the government, the civil rights of both remained practically equal, and later all traces of former distinctions disappeared.

PLEIADES (plē'yā-dēz), a beautiful cluster of stars in the constellation Taurus, which is sometimes called the *Seven Sisters*. It contains a large number of stars, six of which are visible to the naked eye. In Greek legends the Pleiades were regarded the seven daughters of Atlas and Pleione, and bore the names Electra, Taygete, Maia, Celaeno, Alcyone, Merope, and

Sterope. Grecian mythology accounts for only six of these stars being visible to the naked eye by asserting that Electra left her place that she might behold the ruin of Troy, which city was founded by her son, Dardanus. Later they all committed suicide out of grief for the death of their sister, and were placed by Zeus as stars on the shoulder of Taurus. These stars were anciently of special interest to the sailors of the Mediterranean, since they rise in Italy about the beginning of May and set about the beginning of November, a period covered also by the navigation of the Mediterranean in the prosperity of Greece.

PLEURA (plū'rā), a thin, moist membrane that lines the cavities of the chest, forming a covering of the external surface of the lungs. It is in the form of an inclosed sac and within is a fluid called the *serum*, which is secreted to prevent friction. The pleura consists of two chambers. A portion of the outside of one sac is closely attached to one of the lungs and its root and the other portion to the inside of its thoracic wall, while the fluid lubricates the pleural surfaces, permitting the lung portion to move smoothly over the thoracic portion. Besides forming a protection to the lungs, it serves to hold it and other organs of the chest in position.

PLEURISY (plū'rī-sŷ), an inflammation of the pleura, the membrane which lines the chest and covers the lungs. This disease has been recognized and described at an early date, although it is quite difficult to distinguish it from pneumonia. Though confined to no period of life, the disease is rare in early infancy and in old age. Exposure to cold, external violence, and the presence of tubercles of the lungs are among the chief causes. Chills, fever, acute pain in the chest, and a dry cough are among the early symptoms. Pleurisy may be *dry*, or *plastic*, or may be accompanied by effusions of a pale, yellowish fluid which closely resembles the serum of the blood. When it is dry or plastic, the membrane becomes more or less congested. In pleurisy with effusion an abnormal amount of serum is secreted, which is sometimes accompanied by the growth of bacteria. The disease is not very dangerous, unless it arises from a constitutional malady, such as tuberculosis. Those having a weak constitution need special care, else they may suffer permanent disability or premature death.

PLIOCENE (plī'ō-sēn), in geology, the last epoch of the Tertiary period, so named because the greater part of its fossil shells belong to the recent species. Some writers apply the term post-pliocene to the more recent deposits in

which no extinct species of fossil shells are found, which are below those that contain relics of man. Only small areas of this period are found in North America, but the formations belonging to this epoch are very extensive in Europe.

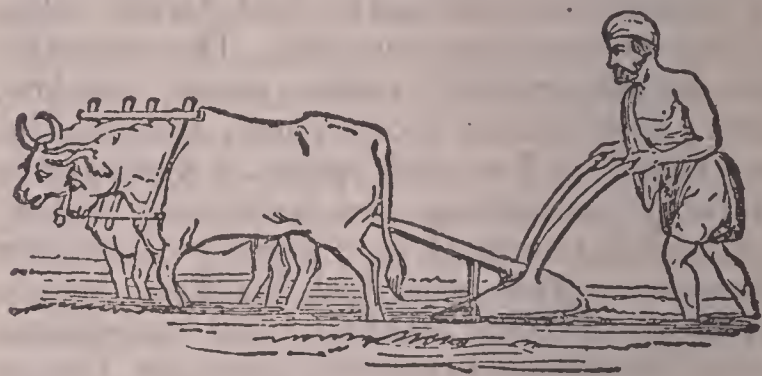
PLOVER (plŭv'ēr), a class of birds frequenting the shore and inland waters of America and Europe. Many of the species are well known, differing in size and color. The *common plover* has long wings, the points usually projecting beyond the tail. It is speckled above and black or dark brown below. The *gray plover* is native to the Northern Hemisphere and the *speckled plover* is found largely in Europe, where it is known locally as the *golden plover*, a name applied because of its colorings of yellow above. The American *golden plover* has yellowish feathers above and smoky-gray below. It feeds principally on insects or the larva found in marshes, and appears to be very fond of grasshoppers. Other American species include the *green plover*, the *killdeer plover*, and the *stilt plover*. Birds classed with the plovers are found in all the temperate and warmer regions. They fly with rapidity and run swiftly, some species pretending to be injured, with the design of protecting their nest and young from an enemy. The *field plover* is a notable example of this class and is found in many regions of America in cultivated fields, where it feeds on seeds, insects, and berries.

The *ring plover* is a familiar bird in eastern Canada, especially on the shore of Cumberland Bay. It is about eight inches long, nests among the pebbles of the sea, and searches for food near the receding waves. The legs are white, the crown and collar are black, and the general color is white with yellow markings. Another Canadian species, the *piping plover*, ranges southward from Newfoundland. Most of the plovers molt twice a year and the males and females have a very similar appearance. The nests of all species are built on the ground. Some species are regarded of value for their flesh and their eggs are eaten in many countries. They are mostly migratory birds, passing to the higher latitudes in the spring.

PLOW, an implement used by farmers and others for turning over, furrowing, or breaking up the soil. It is drawn by animal or steam power. Those designed for ordinary field work are constructed with the view of cutting off longitudinal slices of earth and turning them over so an entirely new surface becomes exposed to the action of the air. Plows of this kind usually have a cutter that cuts off the weeds and stubble so all substances above the

surface may be wholly turned under, thus providing the soil with fertilizing substances and exposing a surface well adapted to cultivation and for receiving the seed of a crop to be sown or planted. Plows are mentioned very early in history, though they were formerly of inferior construction, and people little advanced in industrial arts still use illy constructed implements either wholly or partly of wood.

The plows of modern manufacture are almost entirely of iron and steel. The different parts of an ordinary plow include a *share* for slicing the earth at the bottom of the furrow; a *land-side* that presses against the land to aid in guiding the plow; a *standard*, or *sheath*, con-



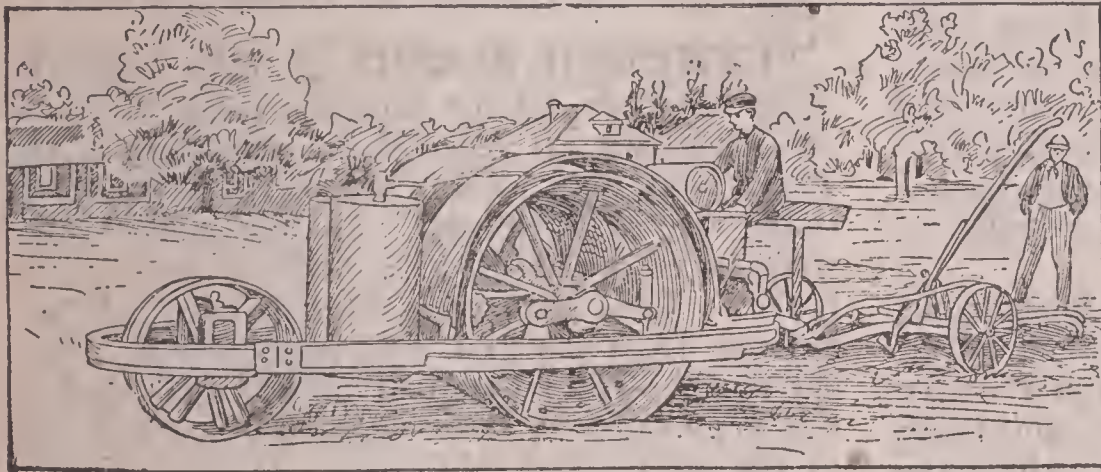
SYRIAN PLOWING.

necting the share and *moldboard* with the beam; a *beam* by which the plow is drawn; *handles* for the plowman to steady and guide the implement; and usually a *colter* for cutting the furrow slice from the land. Special plows are used for different purposes, such as drain plows, drill plows, subsoil plows, and mold plows. A plow with a double moldboard is used for earthing up potatoes and peanuts and a *turn-wrest* plow is so arranged that the entire field may be turned in the same direction, the moldboard being turned to either side for that purpose. A plow of this character is quite serviceable in hilly regions, where it is often desired to turn the soil toward the sloping direction, and in plowing gardens to avoid the inconvenience of a number of furrows.

Plows of American manufacture have gone largely into use in many countries. They are manufactured of various materials so they may work successfully in different kinds of soil. It is essential that the portions passing through the ground be made of a material that easily cleans itself, or *scours*. A soil containing much sand is turned easily with an inferior share and moldboard, but the heavier clay and gumbo soils require metal of extra quality which is hardened by a process requiring considerable care. Much of the plowing on the larger farms and plantations is now done with implements mounted on

wheels, thus avoiding a large part of the friction and enabling the plowman to ride. These plows are drawn by three or four horses and have either one large plow or two or more smaller ones. Steam plows are of modern invention and are used only on farms of the largest size. The plow proper consists of one or two sets of plows attached to an iron frame. Each set consists of two or more plows, sometimes as many as ten, and these are mounted on two or more wheels.

In an early method of plowing by steam the engine was stationed at one side of the field and the plow was drawn back and forth by means of a cable passing through a stationary capstan at the other side. The plows were in two sets, being adjusted so they pointed in different directions, and were raised or lowered alternately so those on the different sides of the wheels plowed only when drawn forward, the others being raised above the surface. Another plan was to have a cable pass entirely around the field which was put in motion by a stationary engine, and the attached plow passed around the field, continually cutting farther inward as the cable was moved from time to time. However, neither of these proved practicable. Steam plows of modern construction are now employed



AN ELECTRIC PLOW.

on the large farms of Canada and the United States, especially in Minnesota, North Dakota, Texas, Manitoba, Saskatchewan, and Alberta. They do the work best where the soil is comparatively level and free from stones. The engines used in plowing may be employed in drawing wagons and driving saws, pumps, mills, and threshing machines at seasons of the year when they are not needed to do plowing. Plows that are propelled by the agency of a gasoline engine, on the plan of an automobile, are used to some extent. Several forms of plows in which electric power is supplied by a storage battery have been invented, but they are not used extensively.

PLUM, a class of fruit trees belonging to the

same genus as the apricot, almond, peach, and cherry. This fruit is cultivated very extensively, especially in the temperate zones. Many species have been described. They range from the small products of cold regions to the large and luscious kinds produced extensively in the temperate and tropical zones. Plums are native to many countries and were found extensively distributed in America at the time of its discovery, though since then other species have been acclimated, and the American trees have been improved more or less by propagation. Among the common species of cultivated plums are the Chickasaw, beach, damson, Damascus, black-thorn, green gage, Cashmere, cherry, and Saint Julien. These differ greatly in size, taste, color, and form, and are alike valuable for different purposes. *Prunes* are made by drying certain kinds of plums, such as the German and Turkish prunes. Others are eaten fresh, preserved, or used in making syrup, vinegar, and alcohol. Plum jellies, jams, and syrups are delicious. Plum wine is valuable for coloring, purifying, refining and mellowing spirits and is made from prunes. The plum tree yields a hard and fine-grained wood which is well adapted for carvings.

PLUMMET (plūm'mĕt), or **Plumb Line**, an instrument used to fix vertical lines, or lines in the direction of terrestrial gravities. It is of very ancient origin and is referred to in Isaiah xxviii, 17. This instrument consists of a weight, generally of lead, hanging to a string. A square is usually set in a vertical position by a plumb line, the other limb of the square being horizontal, and in this way it is possible to determine both vertical and horizontal lines. In surveying and astronomical instruments

the plummet is sometimes used in fixing and regulating their position, but the *spirit level* is employed more generally. Surveyors usually employ the spirit level to regulate the horizontal position of the compass, and a plummet is used to indicate where a stake or marker is to be fixed in the surface of the ground.

PLUSH, the name of a fabric which is quite similar to velvet, but different from the latter in having a longer pile or shag. Many varieties are manufactured and sold in the market. Some grades are all worsted, while others are worsted with a mohair pile, and still others are of cotton with a silk pile. Mohair and worsted plush is employed in making upholstered furniture and the former enters largely into wearing apparel,

such as caps and cloaks. Dresses and hats worn by women and several kinds of hats for men are made of plush with silk pile. France, Germany, and England produce the largest quantities of plush fabrics.

PLYMOUTH (plīm'ŭth), a port of entry in Massachusetts, county seat of Plymouth County, 37 miles southeast of Boston. It is on Plymouth Bay, an inlet from Massachusetts Bay, and on the New York, New Haven and Hartford Railroad. The site is the famous landing place of the Pilgrim Fathers, who came here on Dec. 21, 1620. Among the noted buildings is Pilgrim Hall, a memorial hall erected in 1824 by the Pilgrim Society in memory of the Pilgrims. It was remodeled in 1880. This structure contains a fine collection of paintings relative to the history of the Pilgrims, the most noted being "Landing of the Pilgrims," "Embarkation of the Pilgrims," and "Embarkation from Plymouth, England." It has a number of portraits and a large collection of articles and curiosities brought over in the *Mayflower*. Other buildings include the public library, the high school, a number of fine churches, and the municipal buildings. Another structure of prominence is the National Monument to the Forefathers, erected in 1859, but not completed and dedicated until 1889. It is built of granite, is 81 feet high, and is one of the finest works of art in America. The city has manufactures of cotton and woolen goods, furniture, hardware, cordage, machinery, and metalware. It has a large harbor and a growing coastwise trade. Population, 1905, 11,119; in 1910, 12,141.

PLYMOUTH, a borough of Pennsylvania, in Luzerne County, on the Susquehanna River. It is on the Delaware, Lackawanna and Western Railroad and is surrounded by an anthracite coal-mining country. The features include the public library, the high school, the municipal hall, and a number of churches. It has manufactures of silk fabrics, hosiery, clothing, earthenware, and mining machinery. Plymouth was settled in 1768, and was claimed by both Connecticut and Pennsylvania until 1797. Population, 1900, 13,649; in 1910, 16,996.

PLYMOUTH, a seaport of England, in Devonshire, between the estuaries of the Tamar and Plim rivers, on the north shore of Plymouth Sound, 200 miles southwest of London. The city is well defended by land and sea, has an excellent harbor, and is improved by modern municipal facilities. It has a large number of charitable and educational institutions, many large churches, and fine business blocks. Saint Andrew's Church dates from 1490 and Charles Church, dedicated to Charles the Martyr, was

built in 1646. The city has numerous public parks, several boulevards, and a public library. It has railroad and electric railway connections with inland points. The commercial trade extends to all foreign countries, but it is particularly large with the West Indies, South Africa, and Mediterranean ports. At the time of the Norman conquest Plymouth was a fishing village, when it was known as Sutton, but at the time of Edward the Black Prince it rose into prominence, and was an important factor in the history of England for many years. From this place the Pilgrim Fathers sailed for America in the *Mayflower* in 1620. Population, 1907, 120,063.

PLYMOUTH COLONY. See **Pilgrim Fathers.**

PLYMOUTH ROCK, a granite boulder on Massachusetts Bay, celebrated because of the landing of the Pilgrim Fathers on Dec. 21, 1620. It is supposed that Mary Chilton and John Alden were the first Europeans to set foot upon the rock. A large piece was broken from the rock in the early period of the colony, and this was taken by twenty yoke of oxen to the center of the city of Plymouth, where it was surrounded by an iron railing, but it was returned to its original position at Hedges' Wharf in 1880.

PLYMOUTH SOUND, an inlet from the Atlantic Ocean, on the southern coast of Cornwall, England. It receives the waters from the Tamar and Plim rivers, and on its north shore is the city of Plymouth. An important breakwater was constructed in 1812 to protect the harbor. This structure, although secure and massive from the first, was improved at different times. The amount of money expended on this breakwater is about \$8,250,000 and it is one of the most noted in Europe. It consists of a substantial mole of stones and affords ample protection for the anchorage of vessels within the inclosure formed by its extension of about one mile. Plymouth Sound possesses much natural beauty and has been the scene of many historic and decisive naval engagements. The Eddystone lighthouse is situated about fourteen miles southwest of the breakwater.

PNEUMATIC DISPATCH (nŭ-măt'ĭk), a system of transmitting written dispatches through narrow tubes by the agency of air pressure. Attention was first called to the utility of rapid transmission for short distances through the agency of air by Denis Papin in 1667, when he presented a paper to the Royal Society in London entitled "Double Pneumatic Pumps." However, the system was not practically applied until about the middle of the 19th

century, but at present it is utilized in many cities of America and Europe. In general the system consists in having two tubes of cast iron between the desired stations, forming a circuit in which the air is kept constantly circulating. A compressor forces air into the tubes at a pressure depending upon the length and size of the system. Mechanical devices make it possible to place the matters to be carried into a receptacle within the tube without a waste of air pressure, and they are carried to the other end and deposited into the receiving tray. The time of transit is usually 1,000 yards per minute, but this varies according to the pressure and size of the tube. The pneumatic dispatch line between the New York post office and the Grand Central Palace office is three and one-fourth miles long and is one of the largest in America. In Berlin, Germany, the lines have many stations, and include about 75 miles of tubes, in which the dispatch speed is about twenty miles per hour. Many different systems are now in successful use, in some of which the carriage is by suction. Larger systems have been installed in many cities to carry freight and passengers.

PNEUMATICS, the branch of science which treats of gases, either at rest or in motion. Gases differ from liquids in that their molecules possess greater freedom of motion, but, like the latter, possess the following properties: They transmit pressure equally in all directions; the downward, upward, and lateral pressures at any point are equal; and bodies weighed in air or gas lose a weight equal to the weight of the air of any gas they displace. The repulsive tendency in gases is very marked, which may be seen by placing a small quantity of gas into an empty vessel, when it will expand until the entire vessel is filled. The science of pneumatics includes an investigation of the property of gases, such as their density, weight, pressure, elasticity, condensation, rarefaction, equilibrium, and diffusion. It investigates the instruments and machines that depend upon the pressure and elasticity of air for their actions, such as the barometer, balloon, and air pump. See **Gas**; **Air Pump**.

PNEUMATIC TIRE, a tube of rubber used in the manufacture of wheels for various vehicles, such as automobiles and bicycles. The pneumatic tires for vehicles of this class are made of several thicknesses of canvas and rubber formed into endless air-tight tubes. The purpose is to lessen jars, reduce noise, and overcome to some extent the effects of a rough surface upon the vehicles. They are held in place principally by the U-shaped form of the

rim. To maintain a uniform inside pressure, air is pumped into the tube, which has a valve protected by a screw cock or cover to hold the air in confinement. Improved methods of construction have greatly reduced the liability of puncture, and small holes, as from punctures by nails, can be repaired by cements. Many carriages have rubber tires, but these are solid and are closely fitted on the rim of the wheels, the purpose being to reduce noise and lessen jars, especially in driving on pavements and hard surfaces.

PNEUMATIC TOOLS, the name of a class of tools operated by compressed air. They are applied principally by hand and the mechanism which receives the impulse from the compressed air is in the handle. Two types of pneumatic tools are in extensive use, known as *percussion* and as *rotary* tools. The first type includes those used for drilling, riveting, chipping, caulking, ramming, and hammering. They are used in working in metal, cutting stone, and carving wood. An air compressor located at a congenial and central point conducts the compressed air through a suitable connection, which includes a flexible hose of some length so as to permit the workmen to handle the tool with facility. Percussion tools strike from 1,500 to 20,000 blows per minute, depending upon the manner of construction and handling for the particular use to which they are applied. A valve in the handle permits the operator to control both the speed and the force.

Rotary tools are used for drilling and boring in wood and for various purposes in metal work, such as boring cylinders, screwing nuts on bolts, expanding tubes, grinding joints of steam pipes, and boring cylinders and valve seats. The drills are made in a large number of sizes and forms, hence may be adjusted or replaced with facility as the character and progress of the work to be done may require. The mechanism works with an air pressure of from 60 to 80 pounds, but in the larger tools the pressure is 125 pounds to the square inch. Pneumatic tools are used very extensively in the larger industrial establishments, especially in England, Germany, Canada, and the United States.

PNEUMONIA (nŭ-mō'nĭ-à), or **Lung Fever**, an inflammation of the substance of the lungs, especially of the air sacs and the framework of that organ. It is common to all ages, but prevails more frequently in spring and autumn than in summer and winter, and cases are more numerous in the cold and temperate than in the tropical climates. Sometimes it is difficult to assign a direct cause, but usually it

is due to intemperance, want of ventilation, sudden exposure to severe cold, and hereditary tendencies to pulmonary diseases. Typhus, eruptive, and typhoid fevers often give rise to pneumonia. The direct cause of the disease is a minute bacteria. Medical science places it in the list of infectious as well as slightly contagious diseases. The early symptoms are chills, high fever, and a severe pain due to the accompanying pleurisy. Later a cough arises, expectorations of viscid sputum become frequent, and the pulse and respirations become rapid. Sleeplessness and delirium are common. The crisis usually occurs in from five to ten days. Death is usually due to heart failure caused by the poisonous influences of the bacteria. *Broncho-pneumonia* is the name applied to the disease when it affects both the finer bronchial tubes and the lungs.

PO, a river of Europe, the largest in Italy. It rises in the Alps, near the boundary line of France, at an altitude of 6,000 feet, and drains the large plain of northern Italy lying between the Alps and the Appenines. The entire length is 417 miles and its basin is 27,750 square miles. It enters the Adriatic Sea by a large delta, extending inland above Ferrara, a distance of 60 miles, and its width at the sea is about 58 miles. The Po is remarkable for its width and the large volume of water carried from the mountains to the sea. Its extensive navigation facilities make it an important route. Among the tributaries are the Adda, the Ticino, the Minicino, and the Trebbia. Turin is the most important city on its banks, but there are others that enjoy a large commercial trade.

POCATELLO (pō-kā-tě'lō), a city of Idaho, county seat of Bannock County, in the southeastern part of the State. It is on the Port Neuf River and the Oregon Short Line Railroad. The surrounding country has been made very productive by irrigation, yielding grain, fruit, and vegetables. It has a growing trade in live stock and merchandise. The noteworthy buildings include the county courthouse, the high school, the municipal buildings, and the Academy of Idaho. Among the manufactures are earthenware, clothing, cigars, and machinery. The place owes its early growth largely to the development of mining interests in the vicinity. Population, 1905, 7,500; 1910, 9,110.

POETRY (pō'ēt-rĭ), one of the fine arts, and the form of literature that has for its object the creation of intellectual pleasure by the use of imaginative and passionate language. It is generally written in regular measure. However, it is not essential that its form be reduced to meter or rhyme, and in this widest

sense poetry may be defined as that which is the product of the imaginative powers and fancy, and which appeals to the imagination and the sensibilities of others. Poetry is the earliest form of literature, and may be regarded the final and ideal of all pure literature. In this sense it ranks between prose and music, and the skillful poet intermingles the three lines of art by bringing prose into the realm of poetry and touching his rhythm with musical rapture.

The three forms of poetry generally recognized are epic, lyric, and dramatic. *Epic poetry* embraces the narrative form; *lyric poetry* includes all varieties of serious and comic song, the anthem, hymn, ode, elegy, and sonnet; and *dramatic poetry* embraces the poetry of action scenically represented, including both tragedy and comedy. Some writers also include *didactic poetry*, the poetry of thought, or intellect, and *satirical poetry*, the form employing sarcasm, irony, ridicule, or humorous exaggeration. The several classes of poetry are not distinguished by distinct lines of demarkation. In fact, each class may contain elements of the different forms, which is specially true of epic poetry, since it partakes largely of the character of both lyric and dramatic imagination. Hindu poetry has its earliest types in the Rig-Veda, which consists in large part of rhythmal hymns, but the highest forms of Hindu poetry are found in the epics known as the *Rāmāyana* and the *Māhabhārata*.

Portions of Genesis and Exodus comprise the earliest poetry of the Hebrews, and their highest forms are found in the Book of Job and the Psalms. Grecian poetry began with Homer and Hesiod and flourished until about 500 B. C. The greatest Roman poets are Virgil and Horace. Geoffrey Chaucer may be regarded the founder of English poetry, but Shakespeare is the most renowned English poet. Other poets of England include Spenser, Milton, Dryden, Pope, Cowper, and Byron, while Burns is the greatest of Scottish poets. The most distinguished poets of Germany include Goethe, Schiller, Heine, Ludwig Uhland, Christoph Wieland, and Martin Opitz. Among the most lustrous names in American poetry are those of Longfellow, Bryant, Lowell, Whittier, and Poe.

POINTER, a class of sporting dogs allied to the true hounds, remarkable for their habit of pointing with the head toward the game. The habit is instinctive, since it may be noticed in puppies, but it can be improved materially by training. The pointer originated in Spain, to which country its progenitor was brought from the East. It has since been crossed with

the fox hound and greatly resembles that class of dogs. A well-trained pointer stops immediately on scenting game and remains perfectly at rest, indicating the direction of the game.



POINTER.

POISON (poi'z'n), any substance that tends to cause death or seriously injure health when taken into the system by cutaneous absorption, swallowing, or inspiration. Poisons produced by animals are generally called *venoms*, and those resulting from diseased tissues are known as *virus*. The poisons sold in the trade are classed as animal, vegetable, and mineral, according to the sources from which they are derived. The general classification in medicine is governed by their effect upon the living tissues, including the four classes known as narcotic, narcotico-acrid, irritant, and petrescent, or septic. *Narcotic poisons* have a special effect upon the spinal cord and brain, causing headache, obscurity of sight, giddiness, stupor, convulsions, and finally death. They produce no irritation, are not burning or acrid to the taste, and their effect upon the tissues is not marked, leaving no traces after death except a slight enlargement of the nerve fibers and brain. Among the principal narcotics are chloroform, opium, alcohol, belladonna, ether, chloral, hemlock, henbane, and India hemp.

The *narcotico-acrid poisons* produce symptoms similar to those caused by narcotics, and vomiting, nausea, and convulsions. They consist of such substances as aconite, nux vomica, hemlock, poisonous mushrooms, and nicotine—the poisonous principle of tobacco. *Irritant poisons* include acids, some alkalis, mercury, arsenic, vegetable acrids, animal irritants, the vapor of nitrous acid, strychnine, and many others. The *petrescent* or *septic poisons* consist of animal poisons, such as the bites of venomous snakes

and rabid animals, the stings of insects, and the poisons generated by pestilential carbuncle. Many of the poisons are of value in medicine and have a stimulating effect when taken in small quantities, but excessive use causes an impairment of the vital functions, while an unusual or large quantity produces death.

The poisonous principles contained in alcohol, opium, and tobacco are employed by a large number of people for stimulative purposes, but it has been shown successfully that none of them is a food and they do not enter into the support of life or living tissues. Laws to restrict or prohibit the improper use of these poisons have been made in many countries and their sale is either restricted or totally prohibited. To impress the evils of these habits upon the minds of children, the subject-matter of physiology taught in the public schools includes a systematic presentation of the evils of stimulants and narcotics upon the human system. It is hoped that sobriety and temperate habits, founded upon intelligence, will be obtained as a result.

POISON IVY. See *Sumac*.

POISONOUS PLANTS, the term which embraces the plants that have poisonous properties, either when taken into the stomach or brought in contact with the surface of the skin. The line of demarkation between poisonous and nonpoisonous plants is not distinct, since many species are harmless to some persons and injurious to others. Many plants are more or less poisonous in a natural condition, but are rendered harmless or even wholesome food when cooked. To this class belongs the potato, which has slight traces of poison that in a concentrated form become harmful.

A number of plants possess poisonous substances in sufficient quantities to render them harmful both to man and animals, while some are injurious only under some conditions. The poison ivy, a climbing or trailing shrub of North America, is quite poisonous. It ascends trees and rocks, attaching itself to them by many small rootlets, and causes an itching sensation to some persons when coming in contact with the skin. The *strychnos nux vomica* trees or shrubs, from which strychnine is obtained, are exceedingly poisonous. Some mushrooms have harmful properties, hence care should be exercised in selecting species for the table. Henbane, belladonna, black nightshade, and water hemlock are among the poisonous flowering plants. The foliage of the wild cherry is harmful and poison sumac is injurious to the skin when touched. Polkweed, aconite, lobelia, hellebore, bittersweet, and digitalis have poisonous

properties. Many products useful in the arts and in medicine are obtained from plants belonging to this class.

POITIERS (pwä'tyâ), or **Poitiers**, a city of France, capital of the department of Vienna, on the Boivre and Clain rivers. It is situated in a fertile region, has railroad facilities, and has been improved by many public utilities. Walls surround the city and it is otherwise fortified. A number of bridges cross the rivers at convenient points. The city has several parks, a public library of 25,000 volumes, and a number of fine educational institutions and churches. The cathedral is the most noted public building. In the vicinity are remains of Roman temples, baths, an aqueduct, and an amphitheater. Among the manufactures are textiles, earthenware, toys, machinery, and utensils. It has a large trade in produce and merchandise. Poitiers is one of the oldest cities of France and dates from prehistoric times. In 507 A. D. it was the scene of a decisive battle between Clovis and the Visigoths under Alaric, in which the latter were defeated. Near it Charles Martel won a victory over the Saracens under Abd-ur-Rahman in 732. In 1356 an English army under Edward, the Black Prince, defeated the French under King John II. about five miles north of the city. Population, 1906, 39,302.

POKEWEED (pök'wēd), a stout perennial plant native to the United States and Canada, where it is seen as a common weed by the roadside. It has large leaves and greenish-white flowers, and yields berries filled with a crimson juice. Its roots are very large and branchy and contain emetic and cathartic principles. The berries yield medical properties useful in rheumatism. In some localities the young shoots are used as a substitute for asparagus, and in Portugal the crimson juice of the berries serves in coloring port wine.

POLAND (pō'land), formerly a powerful kingdom of Europe. The region is called *Polska* by the Poles, meaning a plain. It included a large section south of the Baltic Sea and at the time of its greatest prosperity had an area of 282,000 square miles. At this time the population was probably 24,000,000. The length from north to south was about 710 miles and the breadth was 675 miles, embracing a large part of the fertile central plain of Europe. The only mountains of this region are the Carpathians on the southwestern boundary, and from them a range of hills extends toward the northeast and forms the principal watershed between the rivers flowing into the Black and Baltic seas. A large part of the surface is a

fertile and undulating plain. The drainage toward the Black Sea is by the Dnieper, Dniester, South Bug, and Pripet rivers, while the Dwina, Vistula, and Nieman belong to the Baltic system. It has splendid forests of oak, birch, pine, and other valuable species of timber. Agriculture, dairying, and stock raising are the principal industries, all of which are conducted on a large scale, but it likewise has extensive commercial and manufacturing interests. Transportation is by canals, rivers, and railroads. Railway and electric lines are adequate to the demands of the country.

Poland was originally populated by the Polani, a Slavonic race, who occupied the region between the Oder and the Vistula in the early history of Europe. Small principalities existed for many centuries, but in 962 Mieczyslaw I. united the different communities and governed successfully until 992. He is classed as a representative of the Piast dynasty, but was himself a vassal of the Emperor of Germany. In his reign Christianity became the religion of the Poles. He united the Polish people in a union that endured until the latter part of the 18th century. In 992 Boleslaw the Great succeeded to the throne and reigned until 1025. He not only consolidated the kingdom, but extended it beyond the Dniester, the Oder, and the Carpathians, and later annexed territory by defeating the army of Emperor Henry II. of Germany and a number of the Russian princes. The German emperors were required to recognize him as king and henceforth Poland was one of the independent powers of Europe, which position it held for more than 700 years.

Among the causes that led to the decline of Polish power are the weakness of its rulers, the protracted internal disagreements, the extensive and intolerant influence exercised by the Jesuits, the want of natural boundaries, and the control of trade and manufacture by Germans and Jews. Local dissensions became so widespread under Stanislaus Augustus, who ruled from 1764 to 1795, that Prussia, Russia, and Austria interfered with the government in 1772 and made the *first partition* of Poland. In this partition Russia received 42,000 square miles of Polish territory; Austria, 27,000; and Prussia, 13,000. Local dissensions not only continued, but disputes arose between the regions annexed and the different countries, and in 1793 Russia and Prussia advanced their armies against the fruitless resistance under Kosciusko. In the *second partition* that followed Russia took 96,000 square miles and Prussia received 22,000.

Hostilities broke out anew the following year, in 1794, and Kosciusko commanded the Polish army with remarkable bravery, but he was overcome by superior numbers and in 1795 the *third and last partition* took place. In this final division Russia received 43,000 square miles; Prussia, 21,000; and Austria, 18,000. In 1815 the division of Poland was rearranged by the Congress of Vienna and Russian Poland was organized as a constitutional monarchy. It existed in this form until 1830, when the French revolution induced the Poles to attempt to throw off Russian power. They were not only defeated, but practically all power was taken from the King of Poland, and the Russian language became the adopted tongue of all the courts and educational institutions. This part of Poland at present has a population of 10,500,000, about two-thirds being Roman Catholics. The portions of Poland included in Germany and Austria have become more fully reconciled and are in fact practically German in language and instinct.

The Polish language belongs to the western branch of the Slavonic tongue and is closely allied to the Lusatian, Wendis, and Czech or Bohemian. It is still spoken by about 10,000,000 people, half of whom are in Russia and the remainder are in Austria, Prussia, and Turkey. The language is rich in synonyms, has a precise orthography, and has a practical grammatical structure. Compound words are rare, except as they have been introduced from other languages. Polish literature is not as rich in popular legends as that of other Slavonic tongues, and does not date from as early a period as the Czech. Early Polish writers employed the Latin language in their religious, political, and historical productions, largely because the Latin was cultivated under the direction of the church, but after the revival of learning in Europe numerous lexicons appeared in the Polish. The national song, entitled "Piesn Boga Rodzica," was written in 1408 and in 1455 Queen Sophia translated a large part of the Bible. In the 16th century Peter Kochanowski translated Tasso's "Jerusalem Delivered." The period between 1521 and 1621 was the most prolific in Polish literature, and Nicolas Rej is noted as the most eminent poet of that time. Subsequently many eminent writers contributed to the fund of literature, including Mickiewicz, Slowacki, Zaleski, and Kraszewski. Polish literature includes representative productions in all branches and is particularly rich in historical, political, and poetical writings. The chief centers of Polish influence are at Cracow, Warsaw, Wilna, and Paris.

POLAR BEAR (pō'lēr). See **Bear**.

POLAR CIRCLE. See **Arctic**.

POLAR EXPEDITIONS, the exploring expeditions made by navigators to the north and south polar regions. The objects of these expeditions have been mainly those of finding new routes of travel and exploring high latitudes in search of an open sea. Navigation in these regions is rendered extremely difficult by intense cold and vast accumulations of ice. For these reasons many millions of square miles are still unexplored and unknown.

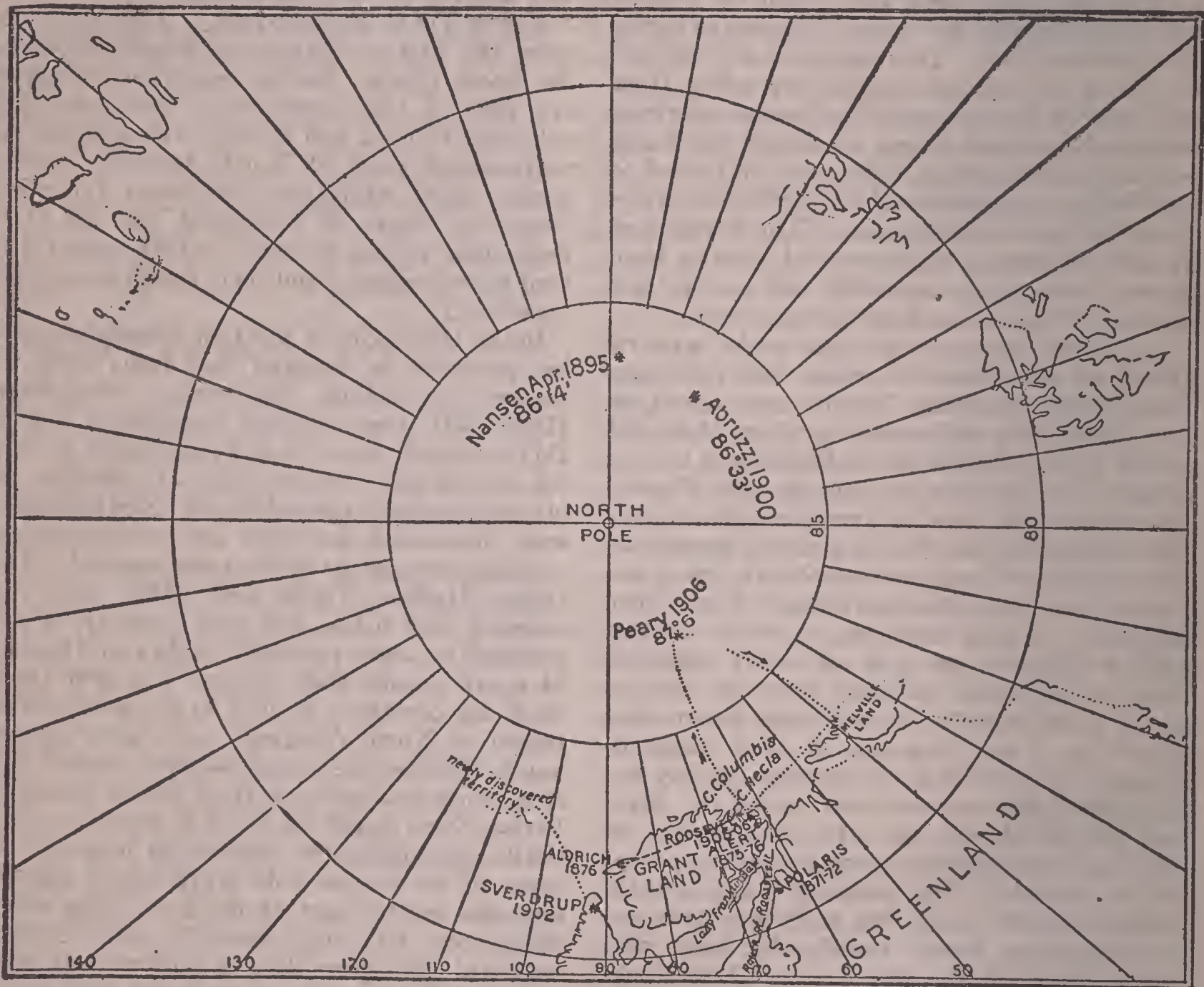
NORTH POLAR EXPLORATION. The Norsemen were the first navigators to penetrate beyond the Arctic Circle. Besides exploring the northern part of the Scandinavian peninsula, they colonized Iceland, and in 1001 cruised along the northeastern coast of North America. Subsequently their navigators penetrated far north along the shores of Greenland, but the black death that visited Norway in 1347 caused Iceland to be neglected and their explorations were abandoned.

In the latter part of the 15th century an opinion prevailed in England that India could be reached by sailing northwest. Accordingly Henry VII. commissioned Sebastian Cabot in 1517 to search for a northwest passage by sailing around the northern coast of America. In his explorations Labrador and Newfoundland were discovered, and soon after successive expeditions were made in the same region by Frobisher, Hudson, Davis, and Baffin, each discovering new fields, and their memory is perpetuated by some particular bodies or channels of water bearing their names. Fox and James made an expedition in 1631 to the northeastern region of North America. Soon after returning to Europe the belief became general that if a northwest passage from Davis Strait to Bering Strait could be found it would be practically unavailable for commercial purposes because of the intense cold prevailing in that region the greater part of the year. The enterprise soon fell into disrepute and remained neglected for more than a century, but King George III. revived it in the latter part of the 18th century. An expedition under Captain Phipps, later Lord Mulgrave, sailed to Spitzbergen in 1773, and after many hardships succeeded in reaching 80° N. Lat. Soon after Captain Cook made an unsuccessful attempt to penetrate beyond that point, and the enterprise was again abandoned until the beginning of the 19th century.

Captain Scoresby explored the eastern coast of Greenland in 1806 and reported a remarkably open sea. Soon after a reward of \$100,000 was offered by the British government to the

discoverer of the northwest passage. This caused numerous efforts to be made, the most famous being that of Sir John Franklin, who embarked from England May 19, 1845. He sailed for Bering Strait from Lancaster Sound, and, after enduring much difficulty with ice floes, his ships were frozen in at a point near 70° N. Lat., where Franklin died in 1847. As no tidings from his expedition reached England, serious apprehensions began to spread, and

of McClure, who sailed from Plymouth to Bering Strait in 1850. Thence he proceeded east and finally reached the Atlantic, and returned to England in 1854, thus being the discoverer of the *northwest passage*. Parliament granted him and his crew an award of \$50,000, and he was knighted. A well-established route exists at present between Davis Strait and Bering Strait, but it is of no practical value aside from supplying geographical knowledge.



MAP OF NORTH POLAR REGION,

Showing latitudes reached by Nansen, Peary, and Duke of Abruzzi prior to 1907.

many expeditions were sent to relieve those thought to be still alive. The first relief expedition started in 1847 under Richardson and Rae, and many others followed, but no tidings of the fate of Franklin's expedition were secured until in 1853, when Rae learned of its fate while exploring King William's Sound. Two years later portions of the *Erebus* and the *Terror*, the two vessels with which Franklin sailed, were discovered by Anderson. One of the relief expeditions was under the direction

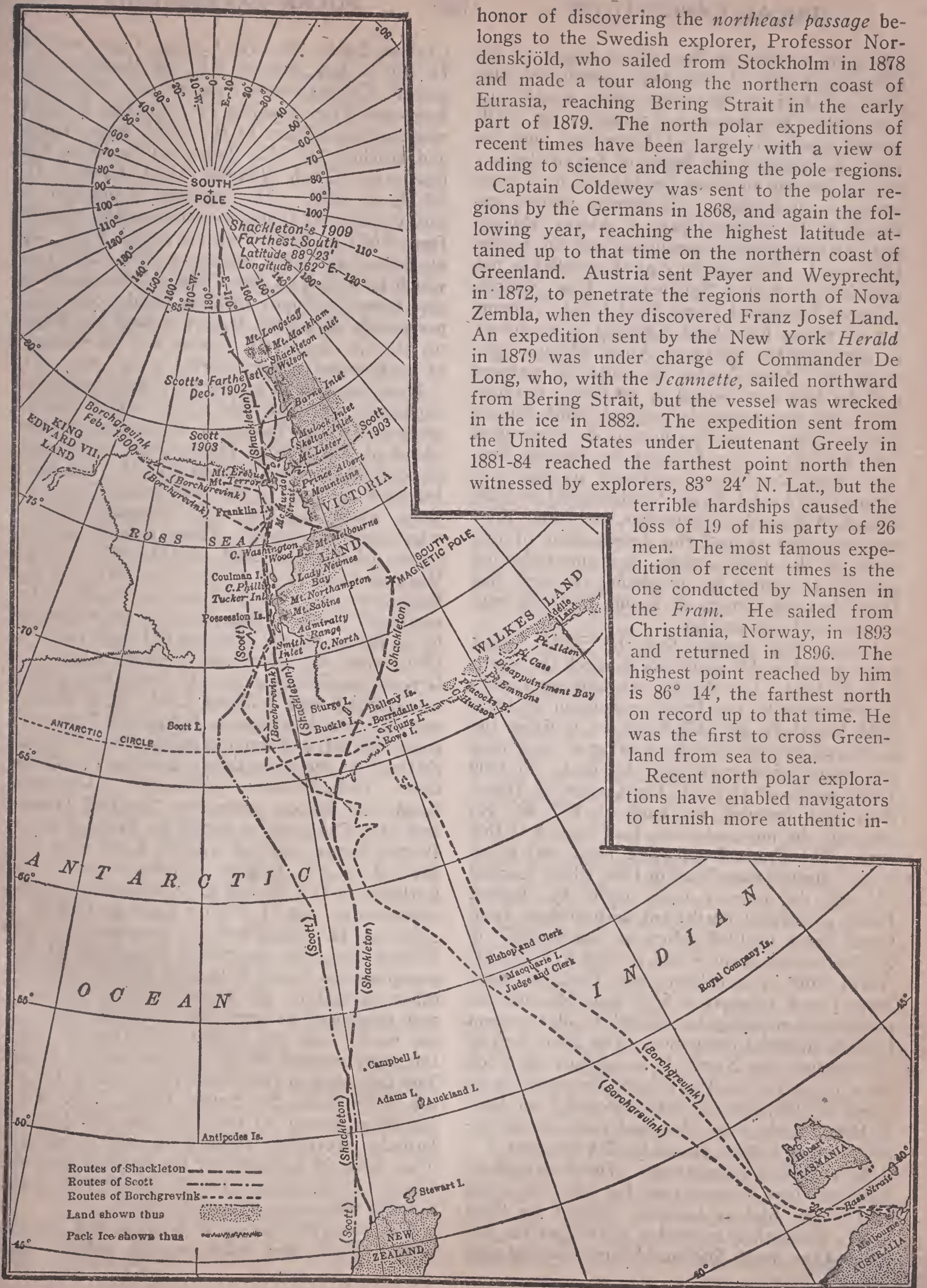
European navigators were also active in attempting the discovery of a northeast passage to the Pacific Ocean at a comparatively early date. An expedition under Willoughby rounded Cape North in 1553, and three years later Burroughs explored the southern coast of Nova Zembla. Captain Cook entered Bering Sea in 1778 with the view of finding the northeast passage by sailing westward from Bering Strait, and soon after Russian explorers made extensive expeditions, both on land and sea. The

honor of discovering the *northeast passage* belongs to the Swedish explorer, Professor Nordenskjöld, who sailed from Stockholm in 1878 and made a tour along the northern coast of Eurasia, reaching Bering Strait in the early part of 1879. The north polar expeditions of recent times have been largely with a view of adding to science and reaching the pole regions.

Captain Coldewey was sent to the polar regions by the Germans in 1868, and again the following year, reaching the highest latitude attained up to that time on the northern coast of Greenland. Austria sent Payer and Weyprecht, in 1872, to penetrate the regions north of Nova Zembla, when they discovered Franz Josef Land. An expedition sent by the New York *Herald* in 1879 was under charge of Commander De Long, who, with the *Jeannette*, sailed northward from Bering Strait, but the vessel was wrecked in the ice in 1882. The expedition sent from the United States under Lieutenant Greely in 1881-84 reached the farthest point north then witnessed by explorers, 83° 24' N. Lat., but the

terrible hardships caused the loss of 19 of his party of 26 men. The most famous expedition of recent times is the one conducted by Nansen in the *Fram*. He sailed from Christiania, Norway, in 1893 and returned in 1896. The highest point reached by him is 86° 14', the farthest north on record up to that time. He was the first to cross Greenland from sea to sea.

Recent north polar explorations have enabled navigators to furnish more authentic in-



MAP OF SOUTH POLAR REGION,
Showing route of Lieutenant Shackleton and others.

formation relative to the natural aspect of regions far north. It has been established that about one-half of the Arctic region consists of land. While Esquimaux are found as far north as the northern coast of Greenland and the Parry Archipelago and bands of Samoyedes engage in hunting in Nova Zembla, much of these regions is uninhabited. Scattering natives are found in the northern part of Alaska, Russia, and the Scandinavian peninsula, and the region lying north of the seventy-ninth parallel is not inhabited, including Spitzbergen, New Siberia, Wrangel Land, and Franz Josef Land. A number of routes have been followed by explorers to penetrate the unknown Arctic Ocean, especially the Nova Zembla or northeast passage and the Lancaster Sound or northwest passage. There are also routes by way of Smith Sound, Bering Strait, the Spitzbergen or Greenland Sea, and Franz Josef Land or Barents Sea. The Nova Zembla or northeast passage was adopted by Adolph Erick Nordenskjöld in 1878, though Willoughby, Chancellor, and other English explorers studied the development of this route in the 16th century, and the following year he succeeded in completing the first trip from Western Europe to Bering Strait by way of the northeast passage.

It was long thought that the Smith Sound route would enable explorers to reach the North Pole by land. This theory was demonstrated to be erroneous by the Peary expedition of 1898-1892, but there are still hopes of utilizing the northwest passage and penetrating at least near the geographical north pole by land. In 1900 Peary explored Grinnell Land, west of Hayes Bay, and traveled by land to $83^{\circ} 39' N.$, which is the most northern land known at this time. The Franz Josef Land route was taken by the Abruzzi expedition in 1900, which reached $86^{\circ} 33'$, the journey being made by sledges. Peary penetrated northward with sledges from Grant Land in 1906, when he reached $87^{\circ} 6' N.$ Baldwin made an effort in 1904 to reach the North Pole by a balloon, and Wellman made several such attempts in 1908 and 1909, and the project can probably be utilized as advancement is made in aerial navigation. The distinction of discovering the North Pole belongs to Cook (q. v.) and Peary. The former discovered it on April 21, 1908, and the latter reached it on April 6, 1909. Both made the final dash across the ice by using sledges drawn by Eskimo dogs.

SOUTH POLAR EXPLORATION. Dutch navigators were the first to penetrate far into the south seas. The highest latitude reached by them is 63° , where their navigator, Dirk Cherrits, discovered the South Shetland Islands, located near

Graham Land. In 1774 Captain Cook reached $71^{\circ} 10' S.$ Lat., and in 1819 the Russian navigator, Bellingshausen, discovered Alexander Land and Peter Land in 70° . Captain Weddell made an expedition to the south seas in 1823 and reached $74^{\circ} 15'$. James Clark Ross, who discovered South Victoria Land, reached $77^{\circ} 32' S.$ in 1841. He explored a portion of this region and found mountain peaks ranging from 9,000 to 13,000 feet above sea level. He discovered an active volcano, height 12,390 feet, which he named Mount Erebus. No vegetation was found in South Victoria Land. Snow lies perpetually about 18° farther toward the Equator than in the Arctic region and the expanse of ice is grand and wonderful.

Three recognized routes have been located in exploring the Antarctic Circle, which extend southward from Tasmania, Patagonia, and the island of Kerguelen. James Cook circumnavigated the Antarctic Ocean in 1773-74. The route followed by him is the one from Tasmania, along which line the most important discoveries have been made. These include the discovery of Wilkes' Land by D'Urville in 1840, Victoria Land by J. C. Ross in 1841, and the exploration of Victoria Land by Scott as far south as $77^{\circ} 21'$. A hazardous voyage was made by J. Biscoe on the Kerguelen Island route in 1831, when he discovered Enderby Land. A German expedition under Dr. Drygalski in 1902 discovered Kaiser Wilhelm Land. N. B. Palmer was the first American to follow the Patagonia route, in 1821, and discovered the Palmer Archipelago. At the same time a Russian expedition under Bellingshausen discovered Alexandria Land, and Biscoe discovered Adelaide Islands and named the region known as Graham Land. Belgica Strait, west of Palmer Land, was discovered by the Belgian expedition under De Gerlache in 1897-99, and O. Nordenskjöld made explorations east of Palmer Land in 1902-04.

Ernest H. Shackleton, a lieutenant in the British navy, has the record at present of approaching the South Pole more closely than any other navigator. He sailed in the *Challenger* and attempted to reach the southern apex of the earth's axis by sledges. On Jan. 9, 1909, this party reached $88^{\circ} 23' S.$ Lat., $162^{\circ} E.$ Long. The four men at the sledge rope were 111 statute miles from the South Pole. They were 421 miles nearer to the pole than the highest latitude previously reached in the Antarctic. They were 92 miles nearer the South Pole than Peary's closest approach to the North Pole prior to 1909, which was about 201 miles.

The Antarctic region is a bleak and barren waste. Seals and other aquatic animals are

found as far south as Victoria Land, but there is no animal life on the land except a few insects and migratory birds. The regions known as Victoria Land, Alexandria Land, Wilkes' Land, and Kaiser Wilhelm Land are not well defined and careful explorations have not been possible. Plants are entirely absent or primitive, and the interior is ice-capped thousands of feet in depth. It is conceded that the cold is more intense in the high latitudes of the Antarctic region than in corresponding latitudes of the Arctic Ocean, and that little of value can be accomplished by explorations aside from the benefits resulting from an addition to knowledge.

POLARITY (pō-lār'ī-tỹ), the quality of having opposite poles, especially the existence of two points possessing contrary tendencies. Polarity may be illustrated by the opposite tendencies in polarized light, by attraction and repulsion at the opposite ends of a magnet, and by the polarity of the earth. A spherical body at rest cannot be said to have definite poles, since its aspect is similar from every direction, but it assumes the quality of a polar body as soon as it rotates around some fixed diameter. The earth rotates around its polar diameter, hence it is a polar body, and the two ends of the axis form its North and South poles. Right and left direction and height and depth may be estimated only from a particular object fixed in place. Thus to a person north of the Equator the sun and other celestial bodies apparently move from left toward right, while to one south of the Equator they appear to move from right toward left.

POLARISCOPE (pō-lār'ī-skōp), an optical instrument for examining substances in polarized light, or for measuring the polarization of light. Various forms have been devised. The important parts of the instrument consist of a polarizer, for polarizing the light, and an analyzer, by which it is observed, usually after passing through some medium to be experimented upon. An excellent polarizer may be made by fixing a glass plate at the proper angle and then applying a small Nicol's prism, or a piece of Iceland spar or tourmaline.

POLARIZATION OF LIGHT (pō-lēr-ī-zā'shŭn), in optics, a change produced upon light so that its reflection and transmission are caused to vary with the position of the surface that reflects it, or of the medium which transmits it. All sides of a ray of light from the sun or any luminous body exhibit the same properties, but if it be reflected or refracted the different sides exhibit different properties. It is then called *polarized light*. Polarized light can-

not be detected by the unaided eye. It is studied by means of an instrument consisting of two parts, one to polarize the light and the other to show that it is polarized. The former is the polarizer, the latter is the analyzer, and the two in combination with the necessary adjustments constitute a *polariscope*, of which there are many forms. A number of mediums by which light may be polarized have been discovered. Among the various ways are its transmission through Iceland spar, or some other crystal that possesses the property of double refraction; by reflection from polished wood, water, glass, or other nonmetallic substance; by transmission through transparent uncrystallized plates; and by transmission through a number of bodies imperfectly crystallized.

A simple experiment consists of cutting two thin plates of the crystal tourmaline parallel to the axis of the crystal and passing light perpendicularly through them. If the two be placed parallel to each other, some of the light is absorbed, but what passes through becomes polarized. If the two pieces be placed so the axes of the crystal cross each other, the light is quenched, since the part passing through the first plate is polarized, but it is stopped by the second plate when crossed. Iceland spar is peculiar for its double refraction and an object viewed through it appears double. If the crystal be placed over a dot and turned around, two dots are seen; one being apparently nearer than the other and revolving around as the crystal is turned. A word can be made to appear double in like manner. Tourmaline is a double-refracting crystal in which the ordinary ray is absorbed unless the plate be made exceedingly thin. If a thin plate of it be placed between the eye and a rotating crystal of spar, it is observed that the dots alternately disappear, thus showing that the two beams are polarized at right angles to each other. In reflecting light from glass, the polarizing angle of incidence is about 56° . Other substances polarize light by reflection, but only at the proper angle from them.

The polarizing angle of incidence at which light is most copiously reflected is called the *plane of polarization*. The wave theory offers the only satisfactory explanation of polarization. According to this theory, polarization is a change in the form of the ether waves. These waves resemble water waves in that they are transverse, but instead of the vibrations being in one plane, as in a water wave, the ether vibrations are in all possible planes across the path of the wave. Hence, if we could look at the end of a ray of light coming toward us, as we can at the end of a rod, we should see the molecules

of ether vibrating across the direction of the ray in all possible planes. All these vibrations are reduced to two sets by a polarizer, as is shown by placing a plate of tourmaline between the eye and the rotating crystal of spar. One of them is called the *ordinary* and the other the *extraordinary* beam.

POLAR LIGHTS. See *Aurora Borealis*.

POLDER (pōl'dēr), the name applied in the Netherlands to redeemed land lying below the level of the sea, or below an adjacent lake or river. It is protected from overflows by dams, and there are embankments at regular intervals by which the water is carried to the river or sea. Pumps and other apparatus are employed in lifting the water upon the embankments. Usually the water is accumulated in centers by canals, often a network of connected channels, the lifting apparatus being placed at regular intervals. The most important polder is the redeemed Haarlem Lake. The land reclaimed in this manner is among the most fertile in Europe.

POLE, either of the two extremities of the axis of a sphere, around which it rotates. The northern one of the earth is called the North Pole, and the southern is designated the South Pole; each is 90° from the Equator. The term is applied in astronomy to the two points of the heavens that appear to be touched by the axis of the earth, and around which the heavens apparently revolve. These points are called the *celestial poles*, and, since no stars indicate their exact position, the polestar is reckoned from as the basis by the people north of the Equator. The term is applied in an enlarged sense to a line passing through the center of a great circle perpendicular to its plane. In this sense the *zenith* and the *nadir* are the poles of the horizon. A like application is made to the poles of a meridian and of the ecliptic. The term may be used in the same sense when speaking respectively of the celestial and terrestrial poles as the poles of the equinoctial and Equator.

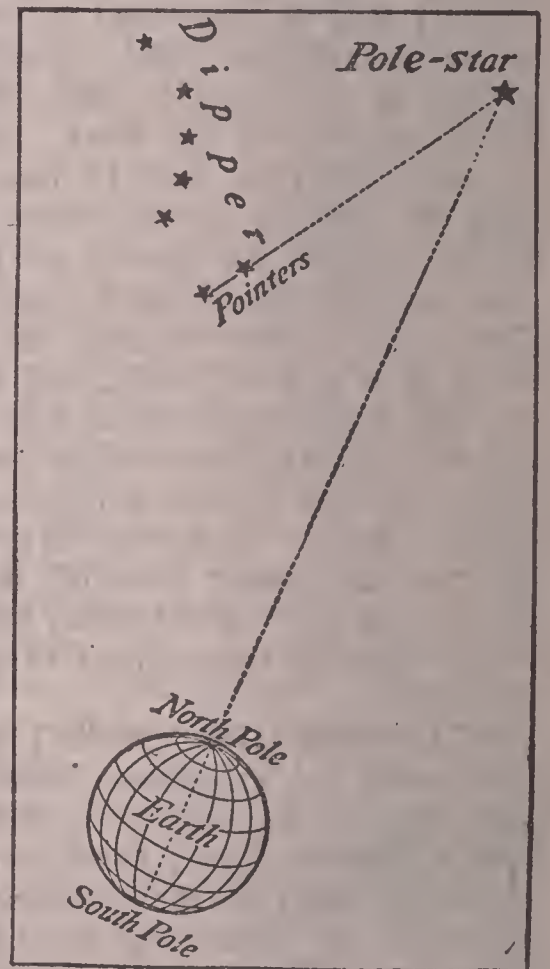
In physics the poles are two points at which opposite quantities are concentrated, which are distinguished as *positive* and *negative*, as the two poles of a battery and the poles of a magnet. The magnetic needle varies 90° from a horizontal position at the *magnetic poles* of the earth. These poles have not been definitely located and it is not certain that they are stationary. Captain Amundsen, in 1906, designated 70° N. Lat. and 100° W. Long. as the location of the North Magnetic Pole.

POLECAT, a carnivorous mammal of the weasel family. It resembles the skunk in having glands that secrete a liquid substance with

a disagreeable odor, which it ejects when scared or irritated. The polecat has a brown color and bears a valuable fur. Its body is from fifteen to twenty inches long. The tail measures six inches, and the body is about seven inches in height. It sleeps by day, but comes out at night in search of food, feeding on newts, mice, rats, frogs, birds, and poultry. Polecats are native to Europe and Asia. They are sometimes called *fitchet*, and their fur is termed *fitch*. The skunk of North America and the badger of South Africa resemble the polecat. See illustration on following page.

POLESTAR, or *Polaris*, the principal star of the constellation Ursa Minor, located at the extremity of the handle of the Little Dipper. It is situated about $1^\circ 20'$ from the celestial north pole, and from

time immemorial has been called the *north polar star*. As it is of the second magnitude, it is of great value in navigation north of the Equator. On the Equator it is seen at the horizon, and if an observer could stand at the North Pole it would appear directly overhead. The Polestar can be easily found, since the two stars known as



pointers in the Great Dipper, or Ursa Major, indicate the direction. Find the pointers, as shown in the illustration, and proceed northward about five times the distance of the two stars from each other. Six of the nine pyramids at Gizeh, Egypt, have openings toward the north. A person standing at the openings 4,000 years ago would directly face Thuban, which was then the north star. The supposed date of the building of the pyramids, in 2123 B. C., accords with that epoch. In the same manner, Polaris approaches and recedes from the North Pole, though the period covers many thousands of years.

POLICE (pō-lēs'), a body of executive offi-

cers who are charged with the duty of maintaining the quiet and good order of communities and cities. In some countries a police force is maintained to preserve civil order in the army, as distinguished from the officers vested with power to maintain military discipline. In others a civil police is supported as a general military organization, as the *gendarmerie* in France and the constabulary of



POLECAT.

Ireland. The police systems differ widely in their organization and control as well as in the duties of their officers. In general, the police comprises officers maintained by the authority of towns and cities, each municipality having its own police administration. The police systems of Canada and the United States are quite similar to the form of organization maintained in most of the cities of Europe, especially Great Britain, Sweden, Germany, and Switzerland. However, in many countries the police force is more generally under the direction of states than in the American cities and the officers are often controlled more directly by the rulers.

In former times European cities were entirely under the supervision of officers directed by the state or province, or this force was supplemented by a local police employed to patrol the city for the suppression of crime and the protection of life and liberty. This system was quite unsatisfactory, since the watchmen were inefficiently supervised by a local central superintendent. England was without a modern police system until in 1829, when Sir Robert Peel organized the metropolitan police for London, and since then the burroughs, counties, and cities have established similar local authority for municipal or district protection. The policemen in all the larger cities may be distinguished by a par-

ticular uniform, but besides those employed as open peace officers, there are secret policemen, more commonly known as *detectives*, who are not uniformed.

The several states of the United States have general power through the Legislature to found and maintain systems of peace officers. Police regulations may be established by Congress separately, but this function is applied only to the army and during times of insurrections. The several states have provisions for maintaining peace officers in the townships and counties, but these are elected and remunerated by the people locally. In counties they are known mainly as *sheriffs* and in townships and towns, as *justices of the peace* and *constables*. The police officers proper are provided for by law as officials in organized towns and cities, and are usually appointed by the mayor with the approval of the city council, though in some cities the mayor appoints a board of police commissioners, with the consent of the aldermen, and in this board is vested the power to appoint and supervise the police. In some states, as in Indiana and Missouri, the power to appoint policemen for the larger towns and the cities is vested in the Governor.

Though the police systems of the large cities are somewhat differently organized and the duties of the various classes of police officers differ somewhat, in the main the regulations present the same general features. New York City being the largest municipality in America, we give in this article the main features of its police system. Up to 1845 New York had the night-watch system as its main organization for maintaining the peace, but in that year an efficient police organization was established under a board of four police commissioners, and this was somewhat modified when Brooklyn became a part of Greater New York. At present the police regulations are as efficiently supervised as those of any large city in America. Besides the general superintendent and his direct assistants, there is a well-organized office force, including clerks and stenographers. Photographers are employed to make portraits of persons held on suspicion, and an adequate force of patrol sergeants and patrol policemen is on duty. The mounted policemen have charge of outlying districts, over which they make frequent trips. The police department has charge of those who keep the streets clean. They inspect premises and sewers and see to the enforcement of the general sanitary regulations. To facilitate the work of keeping the peace, they are assisted by a force of detectives, and have ambulance wagons for the care of men.

and animals that become disabled by accident or otherwise. In connection with the police department are detention camps and hospitals for the care of the sick and wounded.

The general plan at present is to divide the larger cities into inspection districts, which are subdivided into precincts. Special policemen are put on for duty on particular occasions, as in the case of festivals and similar large gatherings of people. London has the largest police force in the world, a total of 16,500 in 1909. In the same year New York had 8,850; Paris, 8,125; Berlin, 6,480; Vienna, 4,642; and Chicago, 4,225. In most instances the number of policemen per 10,000 of population in the large cities ranges from twenty to thirty. The total expense for police protection in New York is about \$12,500,000 per year.

POLILLO (pō-lē'yō), an island of the Philippines, located off the eastern shore of Luzón. A number of other small islands lie adjacent to the coast. It has an area of 294 square miles and the group has 405 square miles. Polillo and a number of adjacent islands are included for administrative purposes with the province of Tayabas, a political division of Luzón. Population, 1903, 1,608.

POLITICAL ECONOMY (pō-lit'ī-kaj ē-kōn'ō-mŷ), or **Economics**, the science of the industries. As such it aims to investigate and explain the nature, relations, and laws of human wants, work, and wealth—three essential factors and elements of the industries. No precise definition of political economy can be formulated, since, as a science, it is in process of formation, and no science can be clearly defined until it has been finished. The study of this science involves three stages, those of observation, imagination, and verification. Notions of economic laws are obtained by the observation of facts, mutual relations between certain groups of facts are established by imagination, and correspondence between the facts is established or disproved by observation. When, after careful investigation, agreements are discovered the facts are said to be verified.

HISTORICAL. Much has been said and written on political economy from remote antiquity, but practically all the extensive treatises date back little more than a century. A number of Greek philosophers made investigations, but most of them applied ethics as an essential element in the discussions, particularly Plato and Xenophon. Aristotle discussed the functions of money as an instrument of exchange and a measure of value. He treated the advantages of the division of labor, called attention to the evils resulting from over-population, and dis-

tinguished between value as applied to exchange and value in use. Hesiod is regarded the first Greek writer to give more than passing attention to economical and industrial subjects. In his "Work and Days" he recognizes the gods as the ultimate disposing influence in the different branches of human economy.

The Romans were practical, realistic, and utilitarian, but they developed no vastly diversified system of production and exchange. This is due to the fact that their state was organized rather for military and political purposes than for the development of industries on the field and in the factory. Many Romans looked upon industrial arts and commerce as ignoble pursuits, even Cicero sharing that view. He joined Cato and Varro in advocating the culture of the soil rather than developing trade and manufactures. However, Pliny gave some attention to discussing value as applied in the industries. He showed the evil effects of transporting money from Rome, and looked upon servile labor as equally injurious to both the laborers and to the state.

The Middle Ages comprise a vast transitory period in the economic activity of Europe. Feudalism was a hindrance to the growth of the industries, since the feudal lord denied the laborers a fair share in the distribution of wealth and levied taxes largely with a view of oppressing the laborer and maintaining the feudal system. With a gradual overthrow of feudalism, labor began to develop in a freer atmosphere, and one by one the fetters of serfdom were broken down. In the 16th and 17th centuries the spirit of colonization caused many Europeans to emigrate to new and undeveloped fields, and the spirit of enterprise at home received a marked impetus by the wholesome reforms resulting from free cities and the beginning of more extensive manufactures. Shortly after the great inventions that revolutionized all branches of industry followed, and in the 18th century such works as Hume's "Economic Essays" and Adam Smith's "Wealth of Nations" had a wide influence in revolutionizing public thought.

SCHOOLS OF ECONOMICS. Several widely different schools of political economy are recognized, including the liberal, Christian, socialist, and historical or realistic. The *liberal school* is sometimes called the *classical*. Its main doctrine is that human societies are governed by natural laws which we could not alter, even if we wished, since they are not of our making. The laws governing wages, capital, and distribution are thus looked upon as natural laws, and their effects as inevitable. The gradual ele-

vation of humanity is thought to result from the efforts made by men and governments to observe these laws. According to the *Christian school*, providential laws govern all social and physical facts, but their effect upon the institutions may be seriously deranged by the action of man himself. John Stuart Mill pointed out that, no matter what class might possess absolute power in a community, it would result in harm to the other classes, and this argument he applied against the Christian school of economists.

The *socialist school* holds that modern society is organized on an improper basis as the result of a long series of acts of injustice, which have been to some extent sanctioned by written laws. Its main opposition is directed against free competition and private property, holding that these are the two great causes that sacrifice social to private interest, and cause the wealth of a community to concentrate in the hands of a few individuals, while the great mass of people are disinherited. Karl Marx, of Germany and Proudhon, of France, are among the many writers who have contributed works of remarkable influence to the literature of socialism. The *historical or realistic school* stands in direct opposition to socialism and had its origin in the German universities about fifty years ago. Roscher's "Treatise of Political Economy," published in 1854, is properly the beginning of this line of study. The realists turn to history for a study of social and economic facts and base their teaching upon the observation of conditions. They include many of the leading statesmen of all civilized nations. Much of the labor legislation of the past twenty years is due to movements promoted by them, and they have set on foot a plan to effect international regulation of labor. The realists have gained an advantage over the liberalists, because they hold that governments may make laws to govern capital, wages, and distribution; over the Christian school, in that they recognize possibilities for all people of whatever faith; and over the socialists, because of looking upon free competition for all as a fundamental basis of human happiness.

ELEMENTS TO CONSIDER. Most writers limit wealth to the quantities which have the three essential characteristics of utility, difficulty of attainment, and transferability. *Value* is a relative term, and may be defined as purchasing power and as power in exchange. The four branches or subdivisions into which political economy is divided are production, consumption, exchange, and distribution. *Production* treats of the creation of wealth. The three

direct agents of production are land, labor, and capital, but the guardianship of government is taken into account as an indirect agent to facilitate it. *Land* comprises all natural resources, as soil, water, forests, and minerals still in natural deposits. *Labor* is defined as the human efforts and sacrifices voluntarily directed toward the production of wealth. *Capital* is the result of previous labor employed for further production. *Consumption* treats of the use of wealth and is either productive or unproductive, the two differing in that productive consumption is a use of wealth resulting in the increase of value. *Exchange* comprises the transfer of commodities between different parties, and depends in volume and commodity values upon supply and demand.

A discussion of exchange involves a consideration of the question of money, the laws of exchange, protection and free trade, banks and banking, public and individual credit and trusts. *Distribution* implies a division of wealth among those who have had a share in producing it, including the landowner, the laborer, the capitalist, and the government. This subdivision of political science is one that is receiving more and more attention from all classes, and the laws favorable to an equitable adjustment by awarding each individual the share to which he is entitled are largely of modern origin. However, other themes are concerned more or less with this particular question, but those relating to the effects of high and low wages as compared with the cost of living are immediately involved. Among the different themes engaging the attention of writers on this branch of political economy are those of unrestricted trade, artificial control of the principal products, over and under production, and the remedies for low wages. The means of relief proposed include trades unions, coöperative associations, and copartnership in industry. The effect of immigration upon wages, the wages of women, rent, interest, and taxation are other questions receiving attention. See **Money; Free Trade; Labor;** etc.

POLITICAL OFFENSES, the acts that are considered injurious to the safety of the state or nation, or which render a subject or citizen disloyal to the supreme authority. They include treason and any other acts of disloyalty and treachery intended to deliver the country or any part of it over to an enemy. In modern times nations have been lenient in dealing with political offenders, and usually they are not compelled to deliver them under extradition treaties. However, much severity is practiced in some countries, as in Russia, where General

Stoessel was punished by life imprisonment for the surrender of Port Arthur in 1905, although military experts justified his course. Another instance is that of Col. Arthur Lynch, a subject of Great Britain, who was sentenced to life imprisonment on conviction of treason for aiding the Boers in the Anglo-Boer War. The term political offenses is sometimes used in government to describe the acts of a public official who exercises undue influence in furthering the interests of his political party.

POLITICAL PARTIES IN THE UNITED STATES, the voluntary associations or organizations of citizens to further certain policies through united political action. During the Revolutionary War two political parties were formed, Whigs and Tories, taking the English names. The Whigs were in favor of independence, the Tories preferred to remain as English colonies. After the Revolution the principal controversy was due to the jealousy between the states. The smaller states feared they would lose their autonomy, hence were alarmed by every movement of the sister states. Finally the Federal Constitution was adopted and the government began under it. Washington received a unanimous election as President. Then commenced the crystallization of political parties.

STRICT AND LOOSE CONSTRUCTIONISTS. The critical condition of the country made the adoption of the Constitution a necessity, but the opposition to it was widespread, because of jealousy between the states and a deep-seated fear of a strong central government. Hence, two parties soon crystallized, called *Federalists* and *Democratic-Republicans*. These parties differed in their views of the Constitution. The Federalists were the *Loose, or Broad, Constructionists*, and the Democratic-Republicans were the *Strict Constructionists*. Washington was a Federalist and his party succeeded in forming a strong central government. John Marshall, who became Chief Justice of the United States Supreme Court, did much to strengthen the national power.

During Washington's administration (1789-1797) party spirit ran high. The controversy between the two parties became intense. The attacks made upon Washington were severe, uncalled for by the facts in the case, coarse, and unfeeling. He himself characterized them as "so exaggerated and indecent as could scarcely be applied to a Nero, a notorious defaulter, or even to a common pickpocket." His farewell address will always remain as his dignified answer to the attacks made against him by his political enemies.

In the administration of John Adams the country was divided by a sharp difference of opinion upon questions growing out of the French Revolution. The Alien Law, passed in 1797, and the Sedition Law, enacted the same year, became exceedingly unpopular. They were enacted by the Federalists and did much to hasten the downfall of that party. The reaction was so great that in the presidential election, in 1800, the Federalist party was absolutely swept out of sight and Jefferson was elected. This reaction caused the passage of the Kentucky Resolutions and the Virginia Resolutions, which constituted the first authorized proclamation of the Strict Construction party.

PURCHASE OF LOUISIANA. The most important event in Jefferson's administration (1801-1809) was the purchase from France of the Louisiana Territory. Jefferson did not plan it, for he desired to buy only the island of New Orleans. The purchase of the whole province, of more than 900,000 square miles of territory, however, was so decidedly for the benefit of the nation that neither the President nor the Senate could reasonably refuse to ratify the treaty. As a matter of fact the purchase was not unconstitutional, but extraconstitutional. By this purchase the extent of the country was more than doubled.

WAR OF 1812. During Madison's administration (1809-1817) occurred the war with Great Britain, called the *War of 1812*. The two great parties were divided upon this subject. The Democrats as a whole favored the war and the Federalists, being more largely a commercial party, were opposed to it. Congress was overwhelmingly Democratic and war was declared. The people were sharply divided and party spirit ran high, but after peace was proclaimed, in 1815, these differences of opinion rapidly vanished, and the Federal party ceased to exist.

ERA OF GOOD FEELING. In 1817 Monroe became President and his administration (1817-1825) was characterized as the *Era of Good Feeling*. During this period, however, important questions arose which subsequently assumed gigantic proportions. In 1819 the government purchased Florida from Spain. Here was another illustration of the Strict Construction party violating its principles and going beyond its interpretation of the Constitution. The application of Missouri for admission as a State (1820) raised the slavery question and paved the way for a readjustment of the political parties. The dispute was compromised by admitting both Maine and Missouri (a free and a slave State) and forever prohibiting slavery in the country north of latitude 36° 30'.

TARIFF AND INTERNAL IMPROVEMENTS. From the first the tariff question had been an issue of contention, the Democratic party favoring a tariff for revenue only and the Federalists insisting on a tariff for protection of American industries. In 1823, Monroe, in his message to Congress upon the war then existing between Spain and her revolting colonies, declared that this government would not interfere in any European colonies now existing on this continent, but we should consider any attempt by the governments of Europe to secure additional territory here as hostile to our interests. This has been called the *Monroe Doctrine*, and without any legal sanction it has become the settled rule of the foreign policy by all the political parties.

The next year the noted tariff of 1824 was adopted by Congress, the Loose Constructionists having a majority, and since that date the country has had a protective tariff. The presidential election of that year was a singular one. As there were no political parties, the contest degenerated into a struggle for individuals, and the election was determined by the House of Representatives. John Quincy Adams was elected. By this time the Strict Construction party, hitherto called the *Democratic-Republican* party, had come to be known officially as the Democratic party. The followers of the principles of Clay and Adams took the name of the *National Republican* party, which after a few years was changed to the *Whig* party. This party was the party of Loose Construction ideas, and it strongly advocated a protective tariff. The Whig party continued its existence for about a quarter of a century, but was in power only a small part of the time. The Democratic party has remained through many vicissitudes to the present time and had control of the government between 1830 and 1860, except two presidential terms.

As the years passed the opinion of men in both parties gradually turned in favor of internal improvements. In 1830 a harbor improvement bill was enacted and two years later Congress appropriated \$1,200,000 for internal improvements.

NULLIFICATION IN SOUTH CAROLINA. The people of the Northern States were largely interested in manufacturing, while those of the South were almost entirely engaged in agriculture, especially in the raising of cotton. The North favored a protective tariff, which was opposed by the South. The people of South Carolina under the leadership of John C. Calhoun were believers in State rights. They held to the practical supremacy of the states and believed that the Federal government was only

a confederation of states for certain purposes, which could be broken at any time by any aggrieved State. They contended that, if any State thought that a law passed by Congress was detrimental to the best interests of the people of that State, they could refuse obedience and annul the law, so far as that State was concerned. This was called *Nullification*.

Hence, when the tariff of 1832 was passed by Congress, which recognized the principle of protection as a policy of the United States, the people of South Carolina, by representatives in convention assembled, formally declared the tariffs of 1828 and 1832 to be "null, void, and no law, not binding upon South Carolina, her officers and citizens." This ordinance was to take effect in February, 1833. In the autumn following, the State Legislature proceeded to make the State ready for war.

But the President, Andrew Jackson, had no sympathy with John C. Calhoun and his doctrines, and he soon made it clear that the whole power of the United States would be used to maintain the national authority over the offending State. Congress, under the leadership of Henry Clay, promptly passed a new tariff law, known as *Clay's Compromise Tariff Law*. This law agreed upon a gradual reduction of the tariff until the year 1842, when the duties on all imports should be uniformly twenty per cent. Upon this South Carolina repealed the nullification ordinance and accepted the existing conditions. In the meantime the country was agitated over the questions relating to the National Bank, the removal of the deposits, the subtreasury, and the Senate's *Resolutions of Censure* of the President.

ANTI-MASONIC PARTY. In 1832 the new *Anti-Masonic* party arose. An opposition to the society of Masons had appeared in western New York. It grew out of a book published in opposition to Free Masonry. William Morgan, who had been active in opposing Masonry, suddenly disappeared and never was seen again, at least in America. It was alleged that he was kidnapped by the Masons. A party was soon formed in western New York, pledged to oppose the election to a public office of any man who was known to be a Mason. This party acquired some influence in several states and in Vermont succeeded in electing Anti-Masonic presidential electors. The principles of the party were quite similar to those of the National Republicans, later called Whigs. The Anti-Masonic party soon disappeared.

POLITICAL CONVENTIONS. In 1832 all the political parties held conventions for nominating a candidate for President. Previous to that

year other methods had been employed. At first the men of each party in Congress had made the nominations. Legislatures in various states had made nominations, but now by a convention of delegates from all the states each party nominated its candidates for President and Vice President. This method is still in force.

ANTI-SLAVERY SOCIETY. The founders of the republic considered slavery as an evil, but near the close of the 18th century the invention of the cotton gin had made slavery profitable in the Southern States. The Northern States were opposed to slavery and many people believed slave holding to be a crime against humanity. In the years 1832 and 1833 the American Anti-Slavery Society and numerous branches were formed. The people of the slave-holding states were seriously alarmed at the growing anti-slavery sentiment in the North and many in the free states were opposed to the agitation of the question, fearing that it would prove dangerous to the peace of the Union. Those composing the extreme Anti-Slavery party were called *Abolitionists*. Severe opposition to the Abolitionists in various sections of the Union and stringent laws in the Southern States tended only to increase the numbers of the Anti-Slavery party and to render more intense their agitation against the slavery system. Both of the larger parties, the Whigs and the Democrats, were opposed to the extreme measures of the Abolitionists.

FINANCIAL PANIC OF 1837. Andrew Jackson, having served two terms as President, was succeeded, in 1837, by his friend Martin Van Buren, who promised "to follow in the footsteps of his illustrious predecessor." Jackson's financial policy had seriously weakened confidence in some sections and the immense amount of paper money circulated by the State banks and the effect of the *Specie Circular* of 1836, in producing an enormous demand for gold and silver—all these things together—brought about a severe financial panic in the first year of Van Buren's administration. Specie payments were generally suspended. An extra session of Congress was called. Banks and corporations were wrecked and prices dropped to an alarming extent. It was the most severe financial panic the country had then ever seen.

ELECTION OF 1840. The election of President in 1840 was unique. Van Buren's financial policy had created a strong opposition to him and the campaign was an exciting one. The Liberty party nominated James G. Birney, the Democrats nominated Van Buren, and the Whigs named William H. Harrison and John Tyler.

Harrison was an old-time Whig. Tyler was a Strict Construction Democrat of the Calhoun type, who had broken away from his party. Harrison and Tyler were elected. The election of Harrison was the first time a Whig had been chosen to that office. Harrison died after serving a month and Tyler became President. Throughout his term he was in constant opposition to Congress.

ANNEXATION OF TEXAS. For nearly fifty years the balance of power had been kept up in the Senate, but with the large territory in the northwest out of which free states could be carved and no territory in the southwest for new slave states, the southern statesmen saw clearly that it would soon be impossible to keep up this balance of power in the Senate. Hence, it was important for them to acquire additional territory in the southwest. In 1844 the annexation of Texas became an absorbing party question. The Liberty party nominated James G. Birney for President, the Whigs nominated Henry Clay, and the Democrats nominated James K. Polk. Polk was strongly in favor of the annexation. Clay wrote, during the campaign, a letter in which he said that he would favor the annexation at some future time. This lost him many votes in the North and gained him none in the South. Polk was elected. Late in the session of 1844-1845 Congress voted to annex Texas and Tyler signed the bill before his term expired. Texas accepted annexation and in December following was admitted as a State.

OREGON QUESTION. Title to the Oregon country was based on: The right of discovery by Capt. Gray, in 1792; government exploration by Lewis and Clark, in 1805; the first actual settlement at Astoria, in 1811; and the purchase of the rights of Spain, in 1819. The boundary was in dispute between Great Britain and the United States for many years. In the presidential campaign of 1844, the Democrats urged two propositions, the one favoring the South and the other designed to conciliate the North—the annexation of Texas and a territorial government over the entire Oregon country from 42° to 54° 40'. "Fifty-four-forty or fight" was the watchword. However, after the election of Polk the interest in Oregon gradually diminished so that in 1846 a treaty was negotiated with Great Britain, fixing the northern boundary as 49° westward from the Rocky Mountains.

WAR WITH MEXICO. Mexico had not acknowledged the independence of Texas. Besides, the territory between the Nueces and the Rio Grande was in dispute between Texas and Mexico. In March, 1846, the President ordered

General Taylor to advance with his army and occupy this disputed territory. This movement precipitated war. Three months later Polk asked Congress for an appropriation to purchase territory from Mexico. This brought up the slavery question, for it was well understood that this territory was destined to be carved into additional slave states. In the House, Wilmot of Pennsylvania offered a proviso, applying to any newly acquired territory the provision of the Ordinance of 1787, that "neither slavery nor involuntary servitude shall exist in any part of said territory, except for crime, whereof the party shall first be duly convicted." This was called the *Wilmot Proviso*. It passed the House, but failed in the Senate. It was favored by the Whigs and northern Democrats. A treaty of peace was made with Mexico in 1848. By this treaty Mexico sold to the United States a large territory, then called New Mexico and Upper California. For this territory, embracing about 600,000 square miles, was paid the sum of \$15,000,000.

The same year Oregon was organized into a Territory, without slavery. In 1848 the Democrats nominated Lewis Cass. The Whigs nominated Zachary Taylor and Millard Fillmore. A new party was formed, called the *Free Soil Party*, which put in nomination Martin Van Buren. This new party was supported by many northern Democrats and by the Liberty party. The election resulted in the triumph of the Whig party. The executive for the next four years, from 1849 to 1853, was Whig, but the legislative department was decidedly Democratic. *Squatter Sovereignty* (q. v.) now became a much talked of question. The South expected that in the Mexican territory slavery would be admitted, but in this it was disappointed.

CALIFORNIA AND THE DISCOVERY OF GOLD. Scarcely had the treaty with Mexico, by which she ceded to the United States her northern provinces, been negotiated, when James Marshall discovered gold in Captain Sutter's race course. People flocked to the gold diggings from all parts of the Union. Many of them were from the North, every State being represented. In November, 1849, a constitution was ratified, under which California, in February, 1850, applied to Congress to be admitted as a State. This constitution absolutely prohibited slavery. In the House of Representatives neither party had a majority, but the balance of power was in the hands of the new Free-Soil party.

From the inauguration of General Taylor, a slaveholder, as President, until the year 1856

the Whig party continued to lose ground. It lost the antislavery men of the North and the proslavery men of the South. The northern Whigs joined the Free Soil party, and the southern men allied themselves with the Democrats. Squatter Sovereignty, or Popular Sovereignty, became the watchword of the Democratic national convention.

COMPROMISE OF 1850. Early in the year 1850 Clay submitted a compromise proposition, which, after prolonged discussion and some changes, passed and became a law. The measures were substantially as follows: The admission of any new states from Texas, the admission of California, the organization of the territories of New Mexico and Utah, the payment of \$10,000,000 indemnity to Texas, a rigid fugitive slave law, and the abolition of the slave trade (but not of slavery) in the District of Columbia.

The passage of the fugitive slave law was especially distasteful to the North. It produced the enactment of sundry personal liberty bills by northern legislatures. President Taylor died in 1850 and Millard Fillmore became President. The controversy concerning the tariff, internal improvements, and a national bank disappeared for a time and the topic of slavery absorbed the attention of the parties. In 1852 the Democrats nominated Franklin Pierce, the Whigs named as their standard bearer Winfield Scott, and the Free Soil party nominated John P. Hale. Pierce was elected.

KANSAS-NEBRASKA BILL. In 1854 came the bitter controversy over the Kansas-Nebraska bill. The Democratic party sought to settle the slavery question by compromising with the North and the South, and the Whig party had largely changed to a Free-Soil party. The Kansas-Nebraska bill proposed to organize two new territories west of Missouri, one called Kansas and the other, Nebraska. By the Compromise of 1820 this territory was dedicated to freedom, but by this bill all the territory north or south of the parallel of 36° 30' should admit or exclude slavery as its inhabitants might decide. This bill finally passed and became a law. The South, Whigs and Democrats, voted for it, the northern Democrats were evenly divided, and the northern Whigs and Free-Soilers were united against it. The northern and southern Whigs were separated, never to come together again. Political parties assumed new lines. The slavery question dominated all national legislation.

At the opening of the Thirty-Fourth Congress, in December, 1855, the Anti-Nebraska men had a majority in the House, but many

of them were *Know-Nothings* (q. v.). Neither political party had a majority. The balloting for Speaker of the House continued until February. One hundred and thirty ballots were taken without a choice. The leading candidates were N. P. Banks of Massachusetts and James L. Orr of South Carolina. Finally it was agreed that a plurality should elect. Then Orr's name was withdrawn and Aiken of South Carolina was put in nomination. On the 134th ballot the vote stood 103 for Banks, 100 for Aiken, and 11 scattering. Banks was declared elected.

The Anti-Nebraska men now adopted the name *Republican*. This party soon crystallized its tenets into the following: The Federal government has power to control slavery in the territories, protective tariffs, internal improvements, and national bank currency. The controversy was long and bitter, but the Republican party finally triumphed. In 1856 the Democratic candidate for President was James Buchanan, the Republicans named John C. Frémont, and the American party (*Know-Nothings*) nominated Millard Fillmore. The contest was spirited. Buchanan was elected.

Immediately after Buchanan had taken the chair, the decision of the United States Supreme Court in the Dred Scott case was announced. This was approved by the South and denounced by the North. According to this decision, Negro slaves were chattels, "who had no rights or privileges but such as those who held the power and the government might choose to grant them." "Congress had no right to prohibit the carrying of slaves into any State or Territory." From this time the nation drifted rapidly toward the Civil War. The whole country was aroused. The presidential election of 1860 drew on apace. The Democratic convention met in Charleston, S. C., and divided into two factions, the northern delegates nominating Stephen A. Douglas and the southern, John C. Breckenridge. The American (*Know-Nothing*) party reorganized under the name of the Constitutional Union party, declared for the Constitution of the country, the Union of the states, and the enforcement of the laws. It nominated John Bell for chief executive. The Republican national convention nominated Abraham Lincoln, who was elected after an exciting campaign.

CIVIL WAR AND RECONSTRUCTION. Since the Republican party was pledged to prevent the extension of slavery, the South undertook to establish the Confederate States (q. v.). Eleven states seceded and the country was thrown into the Civil War (q. v.), which lasted four years. However, the Federal government was support-

ed by the Republican party and by the great mass of northern Democrats. In 1864 Lincoln was again nominated by the Republicans and George B. McClellan was the nominee of the Democrats. Lincoln was reelected, but was assassinated a few weeks after his second inauguration, and Andrew Johnson, the Vice President, became President. Lincoln had issued the Emancipation Proclamation and the war soon closed. Johnson opposed the congressional plan for reconstruction and the South in the meantime suffered under the *carpet-bag* (q. v.) policy. The Thirteenth, Fourteenth, and Fifteenth amendments of the Constitution were adopted. These were the culminating features of the settlement of the slavery question.

Meantime, in 1868, the Republican party nominated Gen. U. S. Grant and the Democratic candidate was Horatio Seymour. Grant was elected by the votes of the North. He served two terms (1869-1877). In 1872 he was opposed by Horace Greeley, the candidate of the Liberal Republicans and Democrats, and for the first time the Prohibition party made a nomination for President. His second term was not so successful as his first term had been, and serious charges of corruption were made against various officeholders. In 1876 a strong effort to nominate Grant for a third term was frustrated and R. B. Hayes was the Republican nominee. He was opposed by Samuel J. Tilden, the Democratic nominee, Peter Cooper, who was nominated by the Greenback party, and Greene C. Smith, the Prohibition candidate. The election was disputed and the whole matter was left by a vote of Congress to the Electoral Commission (q. v.). The decision was in favor of Hayes and he was inaugurated. Reconstruction in the Southern States was completed and the *carpet-bag* régime was ended within his administration. In 1880 the Republican candidate was James A. Garfield, that of the Democrats was W. S. Hancock, and the Greenback candidate was J. B. Weaver. Garfield was elected, but died by the hand of an assassin the following year. He was succeeded by the Vice President, Chester A. Arthur.

TARIFF AND CIVIL SERVICE REFORM. In 1884 the Democrat and Republican parties were divided on the two issues of tariff revision and civil service reform. Grover Cleveland was nominated by the Democrats and James G. Blaine by the Republicans. Several minor parties, such as the Labor party and the Prohibitionists, likewise made nominations. The Democrats carried the election by a large majority, being the first time since 1856. Owing to a lack of harmony within the party on the tariff issue,

little was done to reform the tariff, but considerable advancement was made in improving the civil service. Cleveland was a candidate for reelection in 1888, but was defeated by his Republican opponent, Benjamin Harrison. Within his administration, in 1890, the McKinley tariff and the Sherman silver law were enacted. Both measures proved unpopular and were instrumental in defeating the party in the election of 1892, when Cleveland was elected to the Presidency over his Republican opponent, Benjamin Harrison. The *People's* party nominated J. B. Weaver for President, being the first nominee of that party. Simon Wing was the candidate of the Socialists and John Bidwell of the Prohibitionists. The Democrats, having the executive and both branches of Congress, passed the Mills tariff bill and the income tax law. Since the latter was declared unconstitutional by the Supreme Court, the Mills tariff did not provide sufficient revenue.

MONEY QUESTION. An entirely new alignment was made in the political organizations in 1896, when the money question became the paramount issue. The Democrats, who nominated William J. Bryan, declared in favor of *bimetallism*, favoring the free and unlimited coinage of both gold and silver at the ratio of sixteen to one. William McKinley, author of the McKinley bill, was nominated by the Republicans on a platform which favored higher tariff and the gold standard of coinage. The Democratic nomination was endorsed by the *People's* party. A fraction of the Democratic party, being opposed to bimetallism, organized the *National Democratic* party and nominated John M. Palmer for President. The campaign was one of unusual interest, resulting in the election of McKinley and a majority of Republicans in Congress. Within this administration occurred the Spanish-American War and the single gold standard of coinage was legalized.

INSULAR POSSESSIONS. Those who opposed the annexation of territory remote from the United States declared themselves against the policy of McKinley, hence became known as *Anti-Imperialists*. This question entered largely into the campaign of 1900, when McKinley, as the Republican candidate, defeated Bryan, his Democratic opponent. However, McKinley was assassinated in 1901 and was succeeded by Theodore Roosevelt, the Vice President. The latter was elected to the Presidency in 1904, defeating Alton B. Parker, the Democratic nominee. During the succeeding administration the policy of McKinley was carried out to a large extent, especially in the administration of government in Porto Rico, Hawaii, and the Phil-

ippines. In the meantime much was said in regard to Federal regulation of insurance companies, interstate commerce, and railroads and other common carriers. In 1907 the country was thrown into a panic, owing largely to a scarcity of money in New York City and other business centers, but the stringency subsided and business confidence was restored early in the following year.

CURRENT ISSUES. William H. Taft was nominated for President in 1908 by the Republicans; William J. Bryan, by the Democrats; Eugene V. Debs, by the Socialists; Eugene W. Chafin, by the Prohibitionists; and Thomas L. Hisgen, by the Independents. The issues of the campaign centered largely upon tariff reform, interstate commerce, and issues affecting trusts, banks, and common carriers. Taft was elected and announced that he would carry out the policy of his predecessor. However, Congress, although both branches were Republican, failed to reach a conclusion upon the tariff question without an extended discussion. It developed in the meantime that representatives from different sections of the country were variously interested in the proposition to admit grain, lumber, coal, and many classes of manufactured articles at specified rates or entirely free of duty. Besides, the party was not a unit upon the question of enacting an income tax, the majority opposing and the minority favoring such a measure, while the Democrats almost uniformly supported this measure. As a whole the country entered upon a prosperous era at the beginning of the administration.

POLLEN (pŏl'lĕn), the name of a substance developed in the interior of the anther of a plant. When it is carried to the stigma of a blossom belonging to the same species, it germinates the ovules so that they develop into perfect seeds. The most common forms of pollen grains are minute triangular or spheroidal bodies, but in unbelliferous plants they are oval, and in some compound flowers they are polyhedral. They consist of two or three layers and within is a cavity filled with a viscid fluid, which is sometimes transparent, but usually is rendered opaque by the minute granules that float in it. When the pollen grain, conveyed by insects, the wind, or other agencies, is lodged upon the stigma, its internal layer is protruded through the outer one in the form of tubes which elongate themselves rapidly and carry the granules downward until they reach the ovule. As soon as this occurs a change takes place in it by which the embryo is originated. This process, called impregnation, is necessary to produce a complete seed. The ovule and ovary sometimes

continue to grow and ripen into fruit, but seeds that have not been impregnated prove abortive and do not germinate. Although fertilization takes place if only one pollen grain comes in contact with the ovule, every plant produces many pollen grains, a provision of nature that furnishes protection against loss or destruction of the species.

POLL TAX, a tax levied on each poll or head. Most of the nations levy capitation taxes of varying amounts. The power to collect such a tax in the United States is vested in the Constitution and in the states. However, the national government has never exercised this function and the constitutions of several states expressly forbid it. Those imposing the tax make it from fifty cents to \$3 per year, though disabled persons and those below 21 and over 45 years of age are usually exempt from it. Massachusetts and several other states make its payment a qualification for voting.

POLO (pō'lō), a game played on horseback and which in some respects resembles hockey. It originated in Asia, where it was played as early as the 8th century, and is thought to be the game mentioned in the "Arabian Nights" as tennis. British cavalry officers learned the game in India and introduced it into England in 1872. It is now a very popular game in Canada and the United States. The game is played on a space marked out on level ground, usually 200 yards wide and 300 yards long. The players are mounted on horseback and are armed with long polo sticks, usually mallets having flexible handles, and with these they endeavor to drive a ball through the goal of the opposing players. The game is played with four or five on each side, and to succeed well requires good horsemanship and trained ponies. Formerly the standard rules required the ponies not to be more than fourteen hands high, but several associations raised the height to 14.2 hands in 1889. A number of American associations are maintained and the game is steadily gaining favor, though it is somewhat expensive and requires well-bred ponies and carefully laid out grounds. American polo players attained considerable success in competing for prizes in the Exposition at Paris in 1900. The national championship was won in 1907 by the Rockaway Hunting Club, of Long Island, at the games in Chicago.

POLTAVA (pāl-tā'vā), or **Pultowa**, a city of Russia, capital of a government of the same name, at the confluence of the Vorlska and Poltavka rivers. The streets are regularly platted and improved by modern conveniences. Among the manufactures are cotton and woolen

goods, machinery, clothing, and leather. It is the seat of several excellent educational institutions, a fine cathedral, and a splendid monument commemorating the victory of Peter the Great in 1709 over Charles XII. of Sweden. It is surrounded by a fertile agricultural country and has an extensive trade in cereals, live stock, and lumber. Population, 1907, 54,842.

POLYGAMY (pō-līg'ā-mŷ), the practice of having a plurality of wives. The term is sometimes extended to the state in which a woman has more than one husband, but that custom is more properly called *polyandry*. Many of the ancient nations of Asia and Africa sanctioned or tolerated polygamy as a religious institution, and it was practiced by the Israelites and the patriarchs, even under the Mosaic law. In the early history of Greece it had some foothold, but disappeared entirely as civilization progressed, and it was never sanctioned by the Romans and the Germanic races. *Monogamy* is enforced in all Christian countries. Polygamy never was tolerated or practiced in the United States, but was sanctioned for a short time after 1843 by the founders of one branch of the Mormon Church, in Utah. It is still practiced in many countries of Asia and various islands of the Pacific, and is sanctioned in practice by the Mohammedans. Polyandry is practiced in some regions of Tibet, in Ceylon, and among certain races of Australia and New Zealand.

POLYGON (pōl'i-gōn), a plane figure bounded by straight lines. These lines bound it on all sides and collectively are called *sides* of a polygon. The points at which the lines meet are designated *vertices*, and the entire bounding line is called the *perimeter*. The class to which a polygon belongs depends upon the number of its sides or angles. Those with three sides are called *triangles*; those with four, *quadrilaterals*; those with five, *pentagons*; those with six, *hexagons*; those with seven, *heptagons*; those with eight, *octagons*; those with nine, *nonagons*; those with ten, *decagons*, etc. A polygon which has equal sides is said to be *equilateral*, and, if its angles are equal, *equiangular*. A polygon is said to be *regular* if it is both equilateral and equiangular, and *twisted* if the sides are not in a single plane.

POLYMERISM (pō-līm'ēr-iz'm), in chemistry, the term applied to the property of compounds which gives them different molecular weights, although they contain the same number of various atoms. When this property is found in compounds they are said to be polymers of one another.

POLYNESIA (pōl-ī-nē'shī-ā), a name usu-

ally applied to the extensive archipelagoes of the Pacific Ocean, which include all the islands north of New Zealand and east of the Philippines, New Guinea, and Australia. They include innumerable islands and islets, distributed over about 11,000,000 square miles of ocean. However, their combined area does not exceed 200,000 square miles and the population is not more than 1,800,000. Three principal subdivisions are made of the whole group, embracing Polynesia Proper, Micronesia, and Melanesia, and each of these is again divided into smaller groups. *Polynesia Proper* occupies the largest ocean surface and extends from below to regions far above the Equator. The general direction of the islands of this and the other groups is from northwest to southeast. Besides a large number of scattered islands, it includes the archipelagoes of the Hawaiian Islands, and the Society, Cook, Marquesas, Tokelau, Phoenix, Tonga or Friendly, Ellice, Fiji, Navigator's, and Tuamotu islands. The inhabitants of these islands belong to the Polynesian race, though many different classes of people have formed settlements in various islands.

Micronesia is situated between the Philippines and the northern part of Polynesia Proper, while its southern boundary is formed principally by the Equator. The principal archipelagoes include the Carolines, Ladrões, Marshall, Radack, Pelew, Gilbert, and Brown islands. *Melanesia* is situated northeast of Australia, south of Micronesia, and west of Polynesia Proper. It is the most important of the divisions, since it comprises the larger part of both the area and population. Among the most important islands of this group are New Guinea, New Pommern, and the groups of Solomon, Loyalty, Huon, Chesterfield, New Caledonia, New Hebrides, Santa Cruz, Admiralty, Norfolk, and Louisiade islands. Renewed interest has been centered in the northern part of this division within recent years, especially in the Bismarck Archipelago, where extensive developments are being made by Germany, Holland, and Great Britain. Many of the islands and groups of Polynesia have much fertility of soil, while all have remarkable uniformity of climate, and some are noted for valuable deposits of many minerals. The islands differ in being partly or entirely of volcanic or coral formation.

Darwin and other writers express the view that this vast region was once a continent and that the land became submerged below the surface of the ocean. In this way the general trend of the volcanic islands is accounted for, since they are regarded the more elevated peaks of former mountain ranges. The coral islands

have been built up by coral polyps as the surface settled farther and farther into the sea. The highest mountains of the volcanic islands are found in the Hawaiian group, where the peak of Mauna Kea attains a height of 16,810 feet, while the coral islands are only slightly elevated above the ocean.

Most of the inhabitants are Polynesians, though there are many people of Malay origin. The languages differ widely, since various dialects are spoken in the separate groups, and there is a marked difference in the state of social and industrial development. Christian missions were first established in 1797 on Tahiti, an island of the Carolines, and since then successive efforts have been made in all the groups, though the population has been gradually decreasing under the civilizing influence of Europeans. This is accounted for from the fact that these peoples represent the lowest types in the intellectual development of mankind. The products are diversified. They include principally fruits, coffee, cocoanuts, sugar, tobacco, cotton, rice, trepang, and cereals. Live stock is reared in abundance. The first extensive discoveries made were by Magellan, who visited the Ladrões and other islands in 1521.

POLYP (pŏl'ip), one of many small aquatic animals, nearly all of which are inhabitants of the sea. Only two species of fresh-water polyps are known. They live largely in societies and include the corals, hydroids, and polyzoa. The body is cylindrical in form and has a mouth at one end, which is surrounded by a circle of arms or tentacles, in which respect they resemble the many-armed cuttlefishes. This class of animals belongs to the lower scale. They have none of the five senses common to other animals and are incapable of moving from their place. The coral polyps are perhaps the most interesting, since they are the builders of the coral islands.

POLYTECHNIC SCHOOL (pŏl-ĭ-tĕk'nĭk), an educational institution that has courses of study in arts and sciences, and whose special object is to induce the practical application of the instruction given. The first school of this class was established by a decree of the French convention on Feb. 13, 1794, and since then many others have been founded. These schools of France are devoted to instruction in architecture, physics, chemistry, mathematics, engineering, telegraphy, and other branches. The institution in which the military officers, engineers, and other public officials of France are trained is known as the Polytechnic School. Institutions of a like character are now very numerous in Europe and America. The first

established in the United States was founded at Troy, N. Y., in 1824, and is known as the Rensselaer Polytechnic Institute. In the latter part of the same year the Franklin Institute was founded at Philadelphia. The Mechanics' Institute at Cincinnati, Ohio, adopted a similar curriculum in 1848. Special institutions or special practical departments in other institutions are now quite general in Canada and the United States.

POLYTHEISM (pŏl'ī-thē-iz'm), the belief in two or more gods, being opposed to *monotheism*, which is the belief in one god. It is generally held that monotheism is the primitive or original form of worship, and that polytheism and other beliefs originated from the apostasy of those who abandoned the original faith or principles. The feeling of personal dependence and the practice of worship is natural to man, hence those who live under primitive conditions are easily induced, either by others or as a result of natural tendencies, to worship demonic forces or familiar objects that inspire awe and admiration. At first spirits are looked upon as gods, but when they cease to interest or satisfy, the worshiper defies the sky, earth, sun, or other heavenly bodies. In the beginning of polytheism concrete forms are preferred, but later they develop into the abstract. The Tiber, the Ganges, and the Nile were worshiped before water was developed into a deity, but the latter afterward gave way to wisdom and other virtues, which were objects of worship in the polytheistic systems of the ancients. In the early stages of polytheism the demons and gods were frequently interchanged, and the believer who vainly sought good from the latter might turn to the demon for aid in seeking protection against ills and dangers. In some countries, as in Greece and India, the gods were arranged in social groups to accommodate the several castes or satisfy under various conditions.

POMEGRANATE (pŏm'grăn-ăt), a class of trees of the myrtle family. They are native to Palestine and the Mediterranean region, but are cultivated extensively for their fruit in many countries. The tree is of small size, usually from twelve to twenty feet high. It has shining leaves and twiggy branches and bears large and brilliant red flowers. The fruit is about the size of an orange. It has a hard, reddish-yellow rind inclosing many large seeds, each of which is enveloped in a red pulp from which a cooling drink is made. The rind and the flowers are used as a powerful astringent. Some countries have a brisk trade in the pomegranate, especially in the warmer climates, since it is a particular favorite as a cooling and refreshing

fruit during the warm seasons. Its culture is most extensive in Southern Europe, Western Asia, Northern Africa, Mexico, and the West Indies. Several species survive the winters in latitudes as far north as Pennsylvania, but the fruit does not mature.

POMERANIA (pŏm-ĕ-rā'nĭ-ă), a maritime province of Germany, bounded on the north by the Baltic Sea, east by West Prussia, south by Brandenburg, and west by Mecklenburg. It has an area of 11,628 square miles. The soil is mostly fertile, though along the Baltic the surface is low and sandy. Fine forests are abundant and it has a number of beautiful interior lakes. The drainage is principally by the Oder, Stolpe, and Persante. Among the minerals are bituminous coal and inexhaustible deposits of peat. The fisheries are important. Vegetables, fruits, corn, wheat, rye, barley, and oats are produced in abundance. It has considerable interests in beet sugar, hay, potatoes, tobacco, live stock, and poultry.

Railroad lines penetrate all sections of Pomerania. It has vast commercial enterprises, particularly at Stettin, the capital of the province and one of the chief seaports of Germany. The University of Greifswald is the principal educational institution. Formerly the inhabitants were principally Goths, Slavs, and Vandals, and it was named in the 5th century from a Slavish tribe called *Pomerani*. The first mention in history is in 1140, and shortly after it became a part of the German Empire. It was annexed to Sweden in 1637, but the house of Brandenburg regained it for Germany in different portions until the last Swedish possession was ceded in 1815. Formerly it consisted of Vorpommern and Hinterpommern, but it is now divided into the three governments of Stettin, Stralsund, and Köslin. Population, 1905, 1,684,326.

POMONA, a city of California, in Los Angeles County, 32 miles east of Los Angeles, on the Southern Pacific, the Atchison, Topeka and Santa Fé, and other railroads. The surrounding country produces cereals and fruits. The noteworthy features include the public library, the high school, and Ganesha Park. Pomona College (Congregational) is near the city, at Claremont. Among the manufactures are wine, canned fruits, earthenware, cigars, and machinery. It has public waterworks, sanitary sewerage, and well-graded streets. The place was settled in 1875 and incorporated in 1887. Population, 1900, 5,526; in 1910, 10,207.

POMPEII (pŏm-pā'yĕ), an ancient city of Rome, located in Campania, at the foot of Mount Vesuvius. It had a beautiful site on the Bay of Naples, near which the Sarnus River

has its mouth, and in the time of the latter part of the republic and the early part of the empire it was noted as a favorite retreat and residence city of the wealthy Romans. The city was founded about 600 B. C. by the Oscans and became a Roman possession about 100 B. C. Under the Romans it was made a seaport and trade center of importance. Fine villas were built by noted military men and statesmen, among them Cicero. An earthquake visited it in 63 A. D., when many of its buildings were destroyed, but the Romans at once began to rebuild on a much grander plan, and within a few years it had a population of about 25,000. The calamity that finally destroyed the city occurred in 79 A. D., when great eruptions of cinders, ashes, and melted rocks burst from Mount Vesuvius. This volcano had been inactive for ages, but when it suddenly broke forth on Aug. 24 the accumulated force completely overwhelmed the people. For three days a continuous stream of lava flowed over the city, dense volumes of smoke obstructed the light of the sun, and the panic-stricken people were alarmed by repeated earthquake shocks that heaved and lowered the surface in consecutive waves.

Amid the fearful disturbance the citizens rushed rapidly from the city, but many were buried by the lava or suffocated in the gases that escaped from the burning mountain. Both Pompeii and Herculaneum were destroyed, but the former was buried so deeply that all attempts to restore it were abandoned by Emperor Titus, who had organized commissions to relieve the sufferers and rebuild the city. At present the mass covering the city has an average thickness of twenty feet, but a part has been thrown from the volcano by subsequent eruptions. The city was entirely lost in the Middle Ages, partly because the Sarnus River had been turned from its course and the coast regions had been raised by the disturbance so the site was more than a mile from the Bay of Naples. In 1748 the first discovery of the lost city was made by sinking a well in a vineyard of the vicinity. The workmen discovered a beautiful chamber containing statues and other productions of great beauty. Soon after extensive excavations began to be made and in 1755 the theater, amphitheater, and other buildings of historic interest were uncovered.

A system of excavations was promoted under the Italian government in 1760 for the purpose of restoring a large part of the statues and other valuable works of art. In the reign of Murat, from 1808 to 1815, the Street of Tombs, the Forum, several public buildings, and a number of residences were excavated. Subsequent-

ly Victor Emmanuel devoted public funds to promote excavations and secured many of the ancient works of art that may now be seen in the Italian and other European museums. These excavations show that the city was built in the form of an oval, with straight and regular streets, but some of them were not more than from fifteen to twenty feet wide, though the principal streets had a width of about thirty feet. The streets were paved with blocks of lava. The houses were largely of concrete, though bricks were used in some structures, and many were from two to three stories high. Shops and offices occupied the lower floors and the upper parts were used for dwellings. Light was provided by a hall in the center of the building, which was connected with the street by narrow passages, and all the rooms and apartments were small.

The architecture itself was not of particular interest, except as found in the public buildings, but the works of art are of much value, since they include specimens of the great masters and throw considerable light on ancient history. Among the most notable public buildings are the Temple of Mercury, the Pantheon, or Temple of Augustus, the Temple of Jupiter, the Temple of Venus, the Amphitheater, the Basilica, and the Curia. The private villas of Salust, Marcus Lucretius, and Cicero have been located and a number of paintings and ornaments have been secured from them. The number of skeletons found is not more than 300. They have been exhumed largely from basements, indicating that most of the citizens escaped or were destroyed by the burning lava. The city at its greatest prosperity is thought to have had from 30,000 to 50,000 inhabitants.

POMPEY'S PILLAR, a celebrated column of red granite, standing on an eminence south of Alexandria, Egypt. It is built in the Corinthian order and may be seen about a quarter of a mile south of the walls of the city. The height is 98 feet 9 inches, the shaft comprising 72 feet of this elevation, and it measures about 29 feet in circumference. It is supposed to commemorate the conquest of Alexandria by Diocletian in 296 A. D., and the Greek inscription at the base relates that it was erected by Publius, prefect of Egypt, in honor of that noted conqueror. A splendid circus and a forum were near this monolith in ancient times.

PONCA, a tribe of Indians formerly in the territory now included in South Dakota and the northern part of Nebraska. They belonged to the Sioux family and spoke a dialect of the language used by the Osage, Kaw, and Omaha

tribes. Lewis and Clark met with them near the mouth of the Niobrara in 1804, where they remained until 1877, when they were removed to the territory now included with Oklahoma. They now occupy a reservation jointly with the Otoes and Pawnees. In 1901 the portion in Oklahoma numbered 553, but a branch of the tribe is still in Nebraska.

PONCHO (pŏn'chŏ), an article of dress resembling a cloak, much worn by the Spaniards and Indians of South America. It is made of a rectangular piece of woolen or other cloth, usually from five to seven feet long and four feet wide. A hole in the middle enables the wearer to pass it over the head, and it hangs loosely before and behind, leaving the arms free. Many of the military men wear ponchos of waterproof cloth.

PONDICHERY (pŏn-dĭ-shĕr'rĭ), a city of India, capital of the French territory, 85 miles south of Madras. This tract of land has an area of 115 square miles and is surrounded by the British province of Madras. In 1906 the possession had a population of 272,113. The city is on the Coromandel coast, has steam and electric railway facilities, and is divided into two parts by a canal. Among the chief buildings are those of the government, the Hotel de Ville, and the Catholic cathedral. It is the seat of several native and French colleges and numerous Buddhist temples. Cotton textile, brick, earthenware, clothing, and machinery are the leading manufactures. It has considerable trade in sugar, rice, cotton goods, hides, and fruit. The French acquired the town and territory by purchase in 1674. It was captured by the Dutch in 1693, but four years later was restored to the French by the Treaty of Ryswick. The English took possession of it several times, but since 1815 it has remained continuously in the hands of the French. Population, 1906, 46,887.

PONTCHARTRAIN (pŏn-chär-trän'), a lake of southern Louisiana, situated immediately north of New Orleans, about five miles west of the Mississippi. The length from east to west is 40 miles and the width is 25 miles. Two canals connect it with New Orleans. It communicates through Rigolets Pass with the Mississippi Sound, thus facilitating transportation from New Orleans and the eastern part of Louisiana to the Gulf of Mexico. The lake is a favorite summer resort and many beautiful villas occupy the high and healthful banks on its northern shore. An electric railway extends from New Orleans to the southern shore.

PONTIAC, a city in Michigan, county seat of Oakland County, on the Clinton River, 25 miles northwest of Detroit. It is on the Grand

Trunk and the Pontiac, Oxford and Northern railroads. Many picturesque lakes are in the vicinity, making the place popular for fishing and as a resort. The chief buildings include the county courthouse, the public library, the high school, the Eastern Michigan Asylum for the Insane, and the Michigan Military Academy. Among the manufactures are flour, machinery, woolen goods, wagons, lumber products, and earthenware. The surrounding country has valuable forests and yields large quantities of cereals, dairy products, and wool. Electric lighting, pavements, and waterworks are among the improvements. It was settled in 1818, when it was named from the Indian chief, Pontiac, and was incorporated in 1861. Population, 1910, 14,532.

PONTIFEX (pŏn'tĭ-fĕks), the title given by the ancient Romans to members of one of the two celebrated religious colleges, the other being known as the College of Augurs. Originally there were five pontiffs of this order of priests, the president being styled Pontifex Maximus, but the number was afterward increased to nine and still later to fifteen. The pontiffs were not charged with conducting sacrifices, nor were they obliged to worship any particular divinity, but they had general control of the official religion, and their head was the highest religious authority in the state, thus being neither subject to the people nor to the senate. Only patricians were eligible to membership in the Pontifex until 300 B. C., when the number was increased to nine under the Ogulnian law, and four of the pontiffs were selected from the plebeians. Tib. Coruncanius was the first plebeian to be selected to the high dignity of Pontifex Maximus, being elevated to that position in 254 B. C. In 81 B. C. the number was increased to fifteen by Sulla, and Julius Caesar added himself shortly after as the sixteenth, holding the position of Pontifex Maximus. With the beginning of the empire the highest dignity was bestowed upon the emperor and the title passed in succession to the ruling sovereign. In the time of Theodosius the title became equivalent to Pope, which is now one of the designations of the head of the Roman Catholic church.

PONTIFICAL (pŏn-tĭf'ĭ-kəl), a service book of the Roman Catholic church, which contains rites and ceremonies pertaining to sacraments and public services. The pontifical now generally in use, commonly known as the "Roman Pontifical," was first published in 1485. It was revised in 1596 by authority of Clement VIII. The contents include prayers, ceremonials, and services for use in religious professions, ordinations, consecrations, benedic-

tions, and sacraments. The "Ceremonials" is a similar service book, but is devoted particularly to ceremonials in vespers, mass, and other solemn offices. The learned Pope Benedict XIV. is the author of the most prized edition.

PONTINE MARSHES (pŏn'tin), a marshy region between Rome and Naples, stretching from Velletri to the sea and forming the southern part of the Roman Campagna. It is 26 miles long, varies in width from four to fifteen miles, and owes its existence to an obstruction of the streams rising in the Volscian Hills, due to elevated sand accumulating along the Mediterranean shore. Many attempts were made in ancient times to reclaim this marshy region, the first being by the consul Cornelius Cethegus in 160 B. C. Julius Caesar projected a system of complete drainage, but his untimely death caused his plans to remain unexecuted, and nothing more was done until Pope Boniface VIII. constructed a large canal and redeemed a region in the vicinity of Sezze. Other improvements were made in 1417. Pope Pius VI. began a general system of drainage in 1678 and during the succeeding ten years reclaimed a large part of the area, though much of it was given up as irreclaimable. At present the region has many excellent farms, other portions supply fine pasturage for domestic animals, and the remainder is still an extensive and unhealthy marsh.

PONTOON (pŏn-tŏon'), in military engineering, a floating vessel supporting the timbers of a military bridge. Ordinarily, a number of pontoons are connected, thus forming substantial support for a temporary bridge, which serves as a means for the safe passage of an army over otherwise impassable streams. The pontoons are boats, air-tight tin vessels, wooden frames covered with India rubber, or other devices. Bridges of this character are of vast importance to a marching army and are usually transported by an organized train.

PONTUS (pŏn'tŭs), the name anciently applied to an extensive region in the northeastern part of Asia Minor, bordering on Armenia and Colchis in the east and extending westward to the Halys River. It included the regions north of the Anti-Taurus and Paryadres mountains, thus corresponding somewhat to the Turkish governments of Sivas and Trebizond. Pontus was governed by a Persian satrap until the conquest of Asia Minor by the Greeks. After the death of Alexander the Great, in 323 B. C., Mithridates II., a representative of an independent line of princes, came into possession of the region. He was succeeded by a number of Pontine sultans, the

most powerful being Mithridates VI., who successfully resisted Roman encroachment for many years, but was finally conquered in 65 B. C. by Pompey. Shortly after Pontus was divided, but the principal part was annexed to Bithynia. Pontus developed a high degree of civilization. Its people engaged in agriculture, commerce, manufacture, and fruit raising. The principal cities were Pharnacia, Trapezus, Cabira, and Amisus.

POODLE (pŏd'l), the name of a small dog, distinguished by its long and curly hair. The head is high and round, the ears are long, and the legs are rather short. Large poodles are from eighteen to twenty inches at the shoulders and are favorites among sportsmen as water dogs. They have a keen smell and remarkable power to trace the lost property of their master. Most poodles have a white or tan color, but black and mixed colors are well represented. Small breeds are favorites as lap dogs. All have an affectionate disposition and are attached to their masters.

POOL, a game played on a table similar to that used in billiards, but which has pockets at each corner and midway of two sides, into which the balls may roll in playing the game. The balls are numbered consecutively from one to fifteen and are arranged in a form of a pyramid at the beginning. The first player places the cue ball beyond the string line and drives it at the numbered balls, the object being to cause them to enter the pockets. If he fails to pocket one with the first shot, the next player drives the cue ball from where it stopped, and has the right to play until he fails to pocket a ball. The games played are quite numerous and are described in elaborate rules. Usually each ball counts one, hence the winner must pocket not less than eight balls, but in some games it is customary to count the numbers. In *continuous pool* it is required that balls be pocketed in consecutive order from the lowest number; that is, as numbered from 1, 2, 3, etc. See **Billiards**.

POONA (pŏn'nà), or **Puna**, a city of British India, in the presidency of Bombay, about 120 miles southeast of the city of Bombay. It is quite well built on a desirable site and has several important railroads, but the older part of the city has crooked streets and districts quite poorly provided with sanitary conveniences. Among the chief public institutions are the Deccan College, a public library, an arsenal, several colleges, a teachers' training school, hospitals and a number of churches and temples. It has manufactures of cotton and woolen fabrics, jewelry, ornaments, silk, and utensils. Poona is the military station for a large region

of India, and north of the town is a line of barracks and military hospitals. The inhabitants consist largely of Brahmans. It was formerly the capital of the Mahrattan princes, but was annexed in 1818 to the British possessions. Population, 1906, 160,108.

POOR LAWS, the legal enactments which provide for the collection and disbursement of funds for the maintenance of those lacking the necessary means of subsistence. All the nations have made provision for supporting those who are unfortunate and without means of support, and they have regarded none so indigent or wretched as to refuse to supply them with the ordinary necessities of life, such as shelter, clothing, and food.

INSTITUTIONAL SUPPORT. Charitable institutions had their beginning in the countries of the East, where it was made a religious duty to give alms, but many of the states made provisions for supporting the poor as a matter of governmental policy. However, the support accorded indigents was at first more largely administered through religious teachers, each local organization providing for the unfortunates in its particular parish or vicinity. This plan afterward became institutional, and was fostered by the various schools and monasteries of early times and through the Middle Ages, though in most of the civilized nations it has given way to governmental support. It is still fostered as a religious institution to a greater or less extent in practically all countries. The ancient nations of Europe discouraged begging and made it a state policy to provide for the employment and support of all to such an extent that the necessities of life could be obtained without appearing in public to entreat for assistance.

ANCIENT AND MEDIAEVAL. The Grecian states generally provided for the relief of the poor, though in some of them there were no special provisions of that kind. The Romans enlarged upon the Grecian system by the encouragement of industries, and, where the people needed support or employment, committees usually provided the means. The plan of furnishing seed for crops and subsistence until a supply could be raised was one generally in favor among the Romans, but Cicero and other writers discouraged such support, except where it was actually needed, since they looked upon it as the means of creating a class of idlers who would ever after look for paternal governmental aid. With the rise of the feudal system, after the fall of Rome, the condition of the poor and laboring classes assumed a form of serfdom, when it became customary for the feudal lords

to take all the products of the laborer above his actual needs. Thus this system brought on a state in which the laboring man and the poor generally were dependent upon the feudal lords for all necessities of life. During this time the church developed its functions as a supporter of the needy, and the numerous abbey and monasteries established a system of doles for the poor similar to that of the Mohammedan countries, where alms are still distributed to the poor at the mosques.

EUROPEAN. Legislation to tax all the people for the support of the poor may be said to date in Europe from the earliest civilization, though the taxes imposed were at first of a special character and were levied only in cases of emergency. The first general law in England dates from 1388, but this was revised in 1601 to such an extent that it may be said the British poor laws originated at that time. By the provisions then established all paying taxes were required to contribute an equitable share toward supporting the poor, and overseers were provided to personally supervise the granting of relief and the care of the needy. In some countries the workhouse system was supplied, under which all those in need of support were required to take lodging in the public workhouse, and it was made incumbent upon them to render all the services possible in consideration of their care and support. A law of this kind was in force in England until 1796, when provisions were made for granting the poor support outside workhouses, the relief usually being only a part of the means necessary, since each individual was expected to earn at least a portion of his living, but in cases where that was impossible the relief granted provided for the entire support. At present the support of the poor is a local matter in France and Germany and most other countries. Under the general laws of nearly all the states of Europe each local district is required to levy a general tax and see to it that an adequate amount is provided for all those in need.

AMERICAN. The support of the poor in the United States is left directly to the several states. As a rule the legislatures have established institutions for the maintenance of the dependent and helpless. Formerly the poorhouse was the common receptacle for all the unfortunate and indolent, from the fatherless infant to the idle beggar. At present there are adequate provisions for the defective, dependent, and indigent of all classes, and many of the institutions possess training and educational features. The system as a whole includes

separate schools for the idiotic and feeble-minded, the deaf and dumb, the blind, the insane, the children of dependent parents, the incorrigible children, and those who are neglected. The poorhouses are mostly under the control of county commissioners and are supported by a general county tax. In most instances they are maintained on farms, where the labor of the inmates is utilized to some extent in the culture of cereals, fruits, vegetables, live stock, and bees, thus making it possible for those able to exercise at least a limited amount of physical energy to aid in making the institution partially self-supporting.

The support of the poor in Canada and Newfoundland is very similar to the system in general vogue in the United States. In some instances the county commissioners may provide partial support for the poor outside the poor farm. This plan is generally taken advantage of where the individual or family has means limited below actual need, the public support granted being less in the aggregate than the cost of maintenance at the county poorhouses. Perhaps there is no line where the rules of civil service apply more effectually in the selection of officers than in the case of superintendents of poorhouses and poor farms, since in many instances the selections are made for political reasons, and not because of peculiar fitness to manage and guide the important work of such institutions.

POPAYÁN (pō-pā-yān'), a city of Colombia, capital of the state of Cauca, on the Cauca River, 225 miles southwest of Bogotá. It is surrounded by an elevated but fertile plain. It was the center of great commercial life until 1834, when an earthquake nearly destroyed it, but it has since developed considerable enterprise. Popayán is the seat of a university, contains a cathedral and a hospital, and has a number of beautiful public and private buildings. The manufactures consist chiefly of machinery and woolen goods. A commercial road extends from it to Truxillo, Peru. The place was founded by the Spaniards in 1537. Population, 1909, 11,049.

POPE, a title applied originally to any bishop of the Christian Church, but later to the patriarch of Alexandria, and now to any priest of the Greek Church and to the Bishop of Rome. This article treats particularly of the latter, who is the supreme pontiff and visible head of the Roman Catholic Church. He is regarded by that church the vicar of Christ and the successor of Saint Peter. The title was applied to all the bishops of the Roman Catholic Church in the early centuries, but a

council convened at Rome in 1076, at the instance of Gregory VII., and resolved that it should be applied only to the Bishop of Rome. A long struggle ensued between the Eastern and Western churches for superiority, but the tradition that the apostle Peter founded a church in Rome and afterward suffered martyrdom there gave the Western church preëminence. It was quite natural that the bishops located at the imperial city should acquire precedence in influence and power, and that the widespread conversion to Christianity should ultimately give them large influence in temporal matters.

Emperor Valentinian III. issued a decree, in 445, recognizing the Bishop of Rome as primate, but for more than 300 years papal measures met with violent opposition. The division of the Eastern and Western churches in 1054, known as the Greek and Roman churches, ended the contention between the two bodies. *Temporal power*, though previously claimed, was not fully established until in 754, when Pepin, King of the Franks, recognized such authority. In 774 Charlemagne confirmed the temporal power of the Pope and enlarged his dominion, and in 1076 Princess Matilda, daughter of Duke Boniface of Tuscany, made the Holy See heir to her extensive possessions. For many years powerful contentions between the states of the church and the rulers of Europe were common, and France, under Philip the Fair, was the first power to successfully resist papal authority. The rise of Protestantism under Luther caused the Pope to lose fully one-half of Europe and this loss was never regained. When the Thirty Years' War was ended with the Treaty of Westphalia, in 1648, religious tolerance was established or foreshadowed in all the countries of Europe, and the papal revenues not only decreased, but the bulls issued from Rome no longer had material effect outside the states of the church. Conditions were soon brought about that made the decline of temporal power rapid.

When the Franco-German War began, in 1870, Napoleon III. was obliged to withdraw the French troops from Italy. This circumstance was taken advantage of by Victor Emmanuel, King of Italy, and on Sept. 20 of that year he entered Rome and took possession of the palace for the Italian kingdom. The Pope has lived in seclusion since that time, being stripped of all temporal power, but his influence in spiritual matters has in no wise been interfered with. In 1870 the Vatican Council decreed that the Pope has supreme power in all matters of faith and discipline pertaining

to the pastors and the faithful, and proclaimed that he has *infallibility* by divine assistance, when in his apostolic office he defines a doctrine of faith and morals. The Pope is addressed as *Your Holiness*, and his insignia embrace the straight corsier, the pallium, and the tiara or triple crown. He may not nominate his successor, since that power is vested in the College of Cardinals, who usually select one of their own number.

Below is a list of the popes as published in the *Roman Notizie*, the dates showing the beginning of their pontificates. The names of those who claimed the dignity of Pontiff, usually called the *anti-popes*, are in italics:

	A. D.		A. D.
St. Peter	42	St. Sylverius	536
St. Linus	66	Vigilius	537
St. Anacletus	78	Pelagius I.	555
St. Clement I.	91	John III.	560
St. Evaristus	100	Benedict I.	574
St. Alexander I.	108	Pelagius II.	578
St. Sixtus I.	119	St. Gregory I., the	
St. Telesphorus	127	Great	590
St. Hyginus	139	Sabinianus	604
St. Pius I.	142	Boniface III.	607
St. Anicetus	157	St. Boniface IV.	608
St. Soterus	168	St. Deusdetit	615
St. Eleutherius	177	Boniface V.	619
St. Victor I.	193	Honorius I.	625
St. Zephirinus	202	Severinus	640
St. Calixtus I.	217	John IV.	640
St. Urban I.	223	Theodorus I.	642
St. Pontianus	230	St. Martin I.	649
St. Anterus	235	St. Eugenius I.	654
St. Fabian	236	St. Vitalianus	657
St. Cornelius	250	Adeotatus	672
St. Lucius I.		Domnus I.	676
<i>Novatianus</i>	252	St. Agathon	678
St. Stephen I.	253	St. Leo II.	682
St. Sixtus II.	257	St. Benedict II.	684
St. Dionysius	259	John V.	685
St. Felix I.	269	Conon	
St. Eutychianus	275	<i>Theodorus</i>	686
St. Caius	283	<i>Paschal</i>	
St. Marcellinus	296	St. Sergius I.	687
St. Marcellus I.	308	John VI.	701
St. Eusebius	310	John VII.	705
St. Melchisedes	311	Sisinnius	708
St. Sylvester I.	314	Constantine	708
St. Marcus	336	St. Gregory II.	715
St. Julius I.	337	St. Gregory III.	731
Liberius	352	St. Zachary	741
St. Felix II.	355	Stephen II.	752
St. Damasus I.	366	Stephen III.	752
St. Siricius	384	St. Paul I.	
St. Anastasius I.	398	<i>Constantine</i>	
St. Innocent I.	402	<i>Theophylactus</i>	757
St. Zosimus	417	<i>Philip</i>	
St. Boniface I.		Stephen IV.	768
<i>Eulalius</i>	418	Adrian I.	772
St. Celestine I.	422	St. Leo III.	795
St. Sixtus III.	432	Stephen V.	816
St. Leo I., the Great	440	St. Paschal I.	817
St. Hilary	461	Eugenius II.	824
St. Simplicius	468	Valentinus	827
St. Felix III.	483	Gregory IV.	827
St. Gelasius I.	492	Sergius II.	844
St. Anastasius II.	496	St. Leo IV.	847
St. Symmachus	498	Benedict III.	
St. Hormisdas		<i>Anastasius</i>	855
<i>Lawrence</i>	514	St. Nicholas I.	858
St. John I.	523	Adrian II.	867
St. Felix IV.	526	John VIII.	872
Boniface II.		Martin II., or Mar-	
<i>Dioscorus</i>	530	tinus I.	882
John II.	533	Adrian III.	884
St. Agapetus I.	535	Stephen VI.	885

	A. D.		A. D.
Formosus	891	Celestinus IV.	1241
Boniface VI.	896	Innocent IV.	1243
Stephen VII.	896	Alexander IV.	1254
Romanus	897	Urban IV.	1261
Theodorus II.		Clement IV.	1265
<i>Sergius III.</i>	898	Gregory X.	1271
John IX.	898	Innocent V.	1276
Benedict IV.	900	Adrian V.	1276
Leo V.	903	John XXI.	1276
Christopher	903	Nicholas III.	1277
Sergius III.	904	Martin IV.	1281
Anastasius III.	911	Honorius IV.	1285
Lando	913	Nicholas IV.	1288
John X.	914	St. Celestinus V.	1294
Leo VI.	928	Boniface VIII.	1294
Stephen VIII.	929	Benedict XI.	1303
John XI.	931	Clement V.	1305
Leo VII.	936	John XXII.	1316
Stephen IX.	939	Benedict XII.	
Martin III., or Mar-		<i>Nicholas V.</i>	1334
tinus II.	943	Clement VI.	1342
Agapetus II.	946	Innocent VI.	1352
John XII.		Urban V.	
<i>Leo VIII.</i>	956	<i>Clement VII.</i>	1362
Benedict V.	964	Gregory XI.	1370
John XIII.	965	Urban VI.	1378
Benedict VI.	972	Boniface IX.	
Domnus II.	974	<i>Benedict XIII.</i>	1389
Benedict VII.	975	Innocent VII.	1404
John XIV.		Gregory XII.	1406
<i>Boniface VII.</i>	983	Alexander V.	1409
John XV.	985	John XXIII.	1410
Gregory V.		Martin V.	
<i>John XVI.</i>	996	<i>Clement VIII.</i>	1417
Sylvester II.	999	Eugenius IV.	
John XVII.	1003	<i>Felix V.</i>	1431
John XVIII.	1003	Nicholas V.	1447
Sergius IV.	1009	Calixtus III.	1455
Benedict VIII.		Pius II.	1458
<i>Gregory VI.</i>	1012	Paul II.	1464
John XIX.	1024	Sixtus IV.	1471
Benedict IX.		Innocent VIII.	1484
<i>John XX.</i>	1033	Alexander VI.	1492
Gregory VI.		Pius III.	1503
<i>Sylvester III.</i>	1045	Julius II.	1503
Clement II.	1046	Leo X.	1513
Damasus II.		Adrian VI.	1522
<i>Benedict IX.</i>	1048	Clement VII.	1523
St. Leo IX.	1049	Paul III.	1534
Victor II.	1055	Julius III.	1550
Stephen X.	1057	Marcellus II.	1555
Benedict X.	1058	Paul IV.	1555
Nicholas II.	1058	Pius IV.	1559
Alexander II.		St. Pius V.	1566
<i>Honorius II.</i>	1061	Gregory XIII.	1572
Gregory VII.		Sixtus V.	1585
<i>Clement III.</i>	1073	Urban VII.	1590
Victor III.	1086	Gregory XIV.	1590
Urban II.	1088	Innocent IX.	1591
Paschal II.	1099	Clement VIII.	1592
Gelasius II.		Leo XI.	1605
<i>Gregory VIII.</i>	1118	Paul V.	1605
Calixtus II.	1119	Gregory XV.	1621
Honorius II.	1124	Urban VIII.	1623
<i>Celestine II.</i>		Innocent X.	1644
Innocent II.		Alexander VII.	1655
<i>Anacletus II.</i>	1130	Clement IX.	1667
<i>Victor IV.</i>		Clement X.	1670
Celestinus II.	1143	Innocent XI.	1676
Lucius II.	1144	Alexander VIII.	1689
Eugenius III.	1145	Innocent XII.	1691
Anastasius IV.	1153	Clement XI.	1700
Adrian IV.	1154	Innocent XIII.	1721
Alexander III.		Benedict XIII.	1724
<i>Victor V.</i>		Clement XII.	1730
<i>Paschal III.</i>	1159	Benedict XIV.	1740
<i>Calixtus III.</i>		Clement XIII.	1750
<i>Innocent III.</i>		Clement XIV.	1769
Lucius III.	1181	Pius VI.	1775
Urban III.	1185	Pius VII.	1800
Gregory VIII.	1187	Leo XII.	1825
Clement III.	1187	Pius VIII.	1829
Celestinus III.	1191	Gregory XVI.	1831
Innocent III.	1198	Pius IX.	1846
Honorius III.	1216	Leo XIII.	1878
Gregory IX.	1227	Pius X.	1903

POPLAR (pŏp'lēr), a genus of deciduous trees, widely distributed in the North Temperate Zone, particularly in the temperate parts of North America and Europe. About twenty species have been described, fully half of them being native to North America. Most of the species are of rapid growth, producing timber that is light and easily worked, but not particularly valuable for durable qualities. However, the wood is used extensively for fuel, while the trees are among the most highly prized for

grasses and forests, but vegetation ceases at an altitude of 13,500 feet, and the peak is covered with perpetual snow. The crater is about 900 feet deep, measures three miles in circumference, and smoke issues from it at intervals, but no eruptions have occurred since 1548. Diego Ordez first ascended the mountain in 1522.

POPPY, a genus of plants which are native chiefly to the warmer regions of Europe and the western part of Asia. They occur in many parts of Europe as weeds, but some species have been improved by propagation and are



POPLAR.

Leaves, Flower, and Catkins.

ornamental and shade purposes. The leaves are alternate and have a more or less tremulous motion, and the flowers include both barren and fertile, growing in catkins. Among the most noted species are the aspens, cottonwood, and Lombardy poplar, these three being particularly peculiar for the tremulous motion of their leaves which is due in part to the length and slenderness of the leafstalk, but mainly to its being flattened vertically. Other well-known species include the Italian poplar, white poplar, gray poplar, balsam poplar, black poplar, and Ontario poplar.

POPLIN (pŏp'līn), a fabric of French origin, first made at Avignon in the 15th century. The genuine article is a soft and elastic fabric, made by weaving a warp of silk with a weft of worsted yarn. Imitations are now made by substituting cotton and flax for the silk. Protestant refugees introduced the manufacture of poplin into Ireland and England in the 17th century. It is made quite extensively in Canada and the United States at present.

POPOCATEPETL (pŏ-pŏ-kā-tā'pēt'l), an active volcano of Mexico, situated 45 miles southeast of the City of Mexico, in the state of Puebla. It has an elevation of 17,784 feet above sea level. The lower slopes have fine



WHITE POPPY.

A, Ripe Capsule.

cultivated as ornamental plants and for the production of poppy oil and opium. The roots of the poppy are annual or perennial, the flowers are showy, and the capsule contains a large number of seeds. The *white poppy* is the most valuable for opium. Poppy oil is pressed from the seed of both the white and black poppy. It is useful in artistic painting and is sold as a food in the European market. Poppy oil cake is a wholesome stock food. The *carnation poppy* is a double-flowered variety

and is cultivated extensively in gardens and parks. See **Opium**.

POPULATION (pȫp-û-lā'shŭn), the whole number of people in a place or a given territorial area, or the state of a country with respect to the number of its inhabitants. Every form of vegetable and animal life possesses an inherent power of propagation. This power may be said to be infinite, and, if all the conditions as to climate, space, and food were favorable—that is, if not interfered with by other organic beings or natural conditions—any given form of life would rapidly multiply until every region of the earth would be filled with it. It is apparent to any one studying the subject of population that the power of increase is not limited by desire, since, if it were, the natural tendency of the species to favor a multiplication of their own kind would rapidly increase their number, perhaps, to an extent equal to twice their aggregate in each generation.

Writers generally limit the power of increase to the means of subsistence, since all life forms are interfered with when attainable means to support life are inadequate. Viewed from this standpoint, it is apparent that population must actually increase beyond the means of subsistence before further increase is arrested by this limitation. Conditions of this kind have never arisen to limit the population of the earth as a whole, but in China and other countries of Asia they have prevailed to a greater or less extent, though emigration of large numbers has afforded relief in different periods of time. The excellent work of T. R. Malthus, entitled "Essay on the Principle of Population," published in 1798, places the ratio of increase in population on a geometrical basis, and limits the increase of means of subsistence to an arithmetical ratio. The sources of this writer are historical and statistical and he draws conclusions from both in proof of the fact that human life has continually pressed upon the means of subsistence in all countries and in all climates where the populations have existed for long periods of time. Among the other checks pointed out by him are vice, misery, and moral restraint. Each of these has a more or less marked effect in preventing possible births from taking place. Taken collectively, they have a powerful influence in shortening human life.

The civilized nations of modern times secure an approximately accurate estimate of their respective populations by taking a census at regular intervals. It is usual to obtain more information than the bare fact of the number

of persons in the nation. Such additional information is obtained as will supply a reasonably accurate knowledge of the age and vitality of individuals, their sex, and the relative conditions of the various industries, thus affording reliable intelligence as to the conditions under which the inhabitants may pursue their political life and thought. It cannot be said that a normal state has yet been reached in the population of Canada and the United States, since a large immigration is still coming to find homes under less crowded conditions. However, the births exceed the deaths annually; hence, there would be a perceptible increase in population even if the natural laws of migration were not operating to increase the number of inhabitants.

In Europe the number of females aggregate 1,055 to every 1,000 males, while in the United States the males exceed the females. The census of 1900 places the males at 39,059,242, or 51.2 per cent., and the females at 37,244,145, or 48.8 per cent. This difference is accounted for largely from the fact that more males emigrate from the European countries than females, thus increasing our male population more largely than the female, but the sexes are variously affected by social and industrial conditions. The general advancement of civilization has caused an increase in the duration of life by elevating the general standard of living. However, there is still great need of further development by providing more wholesome sanitary regulations, better shelter, and purer food for a large per cent. of people. It is probable that judicious management would tend to largely increase the means of subsistence in many countries, especially in the cultivation of the land, and correspondingly open fields for the more wholesome support of a larger population. In Canada and the United States there is a continuous concentration of people in the cities. The urban population of the latter country, in 1900, was 24,992,199, or 33.1 per cent. of the total population. In 1790 there were but six cities having more than 8,000 inhabitants, but in 1900 there were 545.

POPULATION, Center of, the locality constituting the center of population of a state or nation. The center of population of the United States has moved westward continuously since the first census was taken, in 1790, when it was 23 miles east of Baltimore. It was 22 miles west of Baltimore in 1800; 40 miles northwest of Washington in 1810; 16 miles north of Woodstock, Va., in 1820; 19 miles southwest of Moorefield, W. Va., in 1830; 16 miles south of Clarksburg, W. Va., in 1840;

23 miles southeast of Parkersburg, W. Va., in 1850; 20 miles south of Chillicothe, Ohio, in 1860; 48 miles east of Cincinnati in 1870; eight miles southwest of Cincinnati (in Kentucky), in 1880; 20 miles east of Columbus, Ind., in 1890; and six miles southeast of Columbus, Ind., in 1900.

POPULIST PARTY (pöp'û-lĭst). See People's Party.

PORCELAIN (pôr'sê-lĭn). See Pottery.

PORCUPINE (pôr'kû-pĭn), a rodent quadruped. It has coarse hair thickly interspersed with erectile quill-like spines, especially on the



CANADA PORCUPINE.

CRESTED PORCUPINE.

rump and tail, which it uses as a means of defense. The genus includes a large number of species, varying greatly in size and habits. The *Canada porcupine* is native to the temperate parts of North America. The body is about two feet long and it weighs from twenty to thirty pounds. It has short quills concealed in the fur, small ears, and a comparatively short tail. The *coendus porcupine* is common to the warmer parts of America and is remarkable for its prehensile tail, which it uses as an aid in crawling among the branches of trees. The *crested porcupine* is widely distributed in Eurasia and Africa. This species has a grizzled-black color and is about the size of the North American porcupine. The spines lie flat and concealed until the animal becomes excited, when they assume an erect position. Most species of porcupines are torpid in winter and generally solitary in habits. They live mostly on fruit, roots, and other vegetable sub-

stances, for which they search at night, but lie concealed in their burrows during the day.

PORGY (pôr'gÿ), or **Porgee**, the name of a class of carnivorous fishes common to the tropical seas, found off the shores of Europe and America. They are sometimes called *scuppaug* and under that name are sold on local markets. Several species are common to the Mediterranean, where they are caught in large numbers. The *California porgy* ranges as far north as British Columbia and is highly valued for food.

PORK, the flesh of swine, either fresh or salted. It is used as food. The pork obtained from young and properly fed animals is easily digested, and, when occasionally eaten, is highly wholesome. The heat-giving qualities of pork make it of special value in temperate and cold climates, while its property of being capable of preservation by salting and drying renders it one of the most valuable meats in the market. No other animal food may be so easily preserved, hence it is prepared in vast quantities as food for home use and for the army and navy. The Mosaic law forbade the use of swine as food, and the Jews still regard the animal unclean. Similar views are held by other peoples of the Old World and by several Christian sects in America. However, a large majority now regard pork as one of the most wholesome foods. Products derived from it enter to a very large extent into the foods of mankind.

POROSITY (pô-rôs'ĩ-tÿ), the quality or property of possessing pores, on account of which no kind of matter, whether solid or liquid, completely fills the space it occupies. Sponges, bread, and many kinds of wood are very porous. However, the pores of some bodies are as completely invisible to the eye as the smallest atom. Pores are caused by the fact that the molecules of which a body is composed are not in actual contact, but are separated by minute spaces. This may be illustrated by adding a quantity of fine salt to a bowl full of water, which may be done without the liquid running over, but care must be exercised in giving the salt time to dissolve and the bubbles of air to pass off. Water may be forced under heavy pressure through metals, such as silver, iron, and steel. A test of this kind is applied to heavy cannon, the water being forced into the gun by hydrostatic pressure until it oozes through the thick metal and covers the outside of the gun like froth, and, after gathering in drops, it runs to the ground in small streams. Porosity enters as a prop-

erty of vast importance into natural phenomena, since water sinking into the earth, sap rising in vegetables, and other essential actions in nature are partly due to it.

PORPHYRY (pôr'fī-rĭ), the name applied originally to a rock having a purple-colored base, with inclosed individual crystals of a feldspar. The term now applies to any fine-grained rock containing distinct crystals of any mineral or minerals, and possessing the property of taking a fine polish. Thus, any rock in which crystals of feldspar are developed individually irrespective of the mineralogical composition of the whole is said to be *porphyritic*. Rocks of this character have been used for sculptures from remote antiquity, the ancients deriving their supply from an extensive deposit in Egypt, between the Red Sea and Siout, and from several regions of Western Asia. Valuable deposits are abundant in Germany and Great Britain, the most noted being of a pale red color with modifications of green, white, and black.

PORPOISE (pôr'pūs), a sea mammal of the dolphin family, found extensively off the coasts of North America and Europe and in the Arctic regions. A full-grown common porpoise is about five feet long. The head is rounded in front and the snout is not extended into a beak. Its external surface is hairless and shining and the color is pure white below and dark gray or black on the upper parts. Porpoises are often seen in small herds along the coasts rather than in the open seas, though they often ascend rivers in pursuit of fishes, upon which they feed. They appear to be particularly fond of mackerel, herring, and salmon, and their teeth are well adapted to catch these fishes while pursuing them in schools. Formerly they were esteemed as an article of food, and they are still eaten by the natives of the northern part of North America, but their only commercial value is derived from the oil obtained from their blubber and their skin, the latter being of value for leather and shoelaces.

PORTAGE (pōrt'āj), a city of Wisconsin, county seat of Columbia County, 35 miles north of Madison. It is on the Wisconsin River, at the terminus of the Fox River Ship Canal, and has communication by the Wisconsin Central and the Chicago, Milwaukee and Saint Paul railways. The surrounding country is fertile. A city library, the county courthouse, and several fine schools and churches are among the principal buildings. The manufactures include brick, flour, and farm machinery. Electric lighting, waterworks, and drainage are among the public improvements. Fort Winnebago,

built in 1828, is near the city. Portage was settled in 1835 and incorporated in 1854. Population, 1905, 5,522; in 1910, 5,440.

PORT ARTHUR, a town and naval station of Manchuria, in the province of Shing-King, 275 miles southeast of Peking, China. It is strongly fortified, but was captured by the Japanese in 1894, who were obliged to return it to China at the instance of Russia in 1896. The Trans-Siberian Railroad connects it with interior cities. It has an important navigation commerce, which is controlled by Russians and Chinese. Russia fortified and made it a naval station, but it was captured in 1905, after a siege, by the Japanese. The Treaty of Portsmouth gave Port Arthur into control of Japan. Population, 1908, 32,602.

PORT ARTHUR, a city of Ontario, in Thunder Bay County, on Thunder Bay, an inlet from Lake Superior. It has communication by steamboats and by the Canadian Northern and the Canadian Pacific railways. In the vicinity are extensive marble quarries, sawmills, and gold and iron mines. The city owns and operates the waterworks and the electric railway, the latter extending to Fort William. It has a large trade in fish, lumber, metals, and grain. The manufactures include brick, lumber, ironware, machinery, and furniture. Population, 1908, 13,576.

PORT ARTHUR, a seaport of Texas, in Jefferson County, twenty miles southeast of Beaumont. It is located on Sabin Lake, an inlet from the Gulf of Mexico, and has transportation facilities by the Kansas City Southern and other railways. The Port Arthur Ship Canal, an artificial waterway between Sabin Lake and the Gulf of Mexico, permits the largest ocean vessels to enter the port, which has been greatly improved by the United States government. It has electric lighting, well graded and paved streets, and several fine schools and churches. In its vicinity are extensive oil fields, agricultural lands, and petroleum refineries. It has large shipping interests in lumber, grain, live stock, and petroleum. Population, 1908, 4,681; in 1910, 7,663.

PORT-AU-PRINCE (pōr-ṭō-prāns'), capital of the republic of Hayti, situated in the western part of the island of Hayti, on a bay of the same name. It has a beautiful site and is regularly platted, but has declined in importance since French occupation of the island ceased. The principal buildings are several government structures, a hospital, the mint, a lyceum, and the customhouse. It has a number of churches, several elementary schools, and a system of waterworks, but most of the public improve-

ments made by the French are at present in a poor state of repair. The city has a considerable trade in coffee, mahogany and redwood, cocoanuts, and fruits. Population, 1906, 70,341.

PORT CHESTER (chēs'tēr), a village of New York, in Westchester County, 25 miles northwest of New York City, on the New York, New Haven and Hartford Railroad. It is located on Long Island Sound and has regular communication by steamboats. Many New York business men reside here and it is popular as a summer residential center. It has a public library, a park, and a hospital. The manufactures include woolen goods, clothing, hardware, and carriages. Port Chester was settled about 1742 and was known as Saw Pit until 1837. It became an incorporated village in 1868. Population, 1905, 11,198; in 1910, 12,809.

PORTCULLIS (pōrt-kū'l'is), a framework of strong bars of wood or iron. It is usually adjusted to slide vertically in grooves on either side of the portal of a fortified place, and is so constructed that it may be quickly dropped to close the entrance in case of surprise. The lower ends were formerly supplied with sharp-pointed bars, which were intended to strike any one attempting to enter. In the Middle Ages it was common to have one or more portcullises at the entrance of castles and retreats built to insure safety, and in some countries of Europe and Asia they are still in use. The weight of many is so heavy that it is necessary to provide a powerful windlass to raise them.

PORT DARWIN (där'wīn), a seaport of Australia, on the northern coast of Australia, in the Northern Territory of South Australia. Near it is the city of Palmerston, which has telegraph and railroad facilities. Port Darwin has a considerable trade in lumber, live stock, and fruits.

PORT ELIZABETH (ē-liz'ā-bēth), a seaport of South Africa, in Cape Colony, on the western shore of Algoa Bay. It is nicely located, has a number of well-paved streets, and contains several substantial government buildings and other public institutions. Among the most noteworthy structures are the Roman Catholic cathedral, the Gray Institute Schools, the high school, several colleges and hospitals, and a number of fine churches. Among the municipal facilities are pavements, a public library, telephones, electric lighting, sanitary sewerage, and public waterworks. It has a large trade in wool, feathers, skins, machinery, and utensils. Railroad and steamboat lines supply excellent commercial facilities. Population, 1906, 33,984.

PORT HUDSON, Siege of, an attempt to

capture Port Hudson, a village in Louisiana, in the Civil War of the United States. It is situated on the Mississippi, 135 miles above New Orleans, and was strongly fortified by the Confederates as a means to control navigation on the Mississippi. General Gardner commanded the garrison with about 7,500 men, while the Federal force under General Banks and Admiral Farragut numbered fully 20,000. The place was infested by the Federals on March 26, 1863, but it withstood numerous attacks until July 9, after General Grant had taken possession of Vicksburg.

PORT HURON (hū'rūn), a city in Michigan, county seat of Saint Clair County, on the Saint Clair River, sixty miles northeast of Detroit. It is on the Grand Trunk and the Père Marquette railroads and has steamboat connection with the principal ports on the Great Lakes. It has shipyards, dry docks, a customhouse, and extensive grain elevators. The noteworthy buildings include the county courthouse, the Carnegie public library, the high school, the city hall, the Maccabee Temple, the public hospital, and many fine churches. Among the manufactures are flour, carriages and wagons, tobacco and cigars, marble products, engines, ironware, farming implements, machinery, and earthenware. The city is supplied with electric street railways, city waterworks, sanitary sewerage, street pavements, and other municipal facilities. It is connected by a railway tunnel under the Saint Clair River with Sarnia, in Canada, and has a large trade in lumber, produce, and merchandise. Port Huron was settled by the French in 1790, became a village in 1849, and was incorporated as a city in 1857. Population, 1904, 20,028; in 1910, 18,863.

PORT JERVIS (jēr'vīs), a village of Orange County, New York, on the Delaware River, sixty miles northwest of New York City. It is on the Erie and the New York, Ontario and Western railroads, and is surrounded by a fertile farming and dairying country. The manufactures include boots and shoes, glass, machinery, gloves, and watch cases. Among the principal buildings are the Carnegie public library, the Y. M. C. A. building, the high school, and the Saint Mary's Orphan Asylum. The place was platted as a village in 1826. It was named after John B. Jervis, an engineer of the Delaware and Hudson Canal. This canal connects the Pennsylvania coal fields with the Hudson River. Population, 1910, 9,564.

PORTLAND (pōrt'land), the largest city of Maine, county seat of Cumberland County, 105 miles northeast of Boston. It is located on Casco Bay, an inlet from the Atlantic, and has

transportation facilities by the Grand Trunk, the Boston and Maine, and the Maine Central railroads. Intercommunication is by a network of electric railways. The harbor is sufficiently deep for the largest vessels and has communication by a number of coastwise and transatlantic steamship lines. About twenty square miles are included in the site, which is beautified by many parkings and shade trees, giving it the name of *Forest City*. The streets are regularly platted, including many that are substantially paved with stone and asphalt. Within the bay are numerous wooded islands and a number of these are popular as summer resorts. Cushing's Island contains Fort Levitt; Great Diamond Island has Fort McKinley; and Portland Head contains Fort Williams.

The public parks embrace about 125 acres. They include Lincoln, Deering Oaks, Fort Allen, and Fort Sumner parks. Monument Square has a fine soldiers' monument. Eastern Cemetery, on the southern slope of Munjoy's Hill, contains the remains of a number of persons noted in history. The public library has about 50,000 volumes. The city hall, the post office, the customhouse, the United States Marine Hospital, and the building of the Portland Society of Natural History are among the principal buildings. It is the seat of the Maine Medical School, a department of Bowdoin College, and has a number of charitable and professional institutions. The churches include the Saint Luke Cathedral (Episcopal), the First Baptist, the Chestnut Street Methodist Episcopal, and the Cathedral of the Immaculate Conception (Roman Catholic). Among the buildings of historical interest are the houses occupied by Longfellow, Preble, and Wadsworth.

Portland is the seat of an extensive domestic and foreign trade. It has large grain elevators, stock yards, and railway machine shops. The exports consist chiefly of apples, live stock, and grain, large quantities of these products coming from many points in Canada. The manufactures include flour and grist, boots and shoes, canned fish and fruits, wagons and carriages, confectionery, monuments and stoneware, locomotives, and machinery. Marble and clay are quarried in the vicinity and the products are used extensively in manufacturing enterprises. It has a large wholesale and jobbing trade and supplies many towns and cities of New England with merchandise and manufactures.

The first settlement on the site of Portland was made in 1632, when it was known by the Indian name of Machigonne. Later the name was changed to Stogomer, then to Casco Neck,

and still later to Falmouth. The Indians destroyed it completely in 1676, when a large number of its inhabitants were taken captive. It was rebuilt soon after, but was again destroyed by the Indians in 1690. The British burned it in 1775, but it was rebuilt during the Revolutionary War and incorporated as Portland in 1786. The present charter dates from 1832. Among the prominent men born in the city are Neal Dow, Henry W. Longfellow, Commodore Preble, Erastus Brooks, and Thomas B. Reed. Population, 1900, 50,145; in 1910, 58,571.

PORTLAND, the largest city in Oregon, county seat of Multnomah County, on the Willamette River, twelve miles above its junction with the Columbia and about 100 miles from the Pacific coast. It is finely located at the head of deep-water navigation, and occupies the slopes that rise gradually from the river and merge into forest-covered hills, back of which are distant mountains. The city is on both sides of the river, which is crossed by a number of substantial bridges. Railway transportation is by the Oregon Railway and Navigation Company, the Northern Pacific, the Great Northern, and the Southern Pacific railroads. An extensive system of electric railways has lines to all parts of the city and many adjacent towns, including Oregon City.

The business district is centered largely on the west side of the river, where the streets are parallel to the river, but all parts of the city are platted on a regular plan, the streets crossing each other at right angles. Many of the streets are paved with stone, brick, asphalt, and macadam, and the residential districts are finely improved with parkings and shade trees. Extensive systems of electric and gas lighting, waterworks, sewerage, and drainage are maintained. The principal buildings include the post office, the union railway depot, the county courthouse, the public library, the high school, the Industrial Exposition building, and the Portland Hotel. Among the large office and business edifices may be mentioned the Frank, Worcester, Meier, Dekum, Marquam, and *Oregonian* buildings. It is the seat of the Portland Academy, the Portland University, the Michael's College, and the law and medical departments of the University of Oregon. The public library has about 35,000 volumes.

Being situated at the head of ocean navigation, on the waterway formed by the Willamette and Columbia rivers, and at the converging center of numerous railroads, it has exceptionally fine commercial advantages. In its vicinity are extensive forests and mineral resources. It has a large trade in lumber, grain,

flour, and merchandise, both domestic and foreign. The Willamette Falls at Oregon City, twelve miles above Portland, furnish water power sufficient to operate the street railways and many industrial enterprises. The manufactures include soap and candles, boats and ships, saddlery and harness, malt and spirituous liquors, canned fruit and fish, clothing, cigars, and machinery. It has extensive grain elevators and wholesale houses.

The city was founded in 1845 by settlers from New England, who named it after Portland, Me. In 1851 it received its charter as a city, when it had a population of only 821. Since then it has grown rapidly and at present is one of the wealthiest cities in the country. In 1904 it was the seat of the Lewis and Clark Exposition, one of the great industrial exhibitions of the United States. Portland Heights, an eminence in the western part of the city, affords a fine view of the valleys of the Willamette and the Columbia, including the snow-capped summits of Mount Ranier and Mount Hood. Population, 1910, 207,214.

PORTLAND, Isle of, a rocky peninsula of Dorsetshire, England, in the English Channel, supposed to have been an island in former times. A ridge of shingle called the Chesil Bank connects it with the mainland. The island is about five miles long and two miles wide, and is formed largely of Portland stone. About 1,500 convicts are kept on the island by the British government, in the convict prison, a massive structure on the top of a hill, and these are employed in working the stone for exportation. Most of the coast line is precipitous and there is but one landing place for vessels, this being on the north side. Several lighthouses are in the vicinity and a breakwater built of stones provides safe refuge for hundreds of the largest ships. With the harbor are connected a naval station and batteries. The southern point of the island is called the *Bill of Portland* and between it and the *Shambles*, three miles to the southeast, is a dangerous surf called the *Race of Portland*. The island has excellent water and is noted for the production of sheep, which yield the famous Portland mutton. Population, 1907, 15,238.

PORTLAND CEMENT. See **Cement.**

PORTLAND VASE, a beautiful cinerary urn, which was found in the Monte del Grano, near Rome, in the 16th century. It is made of transparent, dark blue glass, has a height of ten inches, and is regarded the finest specimen of cameo cut glass preserved from ancient times. This vase was deposited in the Barberini palace at Rome until 1770, when it was purchased by

Sir William Hamilton, from whose possession it passed to the Duchess of Portland. The Duke of Portland placed it in the British Museum in 1810, where it was willfully broken by a miscreant in 1845, but soon after the fragments were skillfully reunited in a complete manner.

PORT LOUIS (lōō'is), the capital of the island of Mauritius, in the Indian Ocean, east of Madagascar. Port Louis is the principal seaport of the British colony of Mauritius. It is situated on the northwestern coast, where it has a fine site on a gradually sloping elevation averaging about 2,000 feet above sea level. It is a British coaling station and has a number of barracks, military stores, and hospitals. The botanical garden contains a fine collection of flowers and plants. The streets are narrow, but they are regularly platted, and are improved by pavements, avenues of trees, electric lighting, street railways, and waterworks. It has a large trade in fruits, wool, clothing, and utensils. Population, 1908, 54,583.

PORT OF SPAIN, a city on the island of Trinidad, situated near the western coast. It is connected with the interior by a railway line. The harbor is sufficiently deep only for the smaller vessels, goods being landed from the larger ships by flatboats and from a pier. The city is well platted and built. It has several substantial government houses, two cathedrals, a theater, barracks, and a number of educational institutions. The trade is quite important, especially in tropical fruits, coffee, tobacco, lumber, and cereals. Population, 1908, 36,284.

PORTO RICO (pōr'tō rē'kō), or **Puerto Rico**, an island of the West Indies, the fourth in size of the Antilles, located east of Hayti, from which it is separated from Mona Passage. It is situated about 1,200 miles north of the equator, 1,000 miles from Key West, Florida, and 100 miles southeast of New York. The length from east to west is about 100 miles, the width is 30 miles, and the area, including several small islands near the coast, is 3,606 square miles.

DESCRIPTION. The island has a shore line of 360 miles, but comparatively few indentations characterize the coast. About one-tenth of the surface is included in the coastal plain, which is usually low and has many fluvial valleys. A range of mountains traverses the island from east to west, reaching its highest altitude at the western extremity in El Yunque, whose highest summit is 3,610 feet above sea level. In most places the highlands have the form of hills, which range from 2,000 to 3,000 feet in altitude. The slopes are principally toward the

north and south from the central highlands, but the lands are cut deeply by streams.

The mountains form the watershed, hence the streams flow either south into the Caribbean Sea or north into the Atlantic. Few of the streams are useful for navigation, being short and rapid, but several flowing north have estuaries that are navigable a few miles and furnish harbors. The La Plata, the Tanama, and the Manati flow north; the Mayaguez and the Anasco flow west; the Coamo and the Guamani flow south; and the Humacao flows east. These and other streams furnish water power and a number are employed in irrigation. Several small lakes are located near the coasts.

Porto Rico has a healthful climate, due in part to its excellent drainage. Along the coast the climate is hot, but the highlands of the interior are less highly heated. In the colder part of the year the thermometer seldom falls below 50° , and in the warmer part of summer it rises to 96° and sometimes to 108° . At San Juan, on the northern coast, the mean annual temperature ranges from 78° to 82° . Rainfall is abundant, averaging 60 inches at San Juan. While the rains are not heavy, precipitation occurs almost daily, but the greater part of it takes place in autumn and summer. It is heaviest in the highlands, by which the rainfall is cut off to some extent along the southern slope, where irrigation is necessary to make farming profitable. Destructive hurricanes sometimes sweep over the island, causing much damage to life and property.

MINING. The island has deposits of iron, copper, and gold, but mining has not been developed to a large extent. Considerable gypsum is produced for making stucco and fertilizers, and granite is quarried for monuments and building purposes. Near Juana Diaz are quarries that produce a fine variety of marble. Phosphates are found along the southern coast and on Mona Island, off the western shore. Rich deposits of guano are worked near Ponce. Lignite and bituminous coal occur in paying deposits, but little has been done to develop the fuel resources. Natural evaporation produces considerable salt in the lagoons near the sea.

AGRICULTURE. Farming is the chief industry, engaging nearly 65 per cent. of the inhabitants. The soil and climate are favorable to the growth of semitropical plants, and modern farming implements have been introduced. About one-fourth of the total area is cultivated, but fully 90 per cent. is suitable for agricultural purposes. Sugar is the principal product, being obtained from sugar cane. Coffee is grown in the region

where the altitudes range between 600 and 2,000 feet and was long the leading crop, but has been exceeded since 1906 by the production of sugar. Tobacco takes third rank in the value of the product. Other crops include cotton, maize, rice, bananas, pineapples, lemons, oranges, and other tropical fruits.

Originally the island was heavily timbered with cedar, ebony, sandalwood, laurel, palms, and other useful trees, and the forest area is still extensive. However, farming and stock raising have encroached considerably upon the timbered districts. Cattle are grown for meat and dairying purposes. Other domestic animals include horses, sheep, mules, swine, and poultry. The sections which are not suitable for cultivation furnish a fine growth of nutritious grasses.

MANUFACTURES. Sugar and tobacco factories are the leading industrial establishments. Fruit canning has developed materially, but it is confined largely to the five months of the year in which the pineapples are in condition to be canned. Planing mills are operated at San Juan and Mayaguez, and macaroni factories are conducted profitably. Other manufactures include rum, cotton and woolen goods, soap, clothing, embroidery, straw goods, boots and shoes, and farming implements. Earthenware and pottery are made quite extensively and considerable interests are vested in the manufacture of household utensils.

TRANSPORTATION AND COMMERCE. The larger part of transportation is by water, since no part of the island is more than twenty miles from the coast. The railways in operation have a total of 225 miles, but a line to form a circle near the shore has been projected. Electric roads are operated at Ponce and San Juan. About 650 miles of telegraph lines are in use. Two submarine cables connect the island with the outside world, one through Kingston, Jamaica, and one through Saint Thomas. Steamers ply regularly between Porto Rico and the leading ports of the United States, South America, and Europe. Commerce has increased materially since the United States took possession of the island. The exports somewhat exceed the imports. Sugar, tobacco, coffee, and fruits are the leading exports. The imports include machinery, clothing, and merchandise. Commerce is largely with the United States, Spain, and the ports of the West Indies.

GOVERNMENT. The government is territorial. In the early part of American occupation the authorities were chiefly military, but civil government was fully established in 1900. Executive power is vested in the Governor, who is ap-

pointed by the President of the United States, subject to confirmation by the Senate. He is assisted by a council of eleven members, all being appointed in the same manner, but five must be native Porto Ricans. Legislative power is vested in the Assembly, which is composed of the executive council and a house of delegates of 35 members. Members in the latter are elected for two years by a popular vote. The right of suffrage is limited to those who have an elementary education and possess a small amount of property. Judicial authority is vested in the supreme and district courts, whose judges are appointed by the President. Other officials appointed in the same way include the treasurer, the commissioner of education, and the attorney-general. A resident commissioner represents the island at Washington, but he has no seat in Congress. Under the system of government formulated for the island, it is provided that a citizen of Porto Rico is not a citizen of the United States.

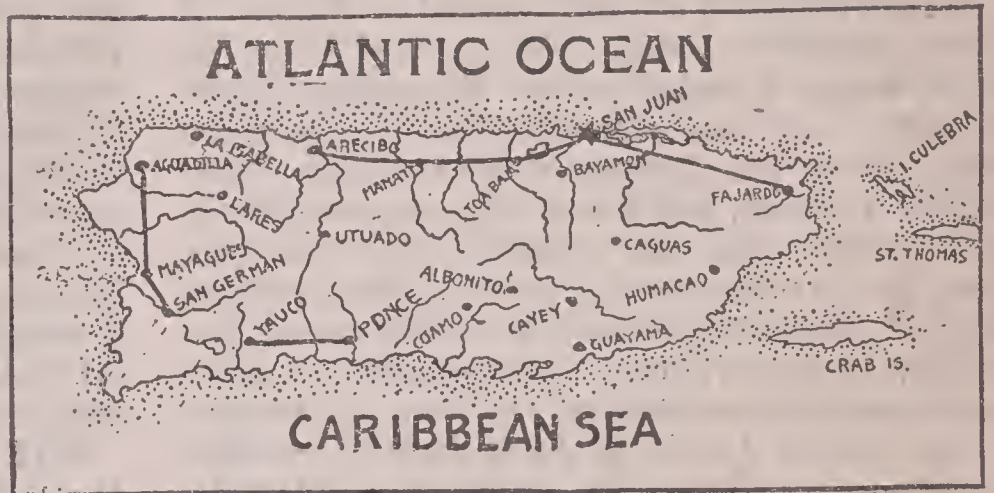
EDUCATION. A system of public schools was put in operation shortly after the island became a possession of the United States. Since then the schools have almost doubled in number. The elementary schools in operation comprise about 1,850 and about half of the teachers are natives of the island. Fully one-third of the schools are graded and high schools with well-articulated courses are maintained in the cities and larger towns. Spanish is taught generally, but the English language has been introduced into the graded schools. A normal school for the training of teachers is situated at San Juan. Roman Catholicism is the predominant religion and the people of that faith maintain a number of parochial schools. Protestant churches are located in Ponce, San Juan, and a number of the smaller towns.

INHABITANTS. Fully three-fourths of the immigrants are Spaniards or of Spanish descent, a large per cent. coming from Spain, South America, and the West India islands. About three-fifths of the inhabitants are pure white and the remainder are partly or entirely of Negro blood. At the time the island was ceded to the United States, about 77 per cent. were unable to read and write. Roman Catholicism was the established religion and the priests were supported by taxation. The people are small in weight and stature, but they are muscular and capable of enduring considerable work. They live chiefly in the rural districts. San Juan, situated on an island separated from Porto Rico proper by San Antonio Channel, is

the capital. Other cities include Ponce, Mayaguez, Arecibo, San German, Bayamon, and Guayama. The island is divided into political divisions called *departments*, which correspond to counties in Canada or the United States. In 1910 the population was 1,118,012. The area, population, and density of population, in 1899, were as given in the table below:

DEPARTMENT.	AREA IN SQUARE MILES.	POPULATION.	PERSONS TO A SQUARE MILE.
Guayama.....	561	111,986	200
Humacao.....	413	88,501	214
Ponce.....	822	203,191	247
Arecibo.....	621	162,308	261
Bayamon.....	542	160,046	295
Mayaguez.....	407	127,566	313
Aguadilla.....	240	99,645	415
Porto Rico.....	3,606	953,243	264

HISTORY. Porto Rico was discovered by Columbus in 1493, when it was named San Juan Bautista. Ponce de León visited the island in 1508, when he explored a part of the coast, and



ISLAND OF PORTO RICO.

two years later conquered the island. The natives, known as Caribs, were hostile for more than ten years, but the native tribes were eventually subdued and enslaved. The island remained under Spanish rule with varying success until 1898, when it was ceded to the United States as a result of the Spanish-American War. In the long period of nearly 400 years the history is not particularly eventful. The English under Drake tried to get a foothold in 1595, the Dutch under Heinrich made a similar attempt in 1615, and a second attempt was made by the English under Abercrombie in 1797. However, the Spanish continued to hold possession even through the revolutionary movements in South America. It was made a province of Spain in 1869 and slavery was abolished in 1873. San Juan was bombarded by a fleet of the United States under Admiral Sampson in 1898, while General Miles landed military

forces at Ponce and other points. On Oct. 18, 1898, the American flag was raised over the island, which was ceded to the United States in December by the Treaty of Paris. Civil government was soon established under Charles H. Allen (born in 1848), who became the first Governor on May 1, 1900.

PORT SAID (pōrt sā-ēd'), a seaport of Egypt, on the Mediterranean Sea, immediately west of the Suez Canal. The site is on a narrow strip of land that is separated from the Mediterranean by Lake Menzaleh. The streets are regularly platted, intersecting each other at right angles. Some of the business blocks and private residences are substantial, but its growth is limited because of an inadequate water supply and the barren nature of the desolate strip of land on which it is located. Port Said owes its existence to the Suez Canal. It was founded in 1859 and was so named from the patron of the enterprise, Said Pasha. It has a considerable canal and sea trade and is important as a coaling station. Population, 1908, 43,590.

PORTSMOUTH (pōrts'mūth), a city of New Hampshire, one of the county seats of Rockingham County, on the Piscataqua River, 58 miles northeast of Boston, Mass. It is three miles from the Atlantic, on the Boston and Maine Railroad, and has a deep and well-fortified harbor. The city contains many buildings that date from colonial times, some of them quaint and old-fashioned, but the streets are beautified with avenues of trees and it is a favorite summer visiting resort. Across the river, at Kittery, Maine, is the United States navy yard, where such vessels as the *Ranger* and the *Kearsarge* were built. Among the conspicuous improvements are the Saint John's Church, the Portsmouth Athenaeum, the high school, the Federal post office, and Langdon, Haven, and Goodwin parks. It is the seat of several educational institutions. Portsmouth has substantial street pavements, electric street railways, and a public library of about 30,000 volumes. The manufactures include boots and shoes, machinery, shoe-buttons, spirituous liquors, and marble and granite products. It was settled in 1623 and incorporated as a town in 1653, but became a city in 1849. The Treaty of Portsmouth, which terminated the Russo-Japanese War, was concluded here in 1905. Population, 1900, 10,637; in 1910, 11,269.

PORTSMOUTH, a city in Ohio, county seat of Scioto County, at the confluence of the Scioto with the Ohio River, and at the southern terminus of the Ohio and Erie Canal. It is on the Chesapeake and Ohio, the Norfolk and Western, and the Baltimore and Ohio South-

western railroads. The most notable buildings are a children's home, a home for destitute aged women, the Masonic Temple, the opera house, the county courthouse, the high school, and many churches. Among the manufactures are furniture, hardware, steel springs, boots and shoes, vehicles, and earthenware. The surrounding country is farming and dairying, producing cereals, fruits, and dairy products. It contains rich iron ore deposits. The place was settled in 1803 and incorporated in 1814. Population, 1900, 17,870; in 1910, 33,481.

PORTSMOUTH, a city of Virginia, county seat of Norfolk County, on the west side of Elizabeth River, opposite Norfolk. It is on the Southern, the Seaboard Air Line, the Atlantic Coast Line, and other railroads. The harbor is deep and well improved. It has a large export trade in lumber, cotton, tobacco, pig iron, and vegetables. Among the manufactures are sailing vessels, machinery, flour, lumber products, and utensils. The chief buildings include the county courthouse, the public library, the opera house, the city hall, and many fine hotels, schools, and churches. It is the seat of the United States Gosport navy yard. Electric lighting, brick and macadam pavements, waterworks, and street railways are among the improvements. Several important railroad shops are located here. Portsmouth was settled in 1752, but was not chartered as a city until 1858. Trinity Episcopal Church, a building of historical interest, was erected in 1762. Population, 1900, 17,427; in 1910, 33,190.

PORTSMOUTH, a seaport of England, on Portsea Island, opposite the Isle of Wight, about seventy miles southwest of London. It is the principal naval station of England, has railway connections with its suburb, Portsea, and is connected with Gosport, a city opposite the entrance to Portsmouth harbor, with a fine bridge. The defenses of Portsmouth are extensive and systematically built. They include on the landward side the Hilsea lines and the Portsdown forts and to the seaward, the forts of Spithead. The harbor is only 400 yards wide at its entrance, but it gradually expands into a large and deep basin, and extends inland more than four miles, where it assumes a breadth of three miles. The manufactures are of little consequence, but it has extensive export and import trade. Coal, corn, cattle, sheep, timber, and machinery are the principal articles of commerce. Portsmouth was first established as a port by Henry VIII., but was strengthened by Elizabeth and afterward by Edward III. The city is surrounded by a large number of suburban villages and towns, all of which are sup-

plied with municipal facilities. They have substantial school and church buildings, and a number of them rank as favorite summer resorts. Population, 1907, 208,291.

PORT TOWNSEND (tounz'end), a city of Washington, county seat of Jefferson County, 35 miles northwest of Seattle. It is situated on the west coast of Puget Sound, near the strait of Juan de Fuca, and has transportation facilities by the Northern Pacific and the Fort Townsend Southern railways. The harbor is safe and large and is protected by three forts with modern guns. Owing to its location within the influence of the Japan Current, it has a favorable and equable climate. Lumbering, farming, and fruit growing are productive enterprises in the vicinity. It has a large export trade in grain, fish, lumber, and minerals. The industries include fish and fruit canneries, machine shops, shipyards, and planing mills. The county courthouse, the city hall, the Federal customhouse, the high school, and several hospitals are among the chief buildings. The city has a public library, public waterworks, and sewerage. It was first settled in 1851 and was incorporated in 1860. Population, 1900, 3,443.

PORTUGAL (pör'tū-gal), a country of Europe, occupying the southwestern part of the Iberian peninsula. It is bounded on the north and east by Spain and on the south and west by the Atlantic Ocean. The length from north to south is 350 miles; the average width, 110 miles; and the area, 35,582 square miles. This includes the Azores and the Madeira islands:

DESCRIPTION. The surface is diversified by a chain of mountains that traverses from southwest to northeast. This elevated region includes the Sierra de Estrella, which is a chain of the Sierra Guadarrama of Spain. This range is between the Douro and the Tagus, and foothills and offshoots extend from it in many directions. It has a general elevation of 4,500 feet, but the most elevated summits are about 7,500 feet above sea level. The coast line, including indentations, has a length of 465 miles. A large part of the coast lands rise quite abruptly from the sea, but in some places the coastal tracts are sandy and low. A greater part of the Atlantic slope is included within Portugal, but much of it is a tableland of considerable elevation.

The drainage is exclusively to the west and south. Both the Douro and the Tagus, the two largest rivers, enter the country from Spain and flow into the Atlantic. The Tamega and Sabor are tributaries of the Douro, while the Tagus receives the inflow from the Zazere and the Zatas. The Sadão, which rises in the south-

ern part, has a general course toward the north and flows into the Setubal Bay. A part of the eastern boundary is formed by the Guadiana, which flows into the Atlantic on the border with Spain. Few of the rivers are navigable, but seagoing vessels ascend the Douro to Oporto and the Tagus a distance of 90 miles. A part of the northern boundary is formed by the Minho, which has a wide and fertile valley.

The climate is modified by oceanic breezes on account of proximity to the sea and by the elevations in several parts, causing a diversified effect upon vegetation and the industry. In general the climate is healthful and the winters are short and mild. Vegetation is not interrupted to a great extent in the southern part, but in midsummer, in July and August, the country is generally dry. At Lisbon the mean temperature is 50° and in July it is 70°, but farther inland the extremes are much greater. Lisbon has a rainfall of 40 inches per year, but midway between that city and Oporto the precipitation is greater than in any part of Europe, averaging about 180 inches. The soil as a whole is somewhat sandy and not highly productive, but many of the valleys and plains are noted for their fertility. Snow remains the greater part of the year on the mountains of the northern part, where the summer season is shorter than farther south, although the dry part of the year is less extended. Spring begins early in January in the southern part, where vegetation grows abundantly in February, but the midsummer is quite dry.

MINING. Although rich in minerals, Portugal has not developed mining to the extent that its resources justify. Salt is produced both for domestic consumption and exportation, and coal, lead, copper, and iron are mined. Other minerals include antimony, tin, and manganese. Slate, marble, and limestone are found in large deposits, but the output is comparatively small. Much of the mining is in the hands of foreigners, but the government is encouraging the development of the industry in a way that is interesting small investors.

AGRICULTURE. Portugal has an extensive flora. Forests of oak, mulberry, chestnut, and cork oak are abundant, and the vegetation in general is similar to that of the southern part of Europe. About sixty per cent. of the surface is fit for cultivation, but the methods of farming are crude and primitive. Vine culture is an important industry and yields a fine quality of products, thus accounting for the large manufacture and export of wine. A superior grade of cereals are produced, but the yield does not meet the demand of home consumption.

Wheat, maize, rye, flax, oats, and hemp are grown profitably. The silkworm is reared with care and success in the north, where the mulberry tree thrives. Many fruits and vegetables are grown extensively.

Farming is conducted on a diversified basis. Sheep and goats are reared by a majority of the agricultural classes. Both cattle and goats are grown for meat and dairying purposes. Other live stock includes swine, horses, mules, and poultry. Oxen are used extensively as beasts of burden and draft.

MANUFACTURES. Portugal ranks as one of the leading wine-producing countries, both from the standpoint of quality and quantity. Considerable interests are vested in the fisheries, which yield many species that are canned and cured, such as the anchovy, tunny, and sardine. Cotton and woolen goods and silk textiles rank among the chief manufactures. Other products include boots and shoes, paper, leather, salt, porcelain, ironware, and machinery. Oporto and Lisbon are the principal manufacturing centers and both have extensive interests in shipbuilding. Repeated efforts have been made by the government to bring about a more extensive utilization of the natural resources in manufacturing enterprises, but the people have been slow in adopting modern machinery.

TRANSPORTATION AND COMMERCE. Lines of railways are operated in most sections of the country, but they are not sufficient to supply the reasonable demand. At present there are 2,350 miles of steam railroads in operation, and electric railways are operated in the larger cities and more popular sections. Wagon roads are in a reasonably good state of improvement. A limited river navigation is furnished by the rivers and canals, but the coast has numerous good harbors. Steamers sail regularly from its port to the leading port cities of the world. The imports greatly exceed the exports. Foreign trade is chiefly with Germany, Great Britain, France, Spain, Brazil, and the United States. Coal, clothing, sugar, rice, wheat, and machinery are the leading imports. The exports include wine, coke, fish, fruits, timber, and olive oil.

GOVERNMENT. The government is based on a constitution revised in 1895. While the crown is hereditary in the male and female lines, the males of equal birthright are given preference. Chief executive authority is vested in the king, who also exercises the moderative function of the government. He is assisted by a responsible ministry, whose official sanction is necessary to legalize the acts of the crown. Legislative authority is vested in the Cortes, which consists of two branches, the house of

peers and the chamber of deputies. The house of peers consists of 90 members appointed by the crown for life, the bishops and archbishops, and the princes of the royal blood who have reached the age of 25 years. In 1885 a law was passed which is operating to gradually abolish hereditary peerages. The members of the chamber of deputies are elected by popular vote, but must have attained the age of 21 years, and are required to be able to read and write or pay taxes in a certain amount upon property, though no property qualification is required of persons belonging to the learned professions. The lower house consists of 120 deputies, of whom six are chosen by the colonies, and the election is for a term of four years. A supreme court at Lisbon has ultimate judicial authority, and subordinate to it are three courts of second instance and a system of lower courts. Local government is administered within 21 districts, which are divided into communes, and these are subdivided into parishes.

The government gives encouragement to the merchant marine, which includes 75 steamers and about 500 sailing vessels. Only a few good vessels are contained in the navy, but it has 40 steamers, 15 sailing vessels, and several training ships. The standing army has a strength of 35,000 men of all ranks, while the war footing is 150,000. An army of 9,250 men and officers is maintained in the foreign colonies, in addition to the native troops.

EDUCATION. Portugal has supported a system of public instruction for many years, but its present institutions of this character are governed by the law of 1844, which makes attendance at school compulsory from the age of seven to fifteen years, provided a school is within a mile. This law is generally enforced where schools are maintained, but elementary schools are limited in number, though secondary schools are abundant and carry efficient courses of study. The higher system of education includes seventeen lycées, from which students may pass to special schools or to the University of Coimbra. This institution as a university dates from 1300 and has an attendance of about 1,650 students. The religion is almost exclusively Roman Catholic, but Protestant places of worship are tolerated at Lisbon, Oporto and other cities. In 1834 the monasteries were closed, when their property was confiscated for the benefit of the state, although convents for nuns still exist. As a whole, the educational status is inferior to that of other European countries.

INHABITANTS. The density of population is

about 152 to the square mile. About one-third of the people reside in rural districts. Only a small number of foreigners are within the country and these consist principally of Spaniards and Brazilians. Emigration is chiefly to Brazil, the United States, and the African colonies. Lisbon, on the Tagus, is the capital and the largest city. Other cities include Oporto, Braga, Setubal, Coimbra, Chaves, and Evora. Population, 1900, 5,423,132; 1908, 5,532,213.

COLONIES. The colonial possessions of Portugal have an area more than twenty times as large as the kingdom. They are situated entirely in Africa and Asia. The African possessions include Angola, the Cape Verde Islands, Guinea, Prince's and Saint Thomas's islands, and Portuguese East Africa. The colonies of Asia embrace Macao, in China; Goa, in India; Daman; and the Indian Archipelago. These possessions have an area of 817,350 square miles and a population of 9,175,800.

LANGUAGE AND LITERATURE. The Portuguese language is classed with the Romance tongues and is a modern descendant of the Latin. It is spoken in Portugal and Brazil and resembles the Spanish in some respects, but the pronunciation is somewhat similar to French. The languages spoken in Portugal and Spain up to the time of Alfonso I. were very similar, but at that time the Castilian dialect became the language of Spain and the Galician dialect quite largely influenced the language of Portugal. The difference in language was one of the causes of hostility between the two countries and each developed distinct spoken and written forms. Portuguese is more flexible than Spanish, but the latter is regarded more polite and dignified.

Many valuable literary productions have been written in the language of Portugal. The earliest writings date from the 13th century and are constituted of collections of poetry made by King Dionysius. Pedro I. was among the early poets, while the sons and grandsons of John I. produced a number of poetical works of value. Fernam Lopes (1380-1459) published "The History of Portugal" in 1425 and Antonio de Ferreira wrote "Ignez de Castro," an excellent tragedy, about 1560. In that period the Portuguese dialect was separated from other dialects spoken in the Iberian peninsula and national pride was aroused by vast explorations in foreign lands, thus giving poets inspiration to laud Portuguese heroes and touch the spirit of nationality.

Among the great writers of the 16th century who wrote much of the classic literature of

Portugal may be included Ferreira, Miranda, Brandão, Oriente, and Camoëns, the last named being the author of dramas, sonnets, songs, and a work of great value, entitled "Os Lusíadas." De Barros is the eminent historian of the 16th century and the author of "The Conquest of the Indies," while his contemporary, Brandão, wrote "The History of the Lusitanian Monarchy." The writers of the 17th and 18th centuries were influenced by French scholars, and in the time of Louis XIV. became quite imitative. Interest in literature was greatly augmented in the early part of the 19th century by the writings of Barbosa du Bocage and Manoel de Nascimento, both of whom are founders of distinct schools of poetry, the former of an affected style of sonnets and the latter of a kind of lyrics. Herculano de Carvalho is the most noted modern historian of Portugal. Other recent writers are Garrett, Ribeiro, Diniz, Silva, Castilho, and Mouzinho de Albuquerque. Brazil likewise has furnished many literary works in the Portuguese and has a large number of magazines and other periodicals. Within recent years a broader spirit and greater vigor have developed in general literature, due principally to the establishment of schools on a freer and better basis. Portuguese art is not particularly noted.

HISTORY. The earliest history of Portugal has come to us from the Phoenicians, Greeks, and Carthaginians, who traded along its coasts and established colonies in various parts of the Iberian peninsula. Its ancient name was Lusitania and the original inhabitants were known as Lusitanians. The region was conquered by the Romans and was held as a dependency for many centuries, but after the decline of Rome it was successively overrun by the Alans, Goths, and Vandals, and in the 8th century the Moors conquered it and introduced their form of civilization. For nearly 400 years the Moors remained the predominating influence, but they were finally conquered in 1139, and Alfonso I. organized an independent kingdom in 1143. The country at first included only the region between the Minho and Douro, but Alfonso enlarged the border by defeating the King of Castile, and thereby extended his dominion beyond the Tagus. In 1143 he annexed Algarve and Sanarem. Lisbon was captured by the aid of the Crusaders in 1147, an event counted among the most notable of the brilliant achievements of the reign of Alfonso.

In the period included between the latter part of the 14th and the former part of the 16th centuries Portugal ranked as one of the greatest countries of Europe. Its proud position

among the nations was attained in the successful reign of King John I. and that of his son, Prince Henry the Navigator. It was during this period that Portugal obtained a code of laws and a constitution, industrial arts were encouraged, and a great navy was established. Many colleges and institutions of learning were founded and all were liberally patronized. The fleet of Portugal sailed upon all the seas known at that time, Lisbon became the most noted commercial center for Eastern products, and the navigators discovered and explored many parts of Africa and the South Sea Islands. In 1487 Bartolommeo Diaz doubled the Cape of Good Hope, India was reached by Vasco da Gama in 1498, and Brazil was claimed for the crown by Cabral in 1500. The Spanish explorers were active at the same time. The jealousies that arose between the two nations caused many quarrels between the two governments, each striving to outrank the other, and in 1580 Philip II. of Spain gained the victory of Alcantara and annexed Portugal to his kingdom.

The Portuguese were greatly discontented under Spanish dominion and made strenuous efforts to regain their independence, but did not finally succeed until 1640. The Spanish government did not recognize their country as an independent nation until 1668. While Portugal and Spain were at war, the Dutch were induced by hostile measures of Philip to make continuous attacks upon the colonial possessions of both countries. During this period Portugal lost the Moluccas and its settlements in Malacca, Guinea, Ceylon, and a portion of Brazil, but the last named was afterward restored to Portugal by purchase. At that time Portugal lost its proud position as one of the great maritime powers of Europe, while its finances were almost ruined and the people sunk into ignorance and bigotry. Joseph I. succeeded to the throne in 1750 and placed the Marquis of Pombal at the head of affairs as minister. The latter sought to restore national credit and former prosperity by making many excellent reforms, but the affairs of the nation passed to the eldest daughter of Joseph, Maria Isabella, in 1777, who governed with inefficiency until in 1792, when it became necessary to make her eldest son John, Prince of Brazil, regent of the nation. The friendly relations maintained between Portugal and England caused Napoleon to desire the extinction of the reigning dynasty, and, after a French force under Junot occupied Portugal, the royal family transferred the seat of government to Rio de Janerio, Brazil, in 1807.

John VI. ascended the throne of Portugal

and Brazil on the death of Maria, in 1816, but he continued to reside in the latter country. The nation viewed with dislike the absence of the royal family, since the government at home was mismanaged by its officers. In 1820 a revolution caused the establishment of a constitution, but the king was invited to return, which he did soon after. Brazil declared its independence from Portugal in 1822, and proclaimed the son of John VI., Dom Pedro, as emperor. King John died in 1826 and the Emperor of Brazil became Dom Pedro IV. of Portugal, but the government was administered under Infanta Isabella Maria as regent. A constitution modeled after that of France was adopted in 1826 and Dom Pedro at once abdicated the throne of Portugal in favor of his daughter, Maria da Gloria, with the condition that she should marry Dom Miguel, who was named as regent. A revolution in favor of the latter caused him to be declared king by the Cortes.

Dom Pedro resigned as Emperor of Brazil, in 1831, and returned to Europe for the purpose of overthrowing Dom Miguel, and succeeded in restoring Maria in 1833. She governed until her death in 1853, when her son, Dom Pedro V., became king under the regency of her husband, Ferdinand Saxe-Coburg. He succeeded to full government in 1855, but died in 1861, and was succeeded by his brother, Louis I. The latter died in 1889 and the sovereignty passed to his son, Carlos I., under whose reign the country experienced an era of considerable prosperity and progress. However, he and his eldest son, Luiz Philippe, were assassinated by revolutionists on Feb. 1, 1908, when his second son, Manuel II. (born Nov. 15, 1889), ascended the throne. A revolt occurred against the monarchical party in 1910, when King Manuel II. was deposed and a republic was declared with Theophile Braga as provisional president.

PORTUGUESE EAST AFRICA, or **Mozambique**, a colony of Portugal, on the eastern coast of Africa. It is bounded on the north by German East Africa, east by the Indian Ocean and the Strait of Mozambique, south by Natal, and west by the Transvaal, Rhodesia, and Central Africa. A part of the northeastern boundary is formed by Lake Nyassa. The area is 300,460 square miles.

The coast is low, but the country rises rapidly toward the west, where the Namuli Mountains reach an altitude of about 9,000 feet. A large part of the country is included in the Manica Plateau. The drainage is chiefly by the Rovuma, the Shire, the Zambesi, and the Oori Limpopo. Much of the country lying along the ocean is subject to malaria, but the

mountainous districts are healthful. The mean annual temperature near the coast ranges from 49° to 106°, but a rainy season extends from December to March. Iron, coal, gold, and building stone constitute the principal minerals. Corn, rice, beans, wheat, tobacco, coffee, indigo, sugar cane, and fruits are grown profitably. Domestic animals, especially cattle and horses, are reared in large numbers.

The region included in the colony was occupied by the Portuguese in 1498, when Vasco da Gama landed at the mouth of the Zambesi. Military posts were established in several localities in the 16th century. Slavery was maintained until 1878, when it was abolished. The boundaries were fixed between the colony and the possessions of Germany and Great Britain in 1890. The government is administered by a royal commissioner, who has his seat at Lourenço Marques, which is the capital. Other towns include Gaza, Beira, Sofala, and Mozambique. Several highways and about 500 miles of railroad have been constructed. The trade is largely with Portugal. Population, 1906, 2,575,000.

PORTUGUESE GUINEA, a colonial possession of Portugal, on the western coast of Africa, bounded on the north by Senegal, east and south by French Guinea, and west by the Atlantic Ocean. A number of small islands off the coast, including the Bissagos, belong to it. The entire area is 14,270 square miles. From the coasts the land rises gradually toward the mountains of French Guinea and the drainage is chiefly by the Rio Grande, which enters the sea by a wide estuary. It has a tropical climate and valuable timber, including many species of the palm tree. Rice, millet, fruits, ivory, nuts, and India rubber are the principal products. The trade is chiefly with Portugal, France, and Germany. The colony has been a possession of Portugal since 1792, but its boundaries were not established until 1886. Bulama is the capital. The inhabitants consist of many native races, mostly pagans and Mohammedans. Population, 1908, 203,100.

PORTUGUESE WEST AFRICA. See Angola.

PORT WINE, a product from grapes. It was made originally in the valley of the Douro, Portugal, and was so named from Oporto, whence it is exported in large quantities. Port wine has a color varying from pink to red, is slightly astringent, and requires about three years to mature. The annual production in Portugal is estimated at 115,000 pipes and about one-third of this is exported. Several artificial grades are made in California and elsewhere.

POSEN (pō'zen), a province of Germany, bounded on the north by West Prussia, east by Russian Poland, south by Silesia, and west by Brandenburg. It has an area of 11,184 square miles. The surface is an undulating plain of great fertility, and the principal drainage is by the Warthe and the Netze. The Vistula forms a part of its northeastern boundary. About twenty per cent. of the surface is covered with forests and sixty per cent. is under cultivation. The principal crops are wheat, rye, hops, potatoes, flax, tobacco, and fruits. Stock raising, dairying, manufacturing, and silk culture are the principal industries. The region included in Posen belonged to Poland until 1772, when it became a part of Prussia and Austria, though a portion of it was not incorporated with Prussia until 1793. Posen formed a part of the duchy of Warsaw from 1807 to 1815, but in the latter year it was again annexed to Prussia as the grand-duchy of Posen. The Polish part of the inhabitants took sides against Prussia in the Revolution of 1848. It is now divided into the governments of Posen and Bromberg. Posen is the capital and largest city. Population, 1905, 1,986,637.

POSEN, a city in Germany, capital of the province of Posen, on the Warthe River, 145 miles east of Berlin. It is conveniently situated, has strong fortifications, and is a noted railroad and manufacturing center. Among the principal buildings are the Marienkirche, the townhall, the royal palace, the public library, the Evangelical gymnasium, the public theater, the central railway station, and many educational institutions. It has a fine public park and two monuments of Polish kings. The manufactures include leather, cotton and woolen goods, silk textiles, tobacco products, carriages and wagons, sugar, musical and scientific instruments, and machinery. Electric lighting, street railways, sanitary sewerage, and pavements of stone and asphalt are among the public utilities. Posen was a member of the Hanseatic League in the Middle Ages and long had importance as a trading center between Western Europe and the regions on the boundary of Asia. It was the residence of the monarchs of Poland until the end of the 13th century. The fortifications were built in 1828, and its modern prosperity dates from the building of railroads. Population, 1905, 136,808.

POST OFFICE, the branch of the civil service of a government which is charged with carrying and delivering the mails. It is certain that systems for conveying intelligence among individuals and between individuals and

officials were maintained in times of remote antiquity, but the first systematic institution having charge of dispatches was established by the Roman Empire, though the business transacted was wholly of a public character. The places at intervals along the roads of Rome, where couriers were stationed to bear dispatches, gave rise to the word *posts*, a term now generally applied in different relations by the several nations in connection with their postal systems. The Hanseatic League of European cities established the first extensive system of carrying letters and parcels in the 13th century.

A business house of Boston, in 1639, organized the first postal service in America, by arranging to care for letters and periodicals to be sent to or received from foreign countries. The New York colony established a postal line in 1672 between New York and Boston, and the stage carrying the mail made a round trip each month, but in 1702 the round trips were changed to twice a month. King William and Queen Mary granted a patent to Thomas Neale, in 1692, whereby he was made Postmaster General for the colonies. In the same year a general post office was established in Virginia, and the next year one was founded at Philadelphia. Parliament established a uniform postal system for all the colonies in 1710, and the principal office in America was located at New York, but there were general post offices to receive and distribute mails for different points in other large cities. Benjamin Franklin was the first Postmaster General to make the system a success, receiving his appointment in 1753, but he was deprived of his office in 1774 for his attitude in the American conflict.

In 1775 Congress adopted a plan for a colonial system, which had been devised by William Goddard, and made Franklin the Postmaster General. Both the Articles of Confederation and the Constitution vested the power over postal affairs in Congress, and that body came in full control of the mails under the new Federal government in 1789. At that time only about 75 post offices were maintained in the thirteen states, but the business was continued with little substantial change until 1840, when the plan to make the post office system only expense-paying originated. Among the notable events in connection with the postal service of the United States are a postal treaty with England in 1846, improvements in postage stamps in 1847, the introduction of stamped envelopes in 1852, the establishment of the registered letter system in 1855, the introduction of free delivery in 1863, the establishment of

the money order system in 1864, the introduction of postal cards in 1873, the establishment of a special delivery system in 1885, the introduction of the two-cent reply postal card in 1892, and the revision of the postal money orders in 1900. Postal notes were first issued in 1883, but the law of 1900 made them payable at any post office having the right of issue.

The growth and importance of the post office system of the United States may be noted from the following table:

YEAR.	NO. POST OFFICES.	REVENUE.	EXPENDITURES.
1790	75	\$ 37,935	\$ 32,140
1800	903	280,804	213,994
1810	2,300	552,366	495,969
1820	4,500	1,111,927	1,160,926
1830	8,450	1,850,583	1,932,708
1840	13,468	4,543,522	4,718,236
1850	18,417	5,552,971	5,212,953
1860	28,498	8,518,067	19,170,610
1870	38,492	19,772,221	23,998,837
1880	42,989	33,315,479	36,542,804
1890	62,401	60,858,783	66,645,083
1900	76,691	102,354,579	107,740,267
1908	61,158	191,478,663	208,351,886

It is the policy of the government to make the postal system practically self-supporting, but the expenditures have exceeded the receipts much of the time. In 1908 the deficit was \$16,910,278.99. This is due in a large extent to improvements effected in the service, such as rapid transit of the mails, free distribution to a large per cent. of the people, and encouragement given to educational arts by reducing or remitting entirely the postage on certain classes of periodicals. A large volume of mail is conveyed without the payment of postage, such as the official communications of postal officers and members of Congress. Besides, the United States postal service is the most extensive of any country in the world, providing for each 1,003 persons an established post office.

The rate of postage on letters depended upon distance in the early period of postal regulations, varying from eight to twenty-five cents per letter, but in 1816 the rates were graded at from six and one-quarter to twenty-five cents. In 1846 the rates were reduced to three cents for distances not exceeding 300 miles, and ten cents was charged when the distance was over 300 miles. The rate on prepaid mail was fixed at three cents for all distances under 3,000 miles in 1851, but, if not prepaid, five cents was collected on delivery. Congress passed a law in 1856 making the prepayment of postage compulsory, and a uniform rate of three cents for each half ounce or fraction thereof was established for all distances in 1863. The rate was reduced to two cents for each ounce or

fraction thereof in 1885, and only one cent was established as the rate for drop letters, except in localities having free delivery, where the rate for drop letters remained at two cents. Domestic rates and conditions apply to all classes of mail matter sent from the United States to the Philippines, Porto Rico, the Hawaiian Islands, and Guam.

All mailable matter is divided into four classes. *First-class* mail includes all letters and parcels sealed against inspection. Periodicals issued at regular intervals not less than four times a year comprise *second-class* mail matter, and the rate of postage is one cent a pound. In 1901 the Postmaster General promulgated a rule that excludes books published under the guise of serial publications from the mails as second-class matter. Circulars, proof sheets, books, transient newspapers, and all printed matter not issued periodically are included with *third-class* mail matter, and the rate of postage is one cent for each two ounces, though each separate parcel is limited so as to not exceed four pounds in weight. Mail matter of the *fourth-class* includes articles of merchandise and all matters not included in the other three classes. The rate of postage for fourth-class mail matter is one cent per ounce and the weight is limited to four pounds. All postage must be prepaid, except that only two cents need necessarily be prepaid on each article of the first class, and all matter may be registered by paying the postage in full and eight cents in addition. Any mail matter failing of delivery, except circulars, advertisements, and other printed articles of no apparent value, is returned to the sender. The return is made direct to the sender if the matter bears upon the outside the name and address, otherwise it is sent to the Dead-Letter Office, in Washington, where it is opened after thirty days and sent to the proper party. Many of the letters and parcels contain money or negotiable paper of value. However, they are all restored to the owner. This is also true of parcels containing merchandise. If the owner cannot be found, they are sold at auction. Auctions of parcels of merchandise unclaimed are held after the parcels remain unclaimed for two years.

There are five general methods of transporting the mails. They consist of transportation by railways, steamboats, ocean steamers, mail messengers, and the star service. Congress is authorized to make contracts for carrying mails, which is done through the postal officials. The *star route service* is utilized in sections of the country where the mails cannot be carried by railroads or water navigation,

when they are transported by carriage or stage, on horseback, or afoot. In 1874 the International Postal Convention in session in Berne, Switzerland, concluded terms whereby the Universal Postal Union was organized, which went into operation on July 1, 1875. Practically all the nations have now joined the union, thus establishing uniform rates of international postage. The rates on letters are five cents a half ounce if prepaid, and double that rate if not prepaid. Postal cards are sent to foreign countries at two cents each. One cent for each two ounces is the rate for printed matter and merchandise if prepaid, otherwise double that rate.

The special delivery authorized by Congress in 1885 provides for messengers who deliver mail matter immediately after it is received at the post office. This system extends to all post offices and in the larger cities permanent messengers are constantly on duty, but in other offices the postmaster effects delivery by any means available. The amount charged in addition to regular postage is ten cents; and the profit to the government accruing from this system aggregates about \$35,000 annually. Free delivery was first authorized by an act of Congress in 1863, and under this system carriers are employed by the government to deliver letters and other mail matter at the home or place of business indicated by the address. These carriers collect the mail matter to be sent from boxes, where it is deposited by the senders. Originally free delivery systems were established only in cities having a population of 10,000, or a gross annual revenue of \$10,000, but now many rural districts have been included, and the mails are carried by special messengers to many of the farm homes. Free delivery in cities and rural districts has proven popular, and is being extended constantly in all sections not already supplied.

The post office system is under the direction of the Postmaster General, who is a member of the President's Cabinet. Four classes of post offices are specified. The post offices having gross receipts of \$1,000 or more are divided into the first, second, and third classes, and those having less than that amount constitute the fourth class. Four assistant postmasters-general are appointed by the President, but all other officers and employees of the department are named by the Postmaster General. The salaries paid to postmasters filling presidential post offices range from \$1,000 to \$6,000 annually, being graded according to the volume of business, while fourth-class postmasters are paid in proportion to the amount of stamps canceled. Any attempt to interfere with the

mails, or the commission of offenses relating to the post office business, such as embezzling, robbing, or destroying any mail matter, is punishable by the government with much severity.

CANADA. The post office department of Canada is under the direction of the Postmaster General, who receives a salary of \$7,000 per year. Letters are forwarded at the uniform rate of two cents per ounce, which must be partially prepaid, else the letters are sent to the dead letter office. Postal cards are one cent each to any place in Canada, Mexico, and the United States. The rate on book post is one cent for two ounces, and the weight is limited to five pounds. Newspapers and periodicals are transmitted at one-fourth of a cent per pound, but single copies require one-half a cent each. General merchandise and all other articles not specially classified are regarded as mail matter of the *fourth-class* and require prepayment of postage at the rate of one cent per ounce or fraction thereof. All classes of mail are registered at five cents per parcel or letter in addition to the regular postage. Letters addressed to any post office in the Dominion may be insured for amounts not exceeding \$25.00 at a fee of from three to six cents. Money may be sent by postal notes, postal money orders, or registered letters. Deposits of \$1.00 or any multiple of \$1.00 are received at the postal savings banks, which are maintained at most of the branches, and deposits receive interest at the rate of three per cent. Canada had 11,377 post offices in 1907. The system yields a net profit to the government.

POTASH (põt'ăsh), or **Potassia**, an alkaline product formed by the metallic base of potassium and other elements. A common form of potash is obtained from the lye of vegetable ashes. The product is so named from the pots and the ashes used in preparing it. It may be obtained by placing a quantity of wood ashes in a barrel, through which water is filtered, and the liquid is then boiled down to concentrate the strength. In a crude form potash is an impure carbonate of potassium and in a pure form is known as *pearl ash*. Formerly it was obtained exclusively from wood ashes, but potash minerals are used for that purpose at present. It is employed in making glass, soap, and various products used in medicines and the arts.

POTASSIUM (põ-tăs'si-üm), a metallic element of a bluish-white color, discovered by Sir Humphry Davy in 1807. It is brittle and crystalline at 32° Fahr. and may be easily cut with a knife at 58°. At 145° it becomes a per-

fect liquid. The specific gravity is .875; thus, it is one of the lightest of all the metals. When thrown upon water, the metal decomposes with much rapidity, forming hydrates of potassium, while the escaping hydrogen takes fire and burns with a rose-red color. Metallic potassium is prepared by decomposing potassium carbonate by carbon at a white heat. It is sold in the trade in round brownish masses, and, since exposure causes a film of oxide to form at the surface, it must be preserved under a liquid free from oxygen; naphtha and rock oil are generally used for that purpose. Potassium is a conductor of electricity. Chloride of potassium is a preparation sold in the market as muriate of potash and resembles common salt, being obtained from the brine of mineral springs, sea water, and the ashes of marine plants. Other preparations of potassium salts include bromide, iodide, nitrate of saltpeter, sulphide, fluoride, phosphide, chlorate, sulphate, cyanide, phosphate, and ferrocyanide. Saltpeter, bromide, and iodide are used in the medical practice, while the other preparations are employed in mechanic arts and as artificial manures.

POTATO (põ-tă'tõ), one of the most valuable food-producing plants. It is cultivated extensively in all the subtropical and temperate countries. The potato is native to the Andean region of South America, where it was cultivated by the Incas long before the discovery of America, and was first brought to Europe from Peru by the Spaniards. Its culture spread rapidly in Italy, Spain, the Netherlands, and Germany before the middle of the 16th century, and was first introduced into England by Sir John Hawkins in 1563. By the close of the 18th century its culture and use had spread over most of Europe and in many countries of Asia. It is now a staple article of food among all classes, but particularly of the poorer people of Europe.

The potato belongs to the same family as the nightshade, tobacco, and henbane. It is an annual plant with large, herbaceous stems, growing from one to three feet in height. The leaves are pinnate and the flowers are of a whitish, bluish, violet, or variegated color. Some species bear a globular fruit somewhat larger than a gooseberry, which contains a number of small seeds. The tubers are the valuable part of the plant and grow underground on slender leafless shoots or branches that differ in character from the true roots. They are different in form, size, color, quality, and time of ripening, and their size has been greatly increased by cultivation. The value

of the tuber depends upon the starch and other matters stored in it. These are usually about twenty per cent. of starch, five per cent. of woody matter, four per cent. of sugar, gum, albumen, casein, gluten, and kindred substances, and about seventy-one per cent. of water. Each potato has a number of eyes, or leaf buds, and propagation is effected usually by planting pieces of the tubers, each piece containing one or more eyes.

Early species of potatoes mature in about three months, but the tubers may be utilized for food under favorable conditions in about six weeks after planting. Some kinds require longer time, but this depends somewhat upon



COMMON POTATO.

the soil and climate. The yield is from 25 to 300 bushels per acre. Germany exceeds all the countries in the production of potatoes, yielding 1,782,759,000 bushels in 1908. A large part of Canada is peculiarly fitted for potato culture, but Ontario has the largest yield, where the crop, in 1908, was 21,645,380 bushels. The potato crop of the United States averages annually about 260,500,000 bushels, valued at \$96,500,000. The states producing the largest annual

yield usually rank as follows: New York, Michigan, Wisconsin, Pennsylvania, Minnesota, Illinois, Iowa, Nebraska, Ohio, Missouri, Indiana, Kansas, and Maine. Besides supplying a large quantity of food for man and animals, potatoes enter into the manufacture of starch, spirits, and sugar products. More than 500 species have been described. Those cultivated most extensively include the Early Rose, Early Ohio, Peerless, Burbank, White Star, Beauty of Hebron, and Peach Blow.

POTATO, Sweet, a climbing perennial plant cultivated extensively for its tuberous root, which is a wholesome and favorite article of food. The leaves are either cordate or lobed and are borne on slender, twining stems. The roots are large, with somewhat pointed ends, and of a reddish or yellowish color, and grow in clusters at a small depth below the surface. Sweet potatoes are propagated by setting the tubers out in the spring, and the rows are ridged in midsummer to facilitate the development of the tuber-roots. It is not certain where the nativity of the sweet potato really is, but it is regarded of tropical origin. Its culture is comparatively modern, but it was cultivated earlier than the common potato, or *Irish potato*, as a food plant. The difficulty experienced in preserving tubers over winter in cold climates has largely limited its culture, but it is more and more entering the trade as a favorite article of food. It is grown in North America as far north as the southern part of Canada. The yield is best in a rich, sandy loam. The yam somewhat resembles the sweet potato.

POTATO FLY, an insect allied to the cabbage fly, beet fly, and turnip fly. Maggots of the potato fly are often found in rotten or damaged potatoes in autumn. In a mature state the fly is very similar to the house fly. The male has a grayish-black color and the female is of an ashy-slate color. They differ also in that the former has five broad stripes on the back and four spots on the second and third segments, while the latter has spots on the second abdominal segment. See **Colorado Beetle**.

POTOMAC (pō-to'māk), a river of the Middle Atlantic States, which rises by two branches in the Allegheny Mountains, in West Virginia, and after a course of about 400 miles enters Chesapeake Bay by an estuary. It forms the boundary between West Virginia and Maryland and between Virginia and Maryland. The course to Cumberland, Md., is in a northeasterly direction, thence it flows in a tortuous direction toward the east and northeast, but soon makes a bold turn toward the

southeast, passing Harper's Ferry, Washington, and Alexandria. The estuary is 100 miles long and about eight miles wide at its entrance into Chesapeake Bay. Tide water reaches Washington, a distance of 125 miles from its mouth, and it is navigable for a large part of its course. Above Washington are several falls and rapids, which obstruct navigation.

POTOSÍ (pō-tō-sē'), a city of Bolivia, on the slope of Cerro de Potosí, about fifty miles southwest of Sucre. The mountain has an elevation of 15,200 feet, and the city is situated on a sloping plain fully 13,250 feet above sea level. It was founded in 1545 in the midst of a productive gold and silver mining region and in 1611 had a population of 165,000. Among the features are several churches and schools, a government mint, and a monument in honor of Bolívar. Within recent years the mines have failed rapidly, chiefly because of a marked decrease in the value of silver, and much of the former city is desolate and in ruins. The surrounding country is unproductive aside from its extensive mineral deposits and grazing lands. Trade is carried on exclusively by stage and highway transports. Mount Cerro de Potosí is covered with snow perpetually, thus greatly modifying the climate, but there is an abundance of water for mining purposes. The productive mines of Potosí yielded in their greatest prosperity silver products valued at \$1,500,000 annually. Population, 1906, 23,450.

POTPOURRI (pō-pō-rē'), a term derived from the French, variously applied to indicate a medley or hotchpotch. It is the name of a mixture of dried, sweet-smelling flower petals used to perfume a room, which is placed in a vase covered with a perforated lid. The flowers used chiefly are violets, roses, and jasmynes, but they are mixed with lavender, cloves, sandalwood, and musk. The term is used also to signify a kind of incense made of mixed gums and seeds, to describe a medley of musical airs, and to signify a literary production of parts brought together without a bond of connection. A mixture of meats and vegetables, such as a stew or potpie, is sometimes called potpourri.

POTSDAM (pōts'dām), a city of Germany, capital of the province of Brandenburg, sixteen miles southwest of Berlin. It is the second royal residence of the kingdom of Prussia. It is finely situated on the Havel River and is connected with Berlin by electric car lines and railways. In the vicinity are a number of beautiful lakes and ranges of hills covered with forest trees. The surrounding country has a fertile soil, producing cereals, fruits, and tobacco. Among the noted buildings are the

royal palace, a gymnasium, and numerous churches. The Church of Garrison has a tower 400 feet high, and under its pulpit are the remains of Frederick William I. and Frederick II. It has a number of beautiful public gardens and boulevards, a public library, and several historical statues and monuments. Potsdam was the favorite residence of Frederick the Great and the birthplace of Alexander von Humboldt. The manufactures include cotton, silk, and woolen goods, machinery, tobacco products, wax cloth, chocolate, scientific instruments, and porcelain. Potsdam was a fishing village until 1660, when Frederick William I. made it a royal residence and built its magnificent palace. Population, 1905, 61,414.

POTSTONE (pōt'stōn), an impure variety of soapstone, composed of a mixture of mica, talc, and chlorite. Though soft when quarried, it becomes hardened by exposure to air, and is used to some extent in making household utensils. In ancient times it was used chiefly for that purpose and its utility appears to have been widely known, since it is mentioned by Pliny and other ancient writers. Extensive deposits are found in Greenland, Austria, the Scandinavian peninsula, and Upper Egypt.

POTTAWATTAMIES (pōt-tā-wōt'ā-mīz), an Indian tribe of North America, belonging to the western branch of the Algonquin family. It early occupied the region now included in Lower Michigan and upper Indiana and Illinois. The French established missions among these Indians at Green Bay, but they afterward joined Pontiac. They were hostile to the Americans during the Revolution, but concluded a peace treaty in 1795. In 1812 they again aided the English, but in 1815 ceded nearly all their territory, when many were assigned land in Missouri and Kansas. At present the tribe numbers about 1,750, of whom 575 are in Kansas, 100 in Michigan, 300 in Wisconsin, and 775 at the Sac and Fox agency in Oklahoma. Many members of this tribe are advanced in educational and industrial arts and are successful in cultivating the soil.

POTTERY (pōt'tēr-ĭ), the art of manufacturing earthenware or porcelain by modeling any kind of clay when in a plastic condition and then hardening by fire. This art is generally called the *ceramic art*, or *ceramics*, especially when it relates to making vessels and utensils.

HISTORICAL. This art was practiced from remote antiquity, the remains and monuments of many races giving it a standing among the industries pursued in prehistoric times. Both glazed brick and tiles have been found among

the ruins of ancient Nineveh, and on the monuments of Thebes are views of potters at work, showing that earthenware entered prominently into household and public service many centuries before the Christian era. The Mosaic writings

make mention of earthenware. In the Metropolitan Museum of Art, in New York, are fine specimens of pottery, including jars, vases, cups, lamps, and household utensils, brought by General di Cesnola from Cyprus, where they were made by the ancient Phoenicians. It is thought that the Greeks learned the art of making pottery from the Egyptians and the Phoenicians, and that the Romans



PORCELAIN VASE.

learned it from the Greeks. Extensive potteries were maintained at Athens, Samos, and Corinth, where most of the pottery of Grecian manufacture was made. The product from these potteries was of splendid design and ornamentation, specimens extant possessing remarkable perfection. Many of the vases now made are patterned from the finest Grecian products.

The art was carried to Spain by the Arabs, who have credit for introducing the manufacture of glazed ware into Western Europe. Although the art of making this grade of ceramics was long thought to be of relatively modern origin, excavations in the ruins of Babylon in the last century disproved this view, since many glazed products were found there, including glazed coffins, vases, and household utensils. The celebrated *majolica wares* were first made by the Arabs in the island of Majorca, and in the 15th century the art was introduced at Florence and other Italian cities. The French learned it of the Italians, though some essentials of the art were held as secrets until Bernard Palissy, a French potter, discovered the important features involved in making *majolica*, and subsequently added many valuable improvements by way of ornamenting with pictures of sea animals, landscapes, and views from nature.

Artistic pottery was introduced into Germany, Gaul, and Britain by the Romans, who made products from native clays, but rude wares had been made in these regions for centuries before. The Dutch developed a peculiar kind of pottery, known as *delft*, from its extensive manufacture at Delft, Holland. Delft wares are more solid and less beautiful than those produced by Eastern methods, but they became noted for their remarkable strength. This art was introduced by the Dutch into England, where large quantities were made for several centuries. Josiah Wedgwood, an English potter, discovered methods for making more ornamental designs about the middle of the 18th century, and may be regarded among the most celebrated manufacturers of modern times. The manufacture of pottery on a large scale in the United States is of comparatively recent date and at present a comparatively large per cent. of the wares sold in the American market are of foreign manufacture. However, there is a constant growth in the annual output, which represents a total value of about \$38,500,000. Extensive potteries are located at Trenton, N. J., East Liverpool, Ohio, Cincinnati, Baltimore, Boston, New York, and Wheeling, W. Va.

PORCELAIN. The manufacture of porcelain has been an important industry among the Chinese and Japanese from a period antedating the Christian era. They were making the finest grade of porcelain while the Greeks were still using terra-cotta vases, and their skill in the finer ceramic art dates fully 2,000 years earlier than that of the Europeans. King-te-chin in the province of Giang-si was for centuries the center of vast potteries, and it is known that excellent grades of porcelain were made there in the 6th century A. D. Many thousand porcelain furnaces were in use in that city in the 18th century, but the Tai-ping insurrection destroyed practically all the works. The varieties of Chinese porcelain are endless in form and decoration and comprise some of the most delicate and beautiful known. Many specimens of the blue ware made before the Middle Ages possessed much value, from which the Delft manufacturers first copied their blue-colored delft ware.

The clay used in making porcelain is called *kaolin* and was thought to be found only in China, but in 1711 Friedrich Böttger discovered large deposits of it near Dresden, Germany. He learned the secret of making porcelain while employed by the Elector of Saxony and a factory was established at Meissen, near Dresden, where the well-known Dresden porcelain is still made. A workman carried the secret to Vienna

in 1720, which became a noted center of porcelain manufacture, and these two cities are still among the most extensive producers of these products in Europe. The principal porcelain manufactory in France is at Sèvres and the most noted of England is in Staffordshire. Kaolin deposits are abundant in North America, notably in New Brunswick, Delaware, Pennsylvania, New Jersey, Missouri, the Carolinas, Ohio, Illinois, and Maine.

MANUFACTURE. Many kinds of pottery are made, but all varieties are produced by molding the clay while in a moist condition into the forms desired, after which they are baked in an open fire. The molded forms are ornamented with patterns stamped into the clay before firing, but some of the grades are plain. Manufacturers mix various matters with the clays to make finer and more delicate pottery, or decorate it by paintings. Pottery is said to be *soft* when its surface is unglazed and easily



MAJOLICA JAR.

scratched by a piece of iron and *hard*, when the iron has no effect on it. A common flowerpot belongs to the soft earthenware and a Sèvres plate to the hard variety. Between these two grades are many kinds of wares. Pottery is generally divided into earthenware, stoneware, and china or porcelain. *Earthenware* is soft and includes many varieties of products, but principally *unglazed ware*, as brick, terra cotta, and flowerpots; *lustrous ware*, or products baked and coated with a slight vitreous glaze, as the ancient Greek vases; *glazed ware*, embracing ordinary clay ware with a lead glaze, as common household ware; and *enameled wares*, including ordinary clay ware with an opaque glaze, as

Italian majolica or Dutch delft. *Stoneware* is a kind of pottery characterized by hardness and infusibility, properties due to the silica in the clay forming the body. The two principal varieties are a kind which is generally colored or dark and usually coated with a salt glaze, as a stoneware crock; and a kind which is light in color and coated with a vitreous glaze containing lead, as granite ware.

Porcelain is the finest and most valuable grade of pottery and is characterized chiefly by hardness. It is almost infusible, is somewhat translucent, and usually has an alkaline glaze. It is made of a body of clay containing silica, usually called *kaolin*. The principal classes include the *hard porcelain*, made of a body of kaolin and feldspar, as the porcelain known as Chinese, Berlin, and Sèvres; the *soft porcelain*, made of kaolin and calcium phosphate coated with a lead and boric acid glaze, as Worcester porcelain; and *artificial porcelain*, a kind resembling glass and made chiefly of alkaline salt and coated with a lead glaze, as the porcelain formerly made at Sèvres, France.

METHODS. Pottery is made by the workman molding and turning the plastic clay on his wheel, a kind of turning lathe, and it is then taken to a room and partially dried under a high temperature. After drying to what is called the *green state*, the product is again placed on the lathe for the purpose of giving it a truer shape and smoothness. However, this depends largely on the form of the articles, since the more complicated circular form must be pressed into molds of plaster of Paris and the work is done almost exclusively by hand.



MAKING POTTERY.

Practically the only machinery used in making pottery are the machine for mixing clay and the turning wheel of the workman. It is probable that machine labor can never be introduced to any considerable extent, since it is practically impossible to substitute any mechanical device for the molding hand of the potter. The articles are ready for the kiln as soon as they are properly shaped and dried, and they are exposed to a high temperature about forty hours. It is necessary for the kiln to cool very slowly, since

rapid cooling causes the articles to warp or crack. They are glazed by immersing in a vitrified composition and subjecting to heat a second time. Decorations are put on in various ways, in some cases by press printing and in others by hand. Paintings are put on earthenware by a brush, usually over the glaze.

POTTSTOWN (pöts'toun), a borough of Pennsylvania, in Montgomery County, on the Schuylkill River, 38 miles northwest of Philadelphia, on the Pennsylvania and the Philadelphia and Reading railroads. The place is surrounded by an agricultural and mining district and is the center of large manufacturing enterprises. The noteworthy buildings include the high school, the public library, the general hospital, and many fine churches. Among the manufactures are dairy products, brass fittings, ironware, steel bridges, nails, iron plate, and farming implements. Fully twenty creameries are operated in the vicinity. It was platted in 1752, when it was named Pottsgrove, but it was incorporated under its present name in 1815. Population, 1900, 13,696; in 1910, 15,599.

POTTSVILLE (pöts'vil), a borough in Pennsylvania, county seat of Schuylkill County, on the Schuylkill River, 35 miles northwest of Reading. It is on the Central of New Jersey, the Pennsylvania, the Philadelphia and Reading, and other railroads. The surrounding country is a mining region that yields annually about 6,000,000 tons of coal. The principal buildings include the county courthouse, the Pottsville Athenaeum, the Commercial Union School, the public library, a children's home, and a general hospital. It has electric street railways, public waterworks, and many paved streets. It was settled in 1800 and platted by John Pitt in 1818. Ten years later, in 1828, it was incorporated. Among the manufactories are rolling mills, machine shops, stove foundries, potteries, nail and spike mills, planing mills, cigar and shirt factories, and silk and woolen mills. Population, 1900, 15,710; in 1910, 20,236.

POUGHKEEPSIE (pö-kíp'si), a city of New York, county seat of Dutchess County, on the Hudson River, 72 miles north of New York City. It is on the New Haven and Hartford, the New York Central, and other railroads. The site rises to a height of 200 feet above the river, which is crossed by a famous cantilever bridge. A ferry crosses the river and communicates with the West Shore Railroad. An extensive system of electric railways furnishes communication to adjoining and distant towns. It has a large commercial trade and many industries. The principal manufactures include silk and cotton goods, boots and shoes,

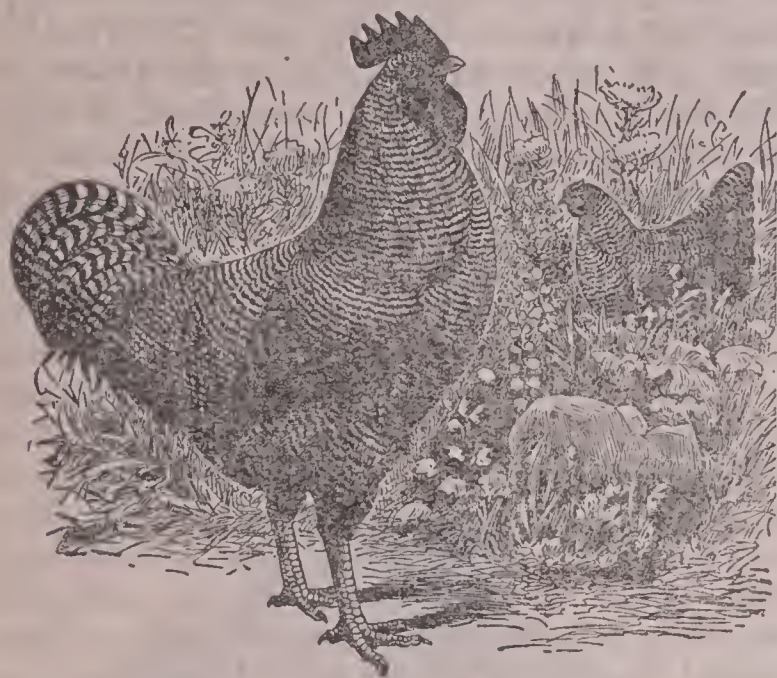
carriages, dyestuffs, farming implements, ironware, clothing, and machinery.

The State Hospital for the Insane is situated two miles north of the city. A short distance east is Vassar College, one of the finest women's colleges in the world. Other educational institutions include the Riverview Military Academy, the Poughkeepsie Military Academy, the Lyndon Hall, the Quincy School, and the Eastman National Business College. It has a fine county courthouse, the Saint Barnabas Hospital, the Adriance Library, and College Hill Park. The place was settled by the Dutch in 1698, became the capital of New York in 1778, and was incorporated in 1799. It was so named from Apokeepsing, an Indian village, the term meaning *safe harbor*. Population, 1905, 25,379; in 1910, 27,936.

POULTRY (pöl'trý), the term applied generally or collectively to domestic fowls. They are reared for their flesh, eggs, or feathers, as chickens, geese, turkeys, ducks, guineas, and pigeons. The common chickens are the most important of the domesticated birds, since both their flesh and eggs are wholesome and favorite food. Such naturalists as Darwin ascribed the origin of the domesticated breeds to the Bankiva fowl, but the species have been increased materially by propagation. We learn from history and ancient paintings that poultry culture is of great antiquity, both civilized and savage peoples engaging more or less successfully in rearing different classes of birds. By far the largest amount of poultry reared is bred by farmers and others who make its culture a profitable adjunct to other enterprises, but in some localities special poultry farms are maintained. In many parts of France and Germany poultry keeping is the leading pursuit of the peasant, and in many places extensive yards may be seen for the confinement of chickens, while in others herders are employed to watch over vast flocks of geese and ducks. The total annual production of poultry in the United States has a value of \$550,000,000 and the production of eggs, \$250,000,000; about 56,000,000 eggs are consumed daily. The eggs of chickens comprise the most important poultry product sold in the market, but the eggs of geese, ducks, and guineas are marketed to a limited extent. As a rule, chickens and turkeys are reared for their flesh and eggs; geese and ducks, for their flesh and feathers; pigeons, for their flesh; and guineas, for their flesh and eggs, or for ornament in the barnyard.

In propagating poultry it is necessary to take into account the objects desired, espe-

cially in chickens, since the species best adapted for flesh are as a rule inclined to lay only a limited number of eggs, while the prolific layers are rather of under size. For mixed farming it is usually desirable that the size be medium, thus combining both flesh and egg-producing qualities. The different kinds of poultry require a somewhat varied treatment, but all retain a higher state of health when allowed to run in spacious yards where they



PLYMOUTH ROCK CHICKENS.

may feed on certain forms of insects and vegetation. It is necessary to provide clean and well-ventilated houses, sufficiently warm in the winter time, and provided with ample sunlight. Soft food is beneficial to laying hens, such as moistened meal, and it is quite necessary to supply a quantity of lime food and gravel, the former entering into the composition of the eggshell and the latter as a digestive agency. Among the most wholesome foods are corn, wheat, rye, and those prepared from these cereals by grinding and soaking.

Chickens are very industrious in searching for food in the soil by scratching, while geese and ducks spend much time in bathing and searching for food at the bottom of shallow water. The eggs of chickens require three weeks for incubation, while those of turkeys, geese, and ducks require four weeks, and usually all eggs hatched are placed under sitting hens. Within recent years machines have been constructed for artificial incubation, the warmth necessary being provided by lamps or by an electric current. Many advantages result from the use of incubators, particularly the benefits derived from the ability to secure broods at any season of the year, and to obtain any number of young at a brood.

POUND, a unit of weight, which is used as a standard in several countries for the measurement of any commodity bought and sold by weight. However, the denominations differ somewhat. The pound *troy* is equal to twelve and the pound *avoirdupois*, to sixteen ounces. The pound *troy* has 5,760 grains, the standard being obtained by weighing a cubic inch of distilled water at 62° Fahr., the barometer being thirty inches; which then weighs 252.458 grains *troy*. The *avoirdupois* pound is equal to 7,000 *troy* grains; hence the *troy* pound is to the *avoirdupois* as 144 to 175.

The pound is of English origin and was derived from the weight of 7,680 grains of wheat taken from the middle of the ears and well dried, hence *grains* form the lowest fractional part of a pound. This continued to be the standard pound from William the Conqueror to Henry VIII., but in the reign of the latter the *avoirdupois* pound of 7,000 grains came into use. Since the time of Elizabeth it has been the standard in England, whence it was brought to America and is now used in Canada and the United States. The principal English coin of account is called *pound*, or *pound sterling*, and corresponds to the coin of circulation known as *sovereign*, which has a value of about \$4.86. It is divided into twenty *shillings*, or 240 *pence*, and weighs 123.27+ *troy* grains. The name was derived from the fact that one pound of silver was formerly coined into 240 silver pence, but now forty pounds of gold are coined into 1,869 *sovereigns*. The sign of the pound is £.

POWDER. See **Gunpowder.**

POWER (pou'ēr), in mathematics, the product obtained by multiplying a factor by itself one or more times. Thus, the second power of 2 is $2 \times 2 = 4$; the third power, $2 \times 2 \times 2 = 8$. The former is the square and the latter is the cube of 2. The degree of the power, or the number of times the given quantity is taken as a factor, is expressed by a number called the *exponent*, which is written above and at the right of the quantity. *Involution* is the process of finding the power of a number.

POWERS, The Great, the name employed in modern diplomacy to designate the most powerful nations. At the beginning of the 20th century they included Austria, France, Germany, Great Britain, Italy, Russia, and the United States. When the term is used in reference to Asia, it is extended to include Japan.

POZZUOLI (pōt-sōō-ō'lē), a city of Italy, anciently called Puteoli, situated on the Bay of Naples, about seven miles west of Naples. It is of interest because of its ancient im-

portance, when it contained the Temple of Augustus and an amphitheater with a seating capacity of 30,000 persons. The temple has been converted into a cathedral and the amphitheater, famous because of its gladiatorial fights under Nero, is in ruins and partly submerged in the sea. Among the other buildings of historic interest is the Temple of Serapis, an Egyptian god. This structure had a portico of 24 pillars, 13 of which still remain. It had several other temples of interest, the harbor of Puteoli, and numerous baths and tombs. Hannibal made an unsuccessful assault upon the city in 214 B. C., and toward the latter part of the republic it was the principal port of Rome. A railway connects Pozzuoli with Naples. Population, 1906, 23,672.

PRAETOR (prĕ'tōr), the official title of the consuls at Rome. In 367 B. C., the consulship was thrown open to the plebeians, and the patricians stipulated that a patrician magistrate should be appointed to act as supreme judge in the civil courts. His official title was *praetor*. The praetorship was opened to the plebeians in 336 B. C. Owing to the large number of foreigners residing in Rome, it was found advisable to appoint a second praetor about 245 B. C., whose duty was to decide suits between aliens or between aliens and citizens. In 227 B. C., the number was increased to four, the two additional praetors being elected to act as governors of provinces in Sicily and Sardinia. The number was increased to eight by Sulla, to ten by Julius Caesar, and still later to sixteen. These officers were elected by the people, and, after holding their offices for one year, they were sent out by lot as governors of provinces, when they were known as *propraetors*.

PRAETORIAN GUARD (prĕ-tō'rĭ-ān), the bodyguard of the Roman emperors, which was organized by Augustus to take the place of the old bodyguard attached to the person of the commander in chief of the Roman army, such as attended Scipio Africanus. Emperor Augustus formed nine or ten cohorts, which consisted of 1,000 men each and included both infantry and cavalry. Only three of these were kept at Rome, while the others were stationed in different cities of the empire. The nine cohorts were centered at Rome by Tiberius, and Vitellius successively increased their number until sixteen cohorts were organized. The praetorians held office for from ten to sixteen years, and their power became so great that they were able to raise and depose emperors at their will. Their high-handed sale of the throne to Didius Julianus, in 193 A. D., caused Septimus Severus to reorganize them by replacing their number

with the most trustworthy veterans serving on the frontier. Constantine the Great finally dispersed them in 312.

PRAGMATIC SANCTION (präg-măt'ik sänk'shŭn), a term applied to a rescript issued by the head of a monarchy under the advice of his council to some order or body of people in relation to affairs of the state or the church. It was the custom of the princes of the Byzantine Empire to issue *rescripts* as declarations of law to individuals, but the solemn decrees issued by the sovereign became known as the *pragmatic sanction*. Since then it has been applied to solemn decrees issued in various countries. The most noteworthy include that of Saint Louis in 1269, which contains articles against the assumptions of the Papacy; that of Charles VII. of France, in 1438, embodying the most important decisions of the council of Basel; that of 1439, giving the house of Austria control of the empire of Germany; that of Emperor Charles VI., in 1713, which finally passed the sovereign authority to his daughter, Maria Theresa; and that of Charles III. of Spain, in 1759, granting the throne of the two Sicilies to his third son and his descendants.

PRAGUE (präg), the capital of Bohemia, the third largest city of Austria-Hungary. It is on the Moldau, which is crossed at this place by seven bridges, and is 152 miles northwest of Vienna. The city is beautifully situated and has wide and well-improved streets. Many of the thoroughfares are paved with stone, asphalt, and macadam. Much of the architecture is of brick and stone, including many tall buildings with steel frames. The most noted structures are the Saint Veits Church, a Gothic structure of the 14th century containing the remains of seven kings or emperors of Germany, the Hesse Church, with the grave of Tycho Brahe, the Roman Catholic cathedral, the Byzantine Church of Saint George, the Theresa Institution for Ladies, the vast Czerni Palace, and a number of modern governmental buildings. It has a large number of fine public schools and hospitals, several charitable institutions, a royal library, and numerous public parks and gardens. The University of Prague is one of the most noted educational centers of Europe.

Prague is centrally located on several railroads, has electric lights and street railways, and is the seat of a large jobbing trade. Among the manufactures are cotton textiles, silk and woolen goods, boots and shoes, beet-root sugar, spirituous liquors, clothing, leather, scientific instruments, machinery, engines, hardware, and pottery. Prague was founded by Princess Libussa in 722. The great university attracted stu-

dents from every part of Europe in the 14th century. The Hussites conquered it in 1424, but it suffered greatly in the Reformation. Frederick the Great of Prussia captured it in 1744, and in the Seven Years' War it suffered or prospered according to the fortunes of battle, but since then it has gained constantly in population and commercial importance. The Prussians occupied it in 1866, as the result of the Austro-Prussian War, which was terminated with the treaty signed here on August 23, 1866. Population, 1907, 228,645.

PRAGUE, University of, an institution of higher learning in Prague, Bohemia. It consists of two sections, one German and the other Bohemian, of which the former is the older and more famous. Charles IV. founded it in 1348, when it included the four faculties of law, medicine, arts, and theology. Religious and political conflicts wrought many changes upon it in shaping the courses and causing the attendance to fluctuate. The Catholics were expelled from it in 1419, when it lost a large number of students, but it received a new impetus in the latter part of the 15th century. In 1654 it came under the influence of the Jesuits, but in more recent times it has been directed by a policy of greater liberality. The Czech movement in the 19th century brought about the organization of the Czech section, which more recently outgrew in attendance the German department of the university. In 1908 the German section had an attendance of 1,500, while the Bohemian department was attended by about 3,000 students.

PRAIRIE (prā'rī), meaning meadow land, the name given by the early French settlers in America to extensive tracts of land which were destitute of trees. Subsequently the term was applied quite generally to the vast region lying between Ohio and Michigan on the east and the Rocky Mountains on the west, extending northward into Canada. The name applies locally only to fertile tracts which are entirely treeless, but, when speaking of prairie in the aggregate, considerable tracts of timber are necessarily included. The altitude of the great prairie region ranges from 100 to 2,000 feet above sea level. At Cairo, Ill., and Keokuk, Iowa, the altitude is about 400 feet, whence it gradually rises toward the north and northwest, giving the rivers a steady flow in all sections tributary to the Mississippi. The streams are bordered by belts of hardy and valuable timber, though there is a perceptible decrease in forest growth along the streams in some sections of Kansas, Nebraska, and the Dakotas, where portions of the surface are sandy and less productive than in other parts of these states.

This great prairie region includes fully 400,000 square miles. It has a generally undulating surface and comprises one of the most valuable and productive regions of the world. In northern Iowa, western Minnesota, and the eastern part of the Dakotas beautiful clear-water lakes are abundant. Prairie soil is mostly composed of a black vegetable mold and formerly many species of nutritious grasses were abundant, but now the region is covered by fields of cereals, meadows, orchards, and gardens. Though stones for building purposes are abundant in some sections, the soil is remarkably clear and unobstructed for cultivation, and forms the most desirable extensive farming region of North America. Formerly vast herds of deer, elks, buffaloes, and other animals were abundant, furnishing a prolific hunting ground for the Indians, but all these primitive conditions have given way to railroads, cities, and cultivated fields. Portions of the prairie region lying west of the 100th meridian are subject to an arid climate, and irrigation is resorted to for the purpose of supplying the necessary moisture. However, all parts are capable of supporting vast herds of cattle, horses, and sheep without cultivation or irrigation.

PRAIRIE CHICKEN. See Grouse.

PRAIRIE DOG, an animal native to the regions both east and west of the Rocky Mountains, but most abundant on the elevated prairies.



PRAIRIE SQUIRREL.

PRAIRIE DOG.

Prairie dogs are rodent mammals. They are allied to the marmot and prairie squirrel, but differ from the latter in having a more bulky body, a shorter tail, and a voice resembling the bark of a dog. They live in groups known as *towns*, or *colonies*. Their burrows are peculiar for having many compartments and an elevated mound at the exit, the opening for passage being at the middle of the mound. Several sentinels are stationed at convenient places and

at the approach of danger give warning to those who happen to be some distance from the colony. They are in no wise dangerous, though in some localities they devour much vegetable growth, and the quickness with which they enter their burrows on the approach of danger makes it exceedingly difficult to kill them. It is a remarkable fact that rattlesnakes and burrowing owls live in the same burrows with prairie dogs.

PRAIRIE DU CHIEN (prā'rē du shēn'), a city of Wisconsin, county seat of Crawford County, sixty miles south of La Crosse. It is situated on the Mississippi River, has communication by the Chicago, Milwaukee and Saint Paul and the Chicago, Burlington and Quincy railroads, and is surrounded by a fertile farming country. The principal buildings include those of the county, the College of the Sacred Heart, and several fine schools and churches. Pickles, pearl buttons, machinery, and lumber products are the leading manufactures. A fort was built on its site by the French in 1689, but the first permanent settlement was not made until 1783. The United States came into possession of it at the close of the Revolutionary War, but it was captured by the British in 1812. The city was incorporated in 1872. Population, 1905, 3,179.

PRAIRIE SQUIRREL. See **Gopher; Prairie Dog.**

PRATT INSTITUTE, an industrial and manual training school at Brooklyn, N. Y., founded by Charles Pratt in 1887. It is coeducational and maintains a high school as a means to obtain a general education. The departments include those of commerce, technology, and normal instruction. Both day and evening classes are maintained. The courses include cooking and sewing. A banking institution is maintained to induce saving and investment by the students. At present the endowment aggregates \$2,500,000. It has an enrollment of 3,500 students and a library of about 80,000 volumes.

PRECESSION (prē-sēsh'ūn), a term applied in astronomy to a slow motion of the equinoctial points on the ecliptic from east to west, causing the time between successive equinoxes to be perceptibly shorter than it would otherwise be. In 150 B. C. Hipparchus discovered that the equinoxes were falling back along the ecliptic, but, since the phenomenon depends for its explanation on the law of gravity, it was first explained by Sir Isaac Newton. This he did by showing that by the law of gravitation one body does not attract another in mass, but by acting on its separate particles, hence the sun does not attract the earth as a whole, but

tends to pull the parts nearer to it away from those in proximity to the center, and those in the center away from the particles on the other side. The earth being flattened at the poles, there is a special tendency for the enlarged equatorial zone to be thus acted upon, and, if it were not for the rotation of the earth, it would be drawn down toward the ecliptic until it and the Equator would ultimately be in one plane. The rotation of the earth modifies this action, and causes the points at which the earth's Equator intersects the plane of the ecliptic to move slowly in a direction opposite to that in which the earth rotates.

The precession of the equinoxes is to be attributed to the sun and moon, though the latter is twice as potent in producing it, owing to its nearness to the earth. It has been observed that the rate of precession is 50.24" per year; that is, if we mark either point in the ecliptic in which the days and nights are equal over the earth, which is when the plane of the earth's Equator passes exactly through the center of the sun, we find that the earth the next year comes back to that position 12 min. 34 sec. of time earlier. Since the circle of the ecliptic is divided into 360°, it follows that the time occupied by the equinoctial points in making a complete revolution at the rate of 50.24" per year is about 25,800 years.

PRECIOUS STONES (prēsh'ūs). See **Stones, Precious.**

PREÈMPTION (prē-ēmp'shūn), the right of purchasing land before others, a privilege accorded by law to an actual settler upon public lands under certain conditions. The first preemption law was passed in the United States on March 3, 1801, and was designed to encourage colonization on the Miami River. A large number of special preemption acts were passed prior to 1830, but in that year the first law of a general character took effect. The general law of 1841, which was repealed in 1891, gave actual settlers a prior right of purchase to 160 acres of public land. It was necessary to file a declaratory statement within thirty days after making settlement, and a final receipt was issued on proof of settlement and cultivation within a year after the declaratory statement was made. The price was \$1.25 per acre for lands outside the limits of railroad grants and within such limits, \$2.50 per acre. The right of preemption extended to all persons over 21 years of age, who were unmarried or the heads of families, and those desiring to do so could convert a preemption claim into a homestead. Under the preemption law title could be secured to public land within a shorter time than under the home-

stead act, but those taking advantage of the latter received title without making any payment for the land.

PREPOSITION (prĕp-ō-zīsh'ūn), in grammar, a part of speech which shows the relation between its object and some other word. In English the preposition generally precedes the noun which it governs. Grammarians usually agree that prepositions were originally either verbs or nouns, and generally class them with relational words. About forty prepositions are used in English, besides a number of participles that are employed as inseparable prepositions, such as *be-stir* and *be-speak*. In Greek there are eighteen prepositions and in Latin there are about fifty.

PRERAPHAELITISM (prĕ-rāf'ā-ĕl-ī-tīz'm), the designation applied to an organization of painters, whose members avowed preference for the great masters who lived before the time of Raphael and drew inspiration for their work from nature rather than by following technical rules. This organization originated in the spring of 1848 and was designed to found a new school of artists who would make the study of nature their direct object. Rossetti, Hunt, and Millais were the three leading representatives and each made an exhibit at the Free Exhibition held in London in 1849. Rossetti exhibited the "Girlhood of the Virgin," Hunt presented "Rienzi," and Millais brought forward his "Lorenzo and Isabella." These works were very highly complimented. However, adverse criticism arose to the newly formed brotherhood, partly from the jealousy of contemporary painters. The discussion continued for some years somewhat to the disadvantage of the Preraphaelites, but Ruskin published several extended letters in the *London Times* in denunciation of those who assailed the new school and its promoters, and pointed out that good would likely result from the merit of their work and efforts. Subsequently many painters of this school became eminent, particularly those named above.

PRESBYTER (prĕz'bī-tēr), the title of an official in the Christian Church, derived from the synagogue. The name is used interchangeably with bishop in the New Testament. At first the title was given because of age or dignity, and later a board of presbyters was maintained. In some cases they were appointed by the apostles and in others they were elected by the people. They were ordained by prayer and the laying on of hands. In the 2d century they filled a position immediate between that of deacon and that of bishop. It was their duty to discipline, teach, preach, receive stran-

gers, visit the sick, and preside at the meetings.

PRESBYTERIAN (prĕz-bī-tēr-ĭ-an), a branch of the Christian Church, so named because the government is by presbyters, or elders. It originated shortly after the Reformation in Europe and is now represented by a large following in many countries of the world, particularly those of North America and Europe. The earliest society of several that paved the way for Presbyterianism may be said to have been the Waldenses, so named from Peter Waldo of Lyons, France, who left the Roman Church in 1170 and preached the gospel to a large following. However, according to some writers, the denomination is thought to have originated at Halle, Germany, where John Brenz drew up a plan of organization in 1526. Branches were formed soon after at Strassburg, Frankfurt, Geneva, and other cities under the leadership and direction of John Calvin, who is regarded the most influential of the early advocates of Presbyterianism.

The first Presbyterian church in London was founded in 1549, and soon after John Knox became the spiritual leader of the denomination in Scotland. He established a powerful organization at Perth in 1557. Presbyterianism is now the most potent Christian organization in Scotland and has a large membership in England. Westminster College, Cambridge, is its theological school in the latter country. Several closely allied branches are maintained in the United States, the two larger being known as the Presbyterian Church North and the Presbyterian Church South. The former branch has 1,312,075 communicants, and the latter has 262,390. Other branches include the United Presbyterian Church of North America, the Reformed, and the Cumberland. In Canada the Presbyterians have 2,250 churches and 235,248 communicants. At present the Presbyterian churches of the world have 68,500 ministers, 9,225,000 communicants, and 4,675,000 Sabbath school scholars.

All the Presbyterian churches have, as a primary element, a judicatory presbytery constituted of delegated elders, of whom the minister is always one. Among the functions of the presbytery are to examine applicants for entrance into the ministry and grant them license to preach the gospel, to fill vacant charges by ordaining ministers, to adjust cases appealed from the church sessions held within the presbytery, and to superintend all matters relating to doctrine and discipline affecting the several congregations within its territory. The provincial synod may modify cases taken up on ap-

peal from the presbytery, and appeal may be taken thence to the general assembly. This system of organization is maintained partly because of the unity of the church and partly on the ground that it is held to be in direct accord with the example set by the church in the apostolic age. For the latter reason it is looked upon as being in accord with the principles of church government that may be deduced from the Scriptures. The Reformed Lutheran Church, in points of doctrine, may be said to be the forerunner of Presbyterianism. It is now the recognized state church of Holland. In the United States it is known as the Reformed Church in America and by several allied organizations.

PRESBYTERY (prěz'bĭ-těr-ŷ), the general name applied to the body of elders or presbyters of the churches that have a Presbyterian form of government. It applies specifically to the elders and pastors who act in a judicatory capacity, ranking next above the court of a local church and below the synod. This body has the power to pass upon the qualification of those who apply for licenses to preach the gospel, to fill vacant ministerial charges by ordination, and to have general superintendence of the various congregations maintained within its jurisdiction, including points of both discipline and doctrine. It has general jurisdiction of complaints and appeals brought up from the local churches. Causes adjudicated by it may be reviewed by the provincial synod, whence they may be taken on appeal before the general assembly. The term presbytery is commonly applied to the residence of the priest or priests in the Roman Catholic Church.

PRESCOTT (prěs'küt), a city in Arizona, county seat of Yavapai County, 135 miles north of Phoenix, on the Atchison, Topeka and Santa Fé and the Prescott and Phoenix railroads. It is situated on an elevated site among mountains, which have deposits of copper, gold, and silver. The surrounding country produces wool, lumber, and cereals. Among the noteworthy buildings are the county courthouse, the high school, the Saint Xavier's Indian School, the public library, the Saint Joseph's Academy, and a number of churches. It has machine shops, waterworks, and a large trade in grain and live stock. Population, 1910, 5,092.

PRESCRIPTION (prě-skrĭp'shŭn), the right title acquired by possession, either to personal or real property. It is the natural rule of the law that a person who has been for a long time in possession of property shall be regarded as the owner of it. This rule originated from the fact that men are naturally inclined

not to give up what belongs to them, and from the additional circumstance that it would be unreasonable without proof that the possessor is a usurper. Formerly a right acquired by possession was based upon immemorial adjoinment, but finally the term was shortened by statute to sixty years and ultimately to twenty years, which is now the time required to acquire tile by possession in most subdivisions of Great Britain and the United States.

PRESIDENT (prěz'ĭ-dent), the chief magistrate of a republic. This is the official title of the supreme executive officer of the United States. Presidents are elective, either by direct vote or through an electoral college, and serve for a definite term of years. The term of office of the president of Mexico and that of most of the South American republics is four years; of the French republic, seven years; and of the Swiss Confederation, one year. The term *president* was first used in America by William Penn, who proposed a scheme for the general government of the colonies, in 1696, and gave its chief executive that title. The Albany convention proposed that of president-general, and the Continental Congress chose a presiding officer termed president. No such officer as a President of the United States was provided for under the Articles of Confederation, but there was an executive committee of thirteen, one from each State. They had no power except during the recess of Congress, since that body possessed the executive power while it was in session. The constitutional convention of 1787 decided that there should be a single executive, to whom the title of President was given. The duty of the Executive Department is to see that the laws are faithfully and promptly executed, hence the efficiency of the President is one indispensable characteristic in the attainment of good government.

The term of office of the President is four years and he may be reelected from time to time, although public sentiment has operated against more than one reelection. The nine presidents chosen for two terms include Washington, Jefferson, Madison, Monroe, Jackson, Lincoln, Grant, Cleveland, and McKinley, though Cleveland did not succeed himself in the presidential office. Five vice presidents succeeded to the Presidency on account of the death of the presidents. The chief executives who died in office are William H. Harrison, who was succeeded by John Tyler in 1841; Zachary Taylor, by Millard Fillmore in 1850; Abraham Lincoln, by Andrew Johnson in 1865; James A. Garfield, by Chester A. Arthur in 1881; and William McKinley, by Theodore Roosevelt in 1901. The

Constitution provides that the President shall be a natural born citizen and shall have resided at least fourteen years within the United States. The age of eligibility is 35 years and the salary is \$100,000 per year. It is specially provided that the President shall not receive any other emolument during his incumbency from any State or from the United States.

Among the duties of the President are the conclusion of treaties with the advice and consent of the Senate, and, under the approval of that body, to appoint cabinet officers, ambassadors, ministers, consuls, and first, second, and third-class postmasters, and to grant reprieves and pardons, except in cases of impeachment. He may require in writing the opinion of any cabinet officer in relation to the duties of his respective office, and has the power to veto any bill passed by Congress, though a measure may become a law without his signature, if two-thirds of the members of each house vote to pass the bill over his veto. The President has appointive power with the consent of the Senate of judges of the Supreme Court, and all other officers of the United States whose appointments are not otherwise provided for.

Seven presidential cabinet officers may succeed to the Presidency in case of the death or removal by impeachment of both the President and Vice President. The order of succession is as follows: Secretary of State, Secretary of the Treasury, Secretary of War, Attorney-General, Postmaster-General, Secretary of the Navy, and Secretary of the Interior. The Secretary of Agriculture and the Secretary of Commerce and Labor cannot succeed to the Presidency for the reason that their positions were made cabinet offices after the passage of the succession law. Up to the ratification of the twelfth amendment, in 1804, the President and Vice President were not separately voted for in the electoral college, but the one obtaining the highest number of votes became President and the second highest, Vice President. Thomas Jefferson and J. Q. Adams were elected President by the House of Representatives, and Richard M. Johnson was chosen Vice President by the Senate in 1837.

The election of presidential electors occurs every fourth year, the first election occurring in 1788, and is held on the Tuesday after the first Monday in November in all the states. The electors chosen meet in the capitals of their respective states on the second Monday in January following their elections to cast their votes for President and Vice President. From each State the votes are certified to the president of the Senate, who counts them on the second

Wednesday in February in the presence of both houses of Congress, and the newly chosen President and Vice President are inaugurated on the 4th of March thereafter. See **Electors; United States.**

PRESS, the newspapers or periodical literature of the country taken collectively. The liberty of the press has been regarded a matter of supreme importance by modern writers. Contentions regarding the freedom to utter and argue according to conscience prevailed for many centuries. However, the freedom of speech was long restricted to narrow limits in many European countries, where it is still abridged more or less for political or other reasons. Originally the Constitution of the United States made no provision regarding liberty of the press, it being regulated by the states according to the established opinion of the people. In 1776 the states of Pennsylvania, Maryland, Delaware, and North Carolina adopted constitutions containing the earliest declarations in favor of the liberty of the press, and the first Congress passed an amendment to the Constitution providing that Congress shall make no law abridging the freedom of speech and of the press. In general, all citizens are held responsible for abuses and are liable for damages or to a fine in case they willfully and unjustly assail the character or motives of any citizen or alien. The British established a strict press-censorship over the colonies in 1637. However, it is now the policy of all nations to supervise more or less the publication of matters during the time of war. It may be said as a rule that the press is comparatively free in all the republics and in the smaller nations, but it is restricted more or less in the powerful monarchies, such as Russia, Austria, Germany, and Great Britain, although in the last mentioned country the press is comparatively free, except in Ireland. See **Printing.**

PRESS ASSOCIATION. See **Journalism.**

PRESSBURG (prës'böörg), or **Presburg**, a city of Hungary, on the Danube River, 35 miles east of Vienna. It has a beautiful location on a range of hills belonging to the Little Carpathians, is well provided with railroad and steamboat facilities, and is the seat of an important commercial trade. Formerly the kings of Hungary were crowned in Pressburg and the city still contains the remains of a once beautiful royal palace. It has a cathedral of Gothic construction, a fine Franciscan church, numerous educational institutions, and several hospitals, parks, libraries, and monuments. Among the manufactures are woolen and silk goods, tobacco products, paper, leather, chemicals, starch,

confectionery, machinery, and ironware. It has electric lights, street pavements, and other municipal facilities. It was the capital of Hungary from 1541 to 1784, but in the latter year Buda was made the capital by Emperor Joseph. German is the prevalent language and the inhabitants include about 7,000 Jews. Population, 1906, 66,768.

PRESTON (prēs'tūn), a city of England, in Lancashire, near the estuary of the Ribble River, 21 miles northeast of Liverpool. It has communication by steam and electric railways. The place is well platted and is surrounded with pleasing scenery. Among the most noteworthy buildings are the Gothic townhall, an exchange, several county buildings, and numerous churches, schools, and charitable institutions. It has a free public library, an institution for the blind, and three large parks. Among the manufactures are spirituous liquors, cordage, brass fixtures, ironware, leather, clothing, and machinery. It is noted as one of the centers of linen and cotton manufacturing of England. The harbor has been improved materially. Preston has a large export trade in coal and imports of iron, corn, and timber. Population, 1907, 117,093.

PRETORIA (prê-tō'rĭ-à), a city of South Africa, capital of the Transvaal Colony, so named from Pretorius, an influential Boer leader. The place is on an elevated plain, on the southern slope of the Magalies Berge, 35 miles northeast of Johannesburg. It is connected by railway with Delagoa Bay, Johannesburg, Bloemfontein, Kroonstad, and Port Elizabeth. The country surrounding it is fertile, producing tobacco, wheat, sugar cane, cotton, coffee, indigo, fruits, and vegetables. Among the noteworthy buildings are those erected by the government, numerous churches, several gymnasia and high schools, and many fine residences. The streets are well paved and it has sanitary sewerage, telephones, waterworks, and other facilities. It was founded in 1855. The president of the Transvaal republic had his official residence at Pretoria. It surrendered to the British in 1900, after which the fort was dismantled. Population, 1909, 41,195.

PREVAILING WINDS. See *Wind*.

PRIBILOF (prē-bê-lōf'), or **Pribylov**, the name of a group of islands in the Bering Sea, 200 miles northwest of Unalaska, belonging to the United States. The group has an area of 170 square miles. Saint George, Saint Paul, and Walrus are the largest islands of the group. Dense fogs surround them much of the time. They are valuable for the sea fisheries. Population, 1908, 400.

PRICKLY ASH, a shrub or small tree which is native to North America. The plant is prickly and the smell of the leaves and bark resembles that of lemons. A stimulant useful in treating toothache and rheumatism is made from the bark, hence it is sometimes called *toothache tree*. Several species are found in the West Indies and the southern part of the United States.

PRICKLY PEAR, a plant native to North America. It is found along the Atlantic coast of the United States and in the Mississippi valley from Michigan to Arkansas. The species which are common to the region between Connecticut and Georgia are sometimes called *Indian fig*. They have a leafless, light green stem, produce pale yellow flowers, and bear an edible fruit an inch or more in length. The pulp of the fruit is juicy and has a sweetish but acid taste. The kindred species of the central Mississippi valley has larger flowers and fruit and a deep green stem. Several species of prickly pear have been introduced and are now propagated in European countries bordering on the Mediterranean and in China, Arabia, Persia, and Syria. The fruit is used extensively as food, but in some countries the plants attain a height of from five to eight feet and are useful as hedge plants. Several species of cacti are known as *prickly pear*. These plants are native to Mexico and the southwestern part of the United States. Several species have been improved for cultivation by Burbank, but in a wild state they are covered with spines.

PRIEST, a person ordained to fill religious offices and perform certain ceremonies. The history of the priestly office is nearly coextensive with that of religion, having been recognized from a very early date. It is related that Cain and Abel offered their own sacrifices, but the priestly office was established soon after. At first it was vested in the heads of families only, as in the case of Abraham, Isaac, and Jacob, but a special priesthood was established under the Mosaic law, when the Levites, the successors of Levi, furnished the priests and the high priests. The idea of a priesthood gained ground in the early pagan and Brahman religions, but the state church of China, which owes its systematization to Confucianism, has no special priesthood, though the priestly functions are exercised by the emperor and various state officers. The Greek, Armenian, and Roman churches maintain the title of priest, and they look upon ordination to this office as one of the sacraments. In the Roman Catholic church the priests are bound to celibacy, but the Greek Church and a number of the eastern branches

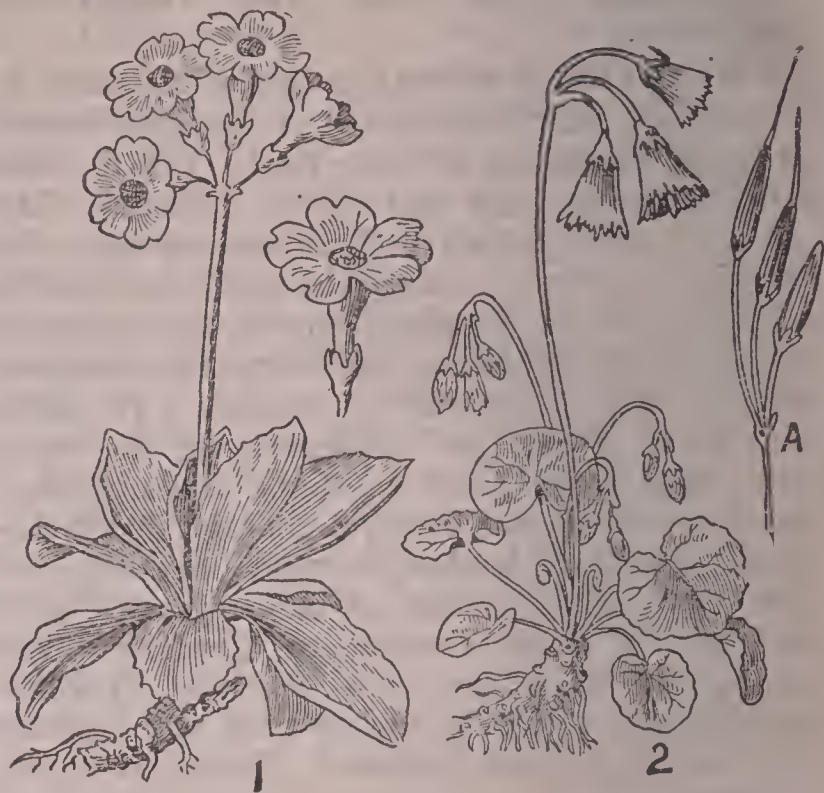
permit the consecration of a married man as priest. Protestant churches look upon Christ as the real priest, who is held to be the only one who has the power of offering sacrifices for the people, and they regard the clergy as the teachers and servants of the church. While the clergy are divinely called and properly appointed, they are held to possess certain ecclesiastical rights and are to discharge certain duties. They derive these functions partly from divine and partly from human law. The word priest is retained by the Anglican and other Episcopal churches to denote the second order of clergy, ranking next to the bishops.

PRIMATES (prī-mā'tēz), the highest order of mammals, including man, the lemures, and the apes and monkeys. They are distinguished by having fore as well as hind limbs, which are capable of freer movement than similar limbs in ordinary quadrupeds in which the joints are formed so as to admit of less freedom of motion. Each limb in the primates has five digits, which are protected by flat nails instead of claws, and the fore limbs are grasping hands. Man and the anthropoid apes are similar in having nostrils close together and opening downward, while the chimpanzees and a few others are closely related to man in structure, especially in the form of the brain and the form and size of the bones. The gorilla, though approaching man in size, has a much smaller brain, especially the cerebrum, which is less than half as large as that of man. Other differences include modification in the size and form of the limbs, an erect posture in walking, and the exercise of the reasoning faculties. Although the gorilla and allied animals appear to have the faculty of communicating, man alone possesses articulate speech.

PRIMOGENITURE (prī-mō-jěn'ī-tūr), in law, the rule which confers a dignity or estate in land on a person by virtue of his being the eldest male of those who could inherit. It was recognized as a common feature in many of the ancient systems of law, but now the custom of primogeniture is not maintained to any great extent. Up to the time of the Norman conquests all sons inherited alike, but at that time the institution was established, although it was limited to narrower channels from time to time until it finally disappeared. As a system it operates to pass the title in all the real estate of the father to the eldest son, who in turn succeeds to the whole estate. However, if there are no male heirs, then the daughters inherit jointly, though this is not the case with the crown, which becomes vested in the eldest daughter. Although this system was

recognized in the American colonies as a part of the English law, it was entirely abandoned at an early date in their history.

PRIMROSE (prim'rōz), an early flowering plant of the Alpine region of Europe and the temperate parts of Asia. The leaves are oblong



PRIMROSE.

1, Cowslip Primrose; 2, Alpine Primrose; A, Fruit.

and wrinkled, the flowers are variously colored, and the roots are perennial. Many species have been described and are cultivated in gardens. Some are among the earliest flowering plants to blossom in the spring, such as the oxlip primrose, cowslip primrose, and common primrose. These and other species are cultivated in Canada and the United States.

PRINCE, the title applied to one who possesses royal honor or power, as the sovereign of a country. The term is used also in speaking of the sons of sovereign rulers, and the title of *princess* is applied to the daughters. In some countries a territorial addition is made to the title, as Prince of Orange, Prince of Wales, and Prince of Naples. The title is applied to a member of a high order of nobility, as in Germany, Holland, Belgium, and Italy, where it has reference to the rank immediately below duke, though in other countries it is used to designate a rank superior to that of duke. Many members of ancient families in Europe bear the title of prince, though they are not immediately connected with a reigning house, but in England the term is applied only to members of the royal family.

PRINCE EDWARD ISLAND, a Province of the Dominion of Canada, situated in the southern part of the Gulf of Saint Lawrence.

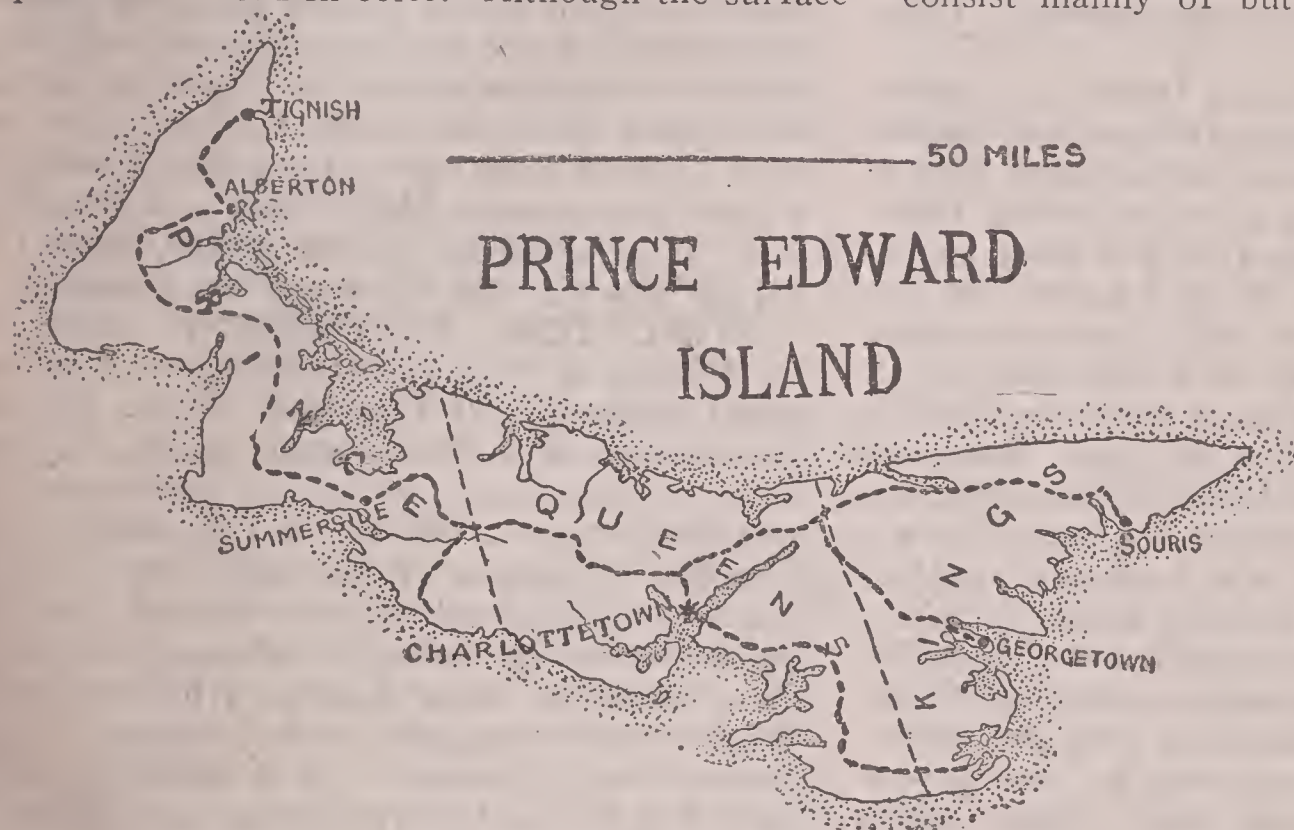
It comprises all of Prince Edward Island, which is separated from Nova Scotia and New Brunswick by Northumberland Strait. The length from southeast to northwest is 120 miles and the width ranges from four to 35 miles. The area is 2,133 square miles, hence the Province is the smallest member of the Dominion.

DESCRIPTION. The coast line is remarkably irregular, being indented by many gulfs, bays, and inlets. Cardigan Bay, on the eastern coast, and many others, afford deep and spacious anchorage for large vessels. Most of the coasts are precipitous cliffs of red sandstone, ranging from 20 to 100 feet, and the soil is made up largely of a sandy loam, inclining in many places to a reddish color. Although the surface

bays are used extensively. Oats, hay, wheat, potatoes, and turnips are the leading crops, but barley, rye, buckwheat, and garden vegetables are grown profitably. Dairy farming has developed to the condition of being an important enterprise. Cattle and horses are raised profitably and the breeds grown are of a high class. Other domestic animals include sheep, swine, and poultry.

Fishing ranks second among the occupations. The catches include lobsters, hake, herring, cod, oysters, and mackerel. Oyster dredging is followed extensively. The fisheries yield products for canning and curing and in this form large quantities are exported. The other manufactures are principally for domestic use. They consist mainly of butter, cheese, earthenware, clothing, machinery, and lumber products. The mining industry is not developed to any great extent, but building stone and clays are found in paying quantities.

Communication is provided by a railway that extends the entire length of the island and branches are operated to some of the more important maritime towns. The lines in operation, a total of 280 miles, were built and are still owned and operated by the government. Highways of a superior class are maintained in all



MAP OF PRINCE EDWARD ISLAND.

is undulating and in places hilly, no part of the island is more than 500 feet above the sea.

The streams are influenced to a considerable extent by the tides, having comparatively wide estuaries as they enter the sea. Though the rivers are short, they furnish considerable water power. The summers are pleasant and the winters are less severe than in Nova Scotia, being influenced noticeably by the sea. All parts are remarkably healthful. Fine forests of hemlock, cedar, fir, spruce, pine, and the hard woods formerly covered the island, but the timber area has been greatly reduced.

INDUSTRIES. Agriculture is the principal industry and fully two-thirds of the area is utilized for farming and grazing. Naturally the soil is highly fertile, but it has been injured through the cultivation of cereals for many years and natural manures obtained from the

parts of the island. Steamboat communication extends to the leading ports in Canada and the United States, but during the winter communication is much restricted, except with New Brunswick, with which vessels communicate the entire year.

GOVERNMENT. The colonial government is similar to that of the other provinces in the Dominion. Chief executive power is vested in the Lieutenant Governor, who is appointed by the Governor General of Canada, and is assisted by an executive council of eight members. The legislative assembly has but a single chamber, whose members are elected by a popular vote. The judicial department embraces an admiralty district court, a superior court, and several minor courts. For the purpose of local government it is divided into the three counties of Prince, Kings, and Queens.

A free school system was established in 1851. The schools are undenominational and are administered by a superintendent and a council appointed by the government. They are supported partly by funds derived from government grants and partly by direct taxation. A well-organized high school with an advanced course of study is maintained at Charlottetown.

INHABITANTS. The density of population is fifty to the square mile, the highest for any Province in the Dominion. Most of the inhabitants are of British origin. The Anglicans, Presbyterians, Methodists, Baptists, and Roman Catholics are well represented in the Province. Charlottetown, on Hillsborough inlet, is the capital and largest city. The principal towns include Summerside, Georgetown, and Alberton. Population, 1901, 103,259.

HISTORY. Prince Edward Island was discovered by Sebastian Cabot in 1497 and was claimed by Champlain for France in the early part of the 17th century. The Count of Saint Pierre secured a grant of it in 1719 and made an unsuccessful attempt to found colonies. It was seized by the British in 1745, but was restored to France by the Treaty of Aix-la-Chapelle. It was finally annexed by Great Britain and placed under the administration of Nova Scotia in 1758, but soon after a separate government was established for it. Canadian confederation was decided upon in 1864 at a conference held at Charlottetown, which resulted in the establishment of the Dominion in 1867, but Prince Edward Island did not enter the confederation until in 1873. The prohibition law, the income tax act, and the act providing for the general improvement of highways were enacted within recent years.

PRINCETON (prĩns'tũn), a city in Indiana, county seat of Gibson County, 26 miles north of Evansville. It is on the Southern and the Evansville and Terre Haute railroads and is surrounded by a fertile agricultural region, which produces cereals and fruits. The principal buildings include the county courthouse, the public library, the high school, and a business college. Among the manufactures are flour, agricultural implements, and clothing. The city has regularly platted streets and good municipal facilities. It was settled in 1804 and incorporated in 1838. Population, 1910, 6,448.

PRINCETON, a borough of Mercer County, New Jersey, on the Delaware and Raritan Canal, 45 miles northeast of Philadelphia, Pa. It is on the Pennsylvania Railroad, has well improved streets, and is noted as the seat of Princeton University. Other features include the Princeton Theological Seminary, the Prince-

ton Preparatory School, and many fine churches and residences. In 1777 Washington defeated the British forces at Princeton and the Continental Congress held its session here in 1783. Population, 1905, 6,029; in 1910, 5,136.

PRINCETON, Battle of, an engagement of the Revolutionary War, fought at Trenton, N. J., between the Americans under Washington and the British under Cornwallis. On Jan. 2, 1777, after the Battle of Trenton, the Americans took a position on the bank of the Assunpink River, where they were confronted by about 8,000 British. Washington was unable to cope with the superior force, hence resorted to strategy. Leaving a small force to keep the campfires burning and to make a noise, he moved with the larger part of his army around the British left and encountered their reënforcements at Princeton on the 3d. By thus cutting the British lines, he forced Cornwallis to retreat to New York, thus giving the Americans a clear field between Philadelphia and the Hudson. The Americans lost about 100, while the British loss was 200 killed and 300 prisoners.

PRINCETON UNIVERSITY, formerly the College of New Jersey, a celebrated educational institution, at Princeton, N. J. Though nonsectarian, it is closely allied to the Presbyterian denomination and is for men only. It was founded in 1746 by charter from John Hamilton, president of His Majesty's Council, and was established with the view of providing ample means for the intellectual and religious culture of those desiring a liberal education, but more especially for the training of candidates for the ministry. The institution was opened at Elizabeth in 1746 under the presidency of John Dickinson, who was succeeded on his death in the same year by the Rev. Aaron Burr. In 1748 it was removed to Newark, where it remained until 1757, when it was removed to Princeton, and Nassau Hall was erected and named in honor of William III. The Presbyterians united to support the college in 1766 and in 1812 established the Princeton Theological Seminary, an institution still unconnected with it. Nassau Hall is the oldest college building and is historic on account of being used as a barracks and hospital by the Americans and British at different times in the Revolution. In the Battle of Princeton, on Jan. 3, 1777, a cannon ball passed through the walls, and in 1783 it was the meeting place of the Continental Congress.

The second president of the college was the father of Aaron Burr, afterward Vice President of the United States, and other noted presidents include Jonathan Edwards and James Mc-

Cosh. It was during the presidency of the latter that the institution reached its present importance, since it received endowments during his incumbency of twenty years which exceeded \$3,000,000. Within this period the departments of language and literature, philosophy, mathematics, and science were established on a firm basis. John C. Green, in 1873, made a liberal endowment to establish the departments of civil engineering, general science, and electrical engineering. The graduates from Princeton include some of the most eminent men of America, among them James Madison, fourth President of the United States. It has adequate and advanced courses of study, 107 endowed scholarships, a library of 300,000 volumes, 150 professors and instructors, and about 1,500 students. The periodicals include the *Princeton Review*, which was founded in 1825 and was edited by Charles Hodge until 1872, when it was united with the *Presbyterian Quarterly*, now published in New York.

PRINTING, the art of making matter for reading by means of type and the printing press on cloth, paper, or other material. It is frequently referred to as "the art preservative of arts," since it supplies the most efficient means of recording knowledge for the use of future generations.

HISTORICAL. The Chinese were the first to use movable types in printing, and there is evidence that they cut classics upon tablets and made impressions with them as early as 175 A. D. Several of these classics are still extant, while records published in the 6th century are numerous. Printed books came into common use in China in the 10th century. It is remarkable that little progress has been made by the Chinese since they first used wooden blocks for making impressions, and their printing is done quite like it was originally. From 5,000 to 10,000 movable characters are necessary, since each movable type represents a word instead of an elementary sound. Each character is supplied with ink by a brush and pressed upon the paper by the hand of the printer. In some of the larger offices forms are prepared and the printing is done by methods much like those employed in an old-style Washington hand press, while many of the books are printed from blocks on which each page is engraved by itself. In the 12th century blocks were used for ornamenting fabrics in Europe, while playing cards were printed from blocks in the 14th century, and movable type for printing was invented about the middle of the 15th century.

The credit of inventing movable type is claimed by some for Lourens Coster, of Haar-

lem, Holland, but others think the invention due to Johann Gutenberg, of Germany. It is probable that both made inventions about the same time, but the art was first practically applied by Gutenberg, who published an edition of the Bible in Latin about 1445. Those claiming the honor for Coster show specimens of printing found at Haarlem, but it is singular that none of the early printed matter contains the names of those associated with the productions. Gutenberg was located at Mentz and Strassburg and was supported financially by Johann Fust and Peter Schoeffer, who aided him in producing many of the earliest printed matters in the German. Soon after the art was carried to France, Austria, and Italy, and in 1471 William Caxton introduced printing into England by setting up a press in Westminster Abbey. A strict censorship was established in England over the printers in 1530, largely because of the influence exercised by Cardinal Wolsey and others prominently connected with the church. The censorship was discontinued in 1694, after long years of limitation and persecution, and literature and learning immediately experienced a remarkable revival.

Antonio de Mendoza, viceroy of Mexico, founded the first printing establishment in America in 1536, and 103 years later the first printing press was set up within the present territory of the United States, at Harvard College, in Cambridge, Mass. The first printing office at Philadelphia was founded in 1685 and at New York in 1693, but many other similar establishments were installed in rapid succession.

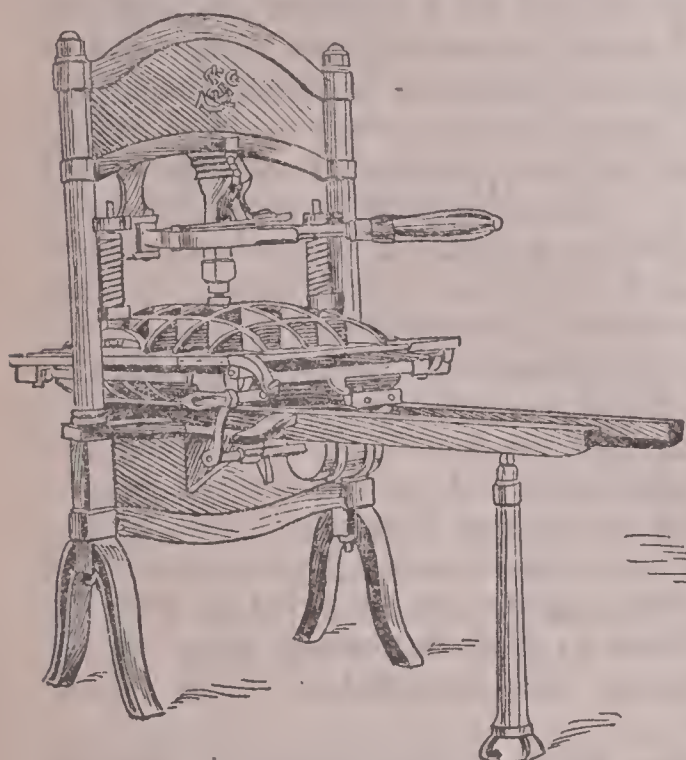
METHODS. Three distinct processes are employed in the modern methods of printing, known as composition, imposition or make-ready, and press work. *Composition*, the first step in printing, consists of setting the type. This is done by the *compositor*, who stands before the *case* in selecting the individual types, which he sets up in a metal frame called the *stick*. About twelve lines are usually set in the stick, after which they are transferred to the *galley*, of which a *proof* is taken for the use of the *proof reader*, who indicates any errors in the work by pencil marks.

Imposition or *make-ready* is the process of forming pages of the type, which involves putting in page numbers, headlines, and running titles. This work is done on a table with a stone or iron top by a workman known as the *stone man*. After the pages are completed, each page is wedged into an iron frame or *chase*, when the frame and the type constitute the *form*. *Page proofs* are usually taken be-

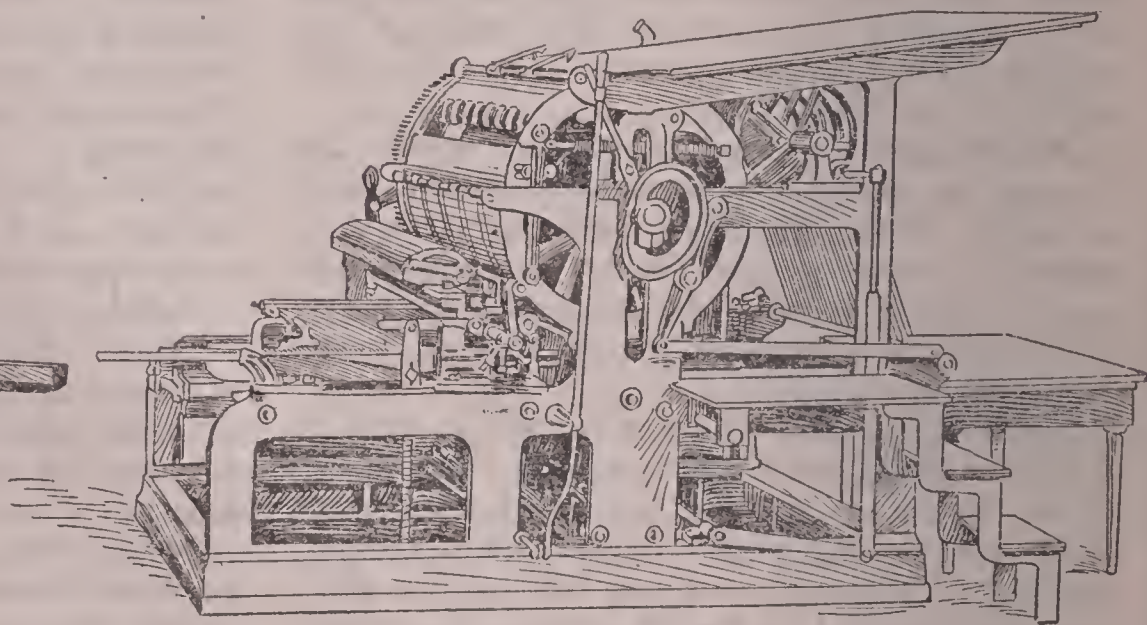
fore the forms are completed, hence the pages are now ready for the printing press, or they are sent to the electrotypers, in case the printing is to be from plates. The *printing* is done on a printing press, which is propelled by hand, or by steam or electric power.

Formerly all the composition was done by hand as described above, but in the larger establishments much of the type now is set up by machinery. In setting type by machines a single operator is able to accomplish as much as from three to five persons working by hand, the difference depending upon skill and the kind of machine used. Many styles of type-setting machines have been invented, all of them being supplied with a keyboard, similar to a typewriter. They may be divided into three

leasing a spring after placing the form of types in position, and this style of press continued in use until the latter part of the 18th century. The Earl of Stanhope improved the hand press in 1800 by inventing a mechanical device whereby pressure was secured through the action of levers, and in 1818 George Clymer, of Philadelphia, made other improvements. His press is known as the *Columbian* and the printing was done by bringing steel jaws together by means of a lever. It was operated by two men and had a capacity of about 180 impressions an hour. The *Washington press* was invented in 1829. It is used extensively in country printing offices, and undoubtedly possesses the highest degree of mechanical completeness possible to be put into a press to be operated only by



WASHINGTON HAND PRESS.



CRANSTON NEWSPAPER PRESS.

classes: those like the *Simplex*, setting the type; those like the *Mergenthaler*, setting matrixes and casting full lines to be used in printing; and those like the *Monotype*, casting and setting type singly, instead of in a line. Improvements have likewise been made in the manufacture of printing presses until now 100,000 perfected sheets may be printed in an hour on a single machine, instead of a few dozen, as was the case when printing was first employed.

PRINTING PRESSES. The printing presses used up to the 17th century consisted of a contrivance whereby the form of types was run under a screw press. By turning the screw by hand, similar to the screw of a letter-copying press, the pressure was applied, and, after withdrawing the form, the printed paper was replaced by another sheet. William Jansen Blaen, of Amsterdam, invented a wooden press whereby it was possible to secure an impression by re-

hand. While not rapid, it does its work with much accuracy.

Modern rapidity in printing may be said to date from 1811, when Friedrich Koenig, a German printer, invented a cylinder press that had self-inking rollers and carried the paper on tapes through the machinery. He soon after improved the machine by adding the double cylinder and supplying the first apparatus ever made to propel a printing press by steam power. This machine had a capacity of 1,800 impressions per hour. Soon after completing this improvement, in 1814, he devised additions whereby the paper, after being printed on one side by a cylinder, was placed in position and printed by a second cylinder on the other side. Many valuable improvements followed in rapid succession. The first notable improvement made in the invention of rapid-printing machinery may be credited to Richard M. Hoe, of New

York, who made a rotary press in 1847 that had a capacity of 20,000 papers per hour, but the impressions were made only on one side. Such machines as the *Cranston press* are now used in the medium class of newspaper offices. Sir Rowland Hill was the patentee of the first web perfecting press in 1835; that is, a press capable of printing from a continuous roll of paper on both sides and cutting and folding the sheets. Walter Scott, of Chicago, in 1879, devoted much attention to press improvements, and the *Scott web perfecting press* may be regarded as one of several combining all the newer features of the best machines now used.

Modern perfecting presses are mammoth machines and contain a multiplication of cylinders and forms in one general framework. The paper used is in one continuous roll, varying in length from three to ten miles, and is of the desired width for printing. It is placed on a rack at the end or above the press and is unrolled at any speed required by the machine. The paper is printed on both sides and cut, and is then folded and the forms are counted by the machine. The largest presses are fed by four rolls of paper, usually 63 inches in width, and the capacity of the most rapid is sufficient to turn out about 140,000 four-page papers in an hour. Among the best known perfecting presses are the Campbell, Walter, Potter, Goss, Hoe, Cottrell, and Bullock. Printing in the larger offices is done almost exclusively from stereotyped or electrotyped plates made after setting the type by machines.

PRISM, a solid whose lateral faces are parallelograms and whose ends or bases form similar, equal, and parallel plane figures. The term is applied in optics to an instrument made of some transparent substance, as quartz, glass, or a prismatic glass case filled with transparent liquid. Such an instrument is usually of a form having equal and parallel triangular ends and whose three sides are bounded by three parallel lines, extending from the three angles of one end to the three angles of the other end. A ray of white light is bent twice from its course in the same direction in passing through such a prism, once on entering and once on leaving, and the different colors are separated so as to form a spectrum. An *achromatic lens* is one that transmits light without separating it into its constituent colors. Light may be achromatized by joining prisms or other refracting bodies which have opposite dispersing power.

PRISONERS OF WAR, the persons who are captured from the enemy in the time of war, whether in military or naval operations. Prisoners of war were anciently treated with

great severity and those captured from the vanquished enemy were recognized as the property of the victors, who either reduced them to slavery or put them to torture and death. The practice of putting to death nonparticipants came into disrepute with the advance of civilization, but for many centuries all those claiming allegiance to the enemy were reduced to serfdom or slavery, and were either employed by the successful nation or sold into bondage to friendly states. It was the common practice in Greece for centuries to destroy the adult male population of the enemy and enslave the women and children. In the early part of the 13th century A. D. more humane treatment of prisoners of war became general, and the exchange of prisoners was established as a common custom. All civilized nations now treat prisoners of war in a humane manner. They provide for the wounded and look after the burial of the dead. Prisoners of war are kept in safe confinement until peace is concluded, unless either exchanged for prisoners taken by the opposite army or navy, or given liberty on parole. Many instances are on record in which modern prisoners of war were treated severely, though in most cases on account of unavoidable circumstances, or because the nations making the capture were to be classed among the savage or semicivilized.

PRISONS, the institutions which are constructed and maintained by states or nations as places of confinement for the safe keeping of persons in legal custody. The prison system may be said to be a result of modern civilization, since it has followed in its completeness the abolition of slavery and the feudal system prevalent for many centuries in most countries of Europe. Instead of allowing the slave masters or feudal lords to institute systems of punishment, as was formerly the case, an offender against the peace and dignity of a state is now looked upon as a public charge and is held for trial in a jail or bridewell, and, after being tried and sentenced, he is sent to a workhouse, house of correction, reformatory, or penitentiary. The punishment is not designed to cause the prisoner to suffer physically or mentally, but all civilized nations are taxing themselves to provide prison systems that shall be more reformatory in character, not only separating the offender from the public as a benefit to the public, but also for the purpose of reforming the individual and leading him to become and remain a law-abiding and useful citizen.

In some countries death punishment is inflicted for the aggravated cases of criminal conduct, but many leading writers and students are

beginning to look upon crime as a disease. According to this view the inclination toward crime is inherited very much the same as other traits of character or tendencies toward physical imperfections. Whether this or some other humane view of those inclined to crime is taken, it is certainly hopeful to notice that many reforms are being effected in the treatment of prisoners and the construction of houses of confinement. However, in some county jails and minor prisons much imperfection still exists. Many of these institutions are not only illy constructed, but their management is open to criticism. In many counties the jails are large buildings and are provided with well-planned residence additions for the sheriff or bailiff. All the modern buildings of this kind are provided with separate cells for the confinement of youths and women, while in others the adult male prisoners are consigned to separate departments with the view of classifying them according to the nature of their character and reputation. The number of county jails in the United States is about 2,475 and the number of Federal and State prisons and penitentiaries is 78. The last census gives the number of prisoners in State prisons and penitentiaries at 47,500, in county jails at 20,500, and in city prisons at 4,250. Besides these are many workhouses and other correctional institutions that contain a considerable number of inmates.

Modern progress in reforming prison practice may be said to date from the early part of the 18th century, though in some countries dark dungeons were maintained long after that, in which prisoners were confined under the most objectionable circumstances. In some cases the prisoners perished after a short period of confinement. The Philadelphia Society for Assisting Distressed Prisoners dates from 1776, and may be said to be the first efficient organization in the world designed to reform prison practice. Previously the benefits of separating prisoners were not recognized, but this and other similar societies inaugurated reforms in prison construction and discipline, and in the early part of the 19th century many of the states followed Pennsylvania in abolishing capital punishment, except for murder in the first degree. In 1829 the penitentiary at Philadelphia adopted the so-called *Pennsylvania System*, under which some classes of prisoners were permanently secluded from others. This system has been superseded almost universally by the *Auburn System*, by which convicts are separated by night and required to labor in silence with associates by day.

In 1825 the first institution for juveniles was

established in New York, while Ohio was the first State to provide separate places of detention for juveniles, founding a reformatory for boys at Lancaster in 1858 and one for girls at Delaware in 1878. These institutions are now generally called *industrial schools* and are maintained in most of the states. Those confined there are taught the common school branches and various industrial pursuits, their labor being utilized quite largely to support the institutions. The chief occupations in which prisoners are employed include making brooms, furniture, utensils, buttons, boots and shoes, clothing and farming implements. In some counties prisoners are employed in mining, carpentering, building railways and highways, and constructing various other public improvements. In some states the prisoners are leased to those bidding highest for their labor, but this system is gradually going out of use. While the employment of prisoners is looked upon as a benefit to those in confinement, it should be the constant aim of the government to employ them at work that does not come into competition with free labor, since otherwise the system interferes with those having to support their families and the State. The *marking system* is employed in all prisons to a varied extent, under which the prisoners may by good conduct and industry shorten considerably the term of confinement. An examination into the condition of prisoners in the United States has disclosed that 75 per cent. have no trade, 24 per cent. are unable to read and write, and the average age is about thirty years.

PRIVATEER (prī-vā-tēr'), a vessel owned and officered by private individuals, and licensed by letters of marque to carry on maritime war against the commerce and ships of an enemy. More than 400 privateers were fitted out by the British colonies to ravage the commerce of France in the colonial wars of America, and these inflicted great damage along the coast of the French possessions in Canada, in the West Indies, and on the coast of France. The Continental Congress authorized privateers in 1776, and before the end of that year they captured 342 British vessels. Since the owners and crews of privateers were given a large share of the prize property lawfully captured by their vessels, many sailors were attracted to the privateer service throughout the Revolution. In 1778 an American privateer captured the British fort of New Providence, in the Bahamas, and a sixteen-gun man-of-war. More than 500 British vessels were captured by American privateers in the War of 1812, and the service became so well organized that immense damage was done

to the British on the coasts of the West Indies, the Canary Islands, and even Great Britain. In 1856 the great powers of Europe united in the Declaration of Paris, whereby it was mutually agreed that privateers should no longer be licensed, but the United States and several other nations have never accepted the treaty.

PRIVET (prĭv'ĕt), an ornamental, bushy shrub native to Europe, but naturalized in some sections of North America. The several species include some that are evergreen or nearly evergreen. Several species are used for hedges. They have opposite, entire leaves and small white flowers with a pleasant odor, and yield a small, globular berry, mostly black, but sometimes yellow or greenish in color. The wood is of value for making shoemakers' pegs and for turners' products, while the berries yield dyes and are of service as bird food.

PRIVY COUNCIL (prĭv'ĭ), the council of the sovereign of Great Britain. It is constituted of persons nominated by the crown at will, and of others on account of their rank or position. The Privy Council originated in the Norman period, but since the duties of government were assumed by the Cabinet its political importance has been greatly diminished. Among the members of the Privy Council are the Prime Minister, the members of the Cabinet, the archbishops, the Bishop of London, the Lord Chancellor and chief judges, the Commander in Chief, the great officers of State, the speaker of the House of Commons, and numerous dignitaries who are or were in responsible offices under the crown. The crown is limited in making nominations for the Privy Council to natural-born subjects, but no patent or grant is necessary. The Lord President of the Council is its legal head, and the debates and reports from the Council to the crown are under his direction. At present the Privy Council is rarely consulted, since its offices have been superseded largely by the Cabinet. Among the important functions exercised by it in recent times are the examination of George III. as to sanity, in 1788, and the determination whether Queen Caroline as queen consort had a right to the crown, in 1821. *Right Honorable* is the title of a Privy Councilor. All the proceedings of the body are conducted in secrecy.

PRIVY SEAL, the minor seal appended by the sovereign of Great Britain to certain documents, which are afterward authenticated by the great seal. It was used as early as the reign of Edward III., and for centuries was affixed by the authority of the Lord Chancellor. In 1884 an act was passed that all instruments to receive the great seal need only to be counter-

signed by the Lord Chancellor, Secretary of State, or a high official of the treasury. The privy seal is in the care of an officer called the *lord privy seal*, who now ranks as fifth great officer of the State, and is usually a member of the Cabinet.

PROA (prō'ā), a sailing boat about thirty feet long and three feet wide, used extensively by the natives of the Ladrone Islands and other islands of the Malay Archipelago. It is built with a stem and stern of similar structure, and may be sailed equally well in either direction. One side is flat, on a line from the stem to the stern, while the other side resembles an ordinary boat. The vessel is prevented from tipping by a frame extending to leeward, and in some boats the outrigger extends to both sides. Proas are of various sizes and their shape makes them capable of swift sailing under an ordinary pressure of wind upon the sail.

PROBATE COURT (prō'bāt), a court that has jurisdiction of the proof of wills and the settlements of estates. The judge of a probate court is the officer who has charge of the instruments that purports to be the last will and testament of a person deceased. When a party files a will, after the decease of the testator, it is required in most cases that a notice of the same be published, and all interested may then appear at the time of hearing at which it is sought to admit the will to probate. A party offering a will is said to be the *proponent* and the party disputing its authenticity is known as the *contestant*. If the will, after the witnesses have testified, is not admitted to probate, the judge is said to pronounce the sentence of *intestacy*. In England the custody of the estates of deceased persons formerly vested in the ordinaries, or the bishops of dioceses, except the rights of the crown or of lords in respect to certain manors, but the act of 1857 abolished the ecclesiastical jurisdiction and conferred full and exclusive authority over all testamentary causes to the court of probate.

PROCESS, in law, the whole proceedings in any action, civil or criminal, real or personal, from the beginning to the end. In a more technical sense, the term is applied to different stages of the procedure, such as the terms of the *original process*, which includes the precepts or writs by which one is called into court; the *final process*, or the forms of procedure by which judgment is carried into execution; and the *mesne process*, which covers the proceedings between the other two, embracing all proceedings properly so called, all writs for compelling the attendance of jurors or witnesses, and for other collateral purposes. Mesne and final proc-

ess are sometimes collectively described by the term *judicial process*, because proceedings in these stages of an action are authorized immediately by the courts, under the hands and seals of their presiding judges. However, in the strict technical sense, process is the means employed for bringing the defendant into court to answer to the action.

The first step in the procedure is to give the defendant *notice* of the issue and pendency of the *original writ*. This notice is given ordinarily by *summons*, informing the party to appear at the return of the writ, and is served upon him by the sheriff, constable, or some other similar officer. The party who brings such an action is known as the *plaintiff*, being the complainant, and the party against whom the action is brought is termed the *defendant*. The suit is commenced after both parties have entered an *appearance* or an appearance is entered for them, when they are said to be *in court*. Each party now makes a statement of the position taken upon the issues of the suit, such as statement comprising the *pleadings*, after which the issue is joined. Questions of law involved in the cause are determined by the judge, while matters of fact are in most cases decided by the jury. A *verdict* is the decision or conclusion of the jury, while a *judgment* is the decision or sentence pronounced by the court. See **Crime; Courts; Jury; Writ**.

PROFIT (prōf'it), the portion of the joint product of labor and capital which belongs to the employer. The employer may be and often is a capitalist, but he is not always necessarily the owner of the capital employed in commercial or industrial enterprises. Both capital and labor are within themselves helpless, since it is necessary to have an employer or business man to effect a union and put both in successful operation. If a large capital and many laborers are employed, it requires much ability to organize and manage a business. The profits of the employer usually depend upon the ability to manage, and, since they are generally proportioned to the volume transacted, large profits imply an increase and not a diminution of wages. Risk and uncertainty are attached to all business enterprises and the greater the elements of uncertainty the larger should be the profits. In general the profits are small upon single commodities, but they are usually quite large in cases where protection from close competition is provided through patents and copyrights, or where the output of an important product is controlled by large interests so as to create a monopoly.

Profits are classed as gross and net. *Gross*

profit is that resulting from the difference between the original cost and the selling price, while *net profit* is what is left after deducting all charges. The proportion which the total profit bears to the capital employed is reckoned on a per cent. basis and is called the *rate of profit*. The gain or loss in business is termed *profit and loss*. These items are made a matter of record in bookkeeping, the former being placed on the credit and the latter on the debit side of the ledger.

PROGRESSION (prō-grēsh'ūn), in mathematics, a succession of numbers, each derived from the preceding, according to a fixed law. The numbers which form a series are called *terms*. If the terms increase toward the right, they form an *ascending series*; if they decrease toward the left, the series is said to be *descending*. The first and last terms are the *extremes*. An arithmetical progression is a series whose terms increase or decrease by the addition or subtraction of a fixed number called the *common difference*, as 3, 5, 7, or 12, 10, 8, in which the common difference is 2. A geometrical progression is a series in which each term is formed by multiplying the previous one by a fixed number called the *common ratio*, as 3, 9, 27, 81, in which the common ratio is 3.

PROHIBITION PARTY (prō-hī-bīsh'ūn), a political organization of the United States, first established as a national organization in Chicago on Sept. 1, 1869. The prohibition movement in the United States dates from 1812, and the first law providing for the prohibition of the liquor traffic was enacted in Maine about 1851. Vermont and Rhode Island passed a similar law in 1852, Connecticut followed in 1854, and the states of New Hampshire, New York, Michigan, and Iowa enacted such laws in 1855. These laws were more or less modified or repealed, but the movement continued to gain many adherents. James Black of Pennsylvania was nominated for President in 1872. He received 5,608 votes and was the first presidential candidate of the Prohibition party. Green Clay Smith received 9,522 votes for President in 1876; Neal Dow, 10,305 votes in 1880; John P. Saint John, 150,369 votes in 1884; Clinton B. Fisk, 250,290 votes in 1888; and John Bidwell, 279,191 votes in 1892.

The party was divided on the money question in 1896, the two opposing factions being known as the Prohibition party and the National party. The former made prohibition the single issue and its candidate for President, Joshua Levering, received 130,560 votes, while the latter supported prohibition, bimetallism, and other issues under the leadership of Charles E. Bentley, who

received 14,392 votes. In 1900 John G. Woolley was the candidate for President, receiving 207,368 votes. Silas C. Swallow was the candidate in 1904, when the party polled 258,537 votes. Eugene W. Chafin was the Presidential nominee in 1908, receiving 250,481 votes. Thus far the prohibition element has been much stronger as a political factor in county and state elections than in national contests, though there is a growing sentiment in favor of making the temperance question an issue of national importance, since many regard prohibition by locality only a step in the general movement.

PROMISSORY NOTE (prŏm'is-sŏ-rŷ), a promise in writing to pay a certain sum of money, either on demand or at a fixed future time. When the promise is to pay it to the payee or his order, the note is negotiable. It is signed by the maker, who is termed the *payer*. A note may be sold or transferred either with or without recourse on the payee. In the former case he merely signs his name on the back, when it is said to be *endorsed*, but to hold him liable in some states it is necessary to protest the note. Those who sell or transfer a note without assuming any responsibility write their name under the phrase, *Without recourse*. Below is the usual form of a negotiable promissory note:

\$680.00 Philadelphia, Pa., Oct. 10, 1909.

Three months after date, for value received, I promise to pay John Doe, or order, six hundred eighty and 00/100 dollars, with interest at the rate of six per cent. per annum.

Gottlieb Doe.

PRONGHORN (prŏng'hŏrn), a small goat antelope native to the western part of North America, known as *cabree* by the French Canadians and as antelope in the United States. In some localities it is known as prongbuck. Formerly these animals were very numerous in the region lying west of the Missouri, extending from Mexico to the Saskatchewan River, but extensive settlements have reduced their range very materially. The adult is three feet high at the shoulders and about four and a half feet long, and the body is shaped like that of the deer. Small herds frequent the open plains and one of the number usually stands as monitor on an elevated point. The horns are spike-like, about one foot in length, and are replaced each spring by a new growth. A rudimentary form of horns are borne by the female, but they are not noticeable except at close contact. The flesh is of a fine flavor and highly nutritious.

PRONOUN (prŏ'noun), in grammar, a word

used instead of a noun, as *I, we, you, his, themselves*. The properties are *gender, person, number, and case*, all of which are the same as that of its antecedent, except its case, which depends upon the construction of the clause in which it is found. Pronouns are either *personal, possessive, relative, or interrogative*. *I, he, and you* are personal; *his, her, and their* are possessive; *what, which, and who* are relative; and *what, which and who*, are interrogative pronouns. To these are sometimes added *indefinite pronouns*, as *any, much, and some*. Such words as *that, this, and these* are termed *demonstrative pronouns*.

PROOF READING, the art of reading proof sheets made in printing and indicating the necessary corrections by means of particular signs or marks. In printing it is necessary to take a rough impression from type, after the compositor has set an article, or part of an article, for the purpose of noting errors to be corrected. This is necessary in order to secure correctness in spelling, punctuation, capitalization, paragraphs, pages, chapters, etc. It is not customary to read proof sheets of matters published in newspapers more than two times, but in bookwork from three to five readings are common. The first impression taken is called the *first proof* and is corrected by the compositor or manager of the printing office. This is used as a guide in making corrections in the type and a *second* or *clean proof* is made to be examined by the editor, who notes any alterations desired and instructs finally as to the printing.

In the case of composing for books a proof is taken after the page is made up, called a *page proof*, and later a *foundry proof* is taken to verify the work done in electrotyping. These proofs are read by one or more persons, and usually also by the editor or author, all exercising care that the matter is properly noted and marked for revision. Proof reading is a difficult art and requires remarkable care and ability to note all the matters demanding attention in an article or a part of it. It is not sufficient to examine every sentence, but every word and letter must be carefully observed, that nothing inaccurate may pass into print.

PROPHETS (prŏf'ets), those who speak as the inspired representatives of the Divine Being, who are mentioned in the Scriptures as teachers sent by God to utter predictions of future events. The first mention made of prophets occurs in Genesis, where Abraham is spoken of in that relation, and it is implied that Moses was one. However, the more typical prophets began with Samuel, who was likewise

a civil ruler, but the prophetic order did not fully develop until the separation of the Israelites into two kingdoms. It is thought that the order of prophets partook of the nature of a school and that young men of the different tribes were admitted into membership, who received instruction in sacred poetry, music, and law. Judah, being generally faithful to Jehovah, did not develop many prophets, but in Israel the prophets were prominent and influential, and devoted much time and energy to opposing apostasy and moral depravity. Elijah and Elisha were among the early prophets who left no written works, but the later prophets committed their messages to writing.

Sixteen prophets of the later period of the Old Testament left books that became recognized as a part of the Old Testament canon. They are divided into the four greater and the twelve lesser prophets. The *four greater prophets* are Isaiah, Jeremiah, Ezekiel, and Daniel, whose books precede the others in the order named. The *twelve lesser prophets* are Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habakkuk, Zephaniah, Haggai, Zechariah, and Malachi. Hosea, Amos, and Jonah belong to the kingdom of Israel as distinct from the kingdom of Judah; Joel, Isaiah, Jeremiah, Obadiah, Micah, Nahum, Habakkuk, and Zephaniah belong to the kingdom of Judah; Ezekiel and Daniel, to the period of captivity; and Haggai, Zechariah, and Malachi, to the period after the return from captivity. Some of the prophets are mentioned as being particularly skilled in using the psaltery, harp, cymbal, and pipe. The higher classes of prophets had inferior prophets to attend upon them and look after their means of subsistence. Many of them were married and had families, including Moses, Hosea, and Isaiah. The wife of Isaiah is spoken of as a prophetess.

PROPORTION (prō-pōr'shūn), in mathematics, the relation of one quantity to another. This relation may be expressed by the difference of the quantities or by their quotient. In the former case it is called *arithmetical relation*, in the latter, *geometrical proportion*. The measure of geometrical proportion is called the ratio; that is to say, ratio is the number of times one quantity contains another taken as a standard. Proportion is sometimes called the *rule of three*, since the fourth term may be found when the other three terms are given. In the arithmetical proportion, $3:6::12:24$, it will be seen that the ratio of 3 to 6 is the same as that of 12 to 24, and, knowing any three of the given term, it is apparent that the fourth can be found. In the algebraic expression, $a:b::c:d$, is indicat-

ed that the ratio of a to b is the same as the ratio of c to d. All the figures or letters of a complete expression are called the *terms* of the proportion, while the first and last terms are its *extremes* and the intermediate terms are the *means*. In the above expression a, b, c, and d are the *terms*; a and d, the *extremes*; b and c, the *means*; a and c, the *antecedents*; b and d, the *consequents*.

PROSE, the ordinary language used in speaking or writing, distinguished from poetry, which is cast in poetical measure or rhythm. Classical prose, though known less extensively than classical poetry, may be considered the most important department of literature. Although a large majority of the dull and commonplace discourses are in prose, it must be admitted that a large proportion of the artistic and finished writings are likewise in the prosaic form. See **Essay**.

PROTECTION (prō-tēk'shūn), an economic theory by which governments seek to limit imports for the benefit of home manufacturers. The principle of protection was recognized distinctly by the first tariff levied in the United States, in 1789, though the amount of protection was moderate. It has been the policy of the government to combine a protective tariff tax with the plan of internal improvements at national expense, and such a policy has been sustained during all its history, except in the period from the establishment of the Walker tariff in 1846 to that of the Morrill tariff in 1861.

Writers on political economy are much divided as to the practical effect of a protective tariff. It is claimed on the one hand that it is absolutely necessary to protect home industry to enable the producers of a protected article to receive in return for their services a fair remuneration. Those taking the opposite view assert that the uniform effect of the policy is to render the article produced both dear and bad. Tariff duties are usually of two classes—protective and prohibitory. A *protective tariff* aims to provide conditions under which articles of foreign and home manufacture can compete in the market on terms nearly equal, while a *prohibitory tariff* has the effect of excluding foreign products from the market.

The protective system was first proposed on a large scale by an Italian in the suite of Catherine de' Medici and soon after legislation developed whereby retaliatory tariffs were levied in a number of countries, as the tariff of England in 1692, which taxed the goods imported from France on an average about 75 per cent. In the period between 1818 and 1824 all bounties to manufacturers were abolished in Britain, and

this, with the repeal of the corn and navigation laws, ended the protective policy in that country. In the United States a large proportion of the people still favor a protective policy, although a considerable minority is in favor of free trade. See **Tariff**; **Free Trade**, etc.

PROTECTOR (prō-tēkt'ēr), the official title of one appointed in England as a regent of the kingdom during the minority or incapacity of the sovereign. The Earl of Pembroke was among the first protectors, serving in 1216 during the minority of Henry III. Oliver Cromwell assumed the title of Lord Protector in 1653 over England, Ireland, and Scotland, serving until 1658, and was succeeded in that capacity by Richard Cromwell.

PROTEIDS (prō'tē-īdz), the name of several important animal and vegetable compounds, some of which are found in solutions or viscous solids in nearly all animal and vegetable organisms. They are formed exclusively in plants and undergo but slight alteration when consumed as food and stored up by animals. However, man derives the proteids, or nitrogenous, foodstuffs principally from grains, vegetables, eggs and milk, and the flesh of animals, birds, and fishes. The constituents of proteids are similar to those of protein, containing carbon, hydrogen, nitrogen, oxygen, and sulphur.

PROTEIN (prō'tē-īn), the name of certain chemical substances which occur in the organism of plants and animals. They are composed principally of oxygen, carbon, nitrogen, and hydrogen. These substances are important as food, serving to furnish heat and to repair and build up the body. The proteins are classified, not according to their chemical composition, but according to their physical properties and their action upon certain reagents. They include the foods known as proteids and nonproteids, of which the former, or albuminoids, are the most important. The albuminoids, known as *true proteids*, are exemplified in the gluten of wheat, the albumin of eggs, and the casein of milk.

PROTESTANTS (prōt'ēs-tānts), the designation applied to Christians who deny the authority of the Pope and hold to the right of private judgment in the matter of religion. The name was first applied to the princes and other adherents of Luther, who, at the second council of Spire, held on April 19, 1529, protested against the decree of the majority, representing the Roman Catholic states of Europe. This decree involved a virtual submission of the reformers, who not only dissented from the decree, but appealed to a general council. Among the leading princes who followed the leadership of Luther were Landgrave Philip of Hesse, the

Electors George of Brandenburg and John of Saxony, Prince Wolfgang of Anhalt, and Princes Ernest and Francis of Brunswick-Luneburg. Many imperial cities joined the movement under Luther. They were Ulm, Strassburg, Nuremberg, Constance, and ten others.

The Protestant churches include the denominations which are not Roman and Greek Catholic, embracing the Lutheran, Presbyterian, Methodist, and other ecclesiastical bodies, though several branches of the Anglican Church do not accept the classification as historically correct when applied to them. Among the fundamental doctrines of Protestantism are the supremacy of the Bible above bishops and councils, individual responsibility, justification by faith, and freedom within the authority of the Bible of conscience and worship. The branches of the Protestant Church are more or less widely distributed, though the Teutonic peoples of Northern Europe and their descendants have had and still make up the largest membership. It has been difficult for Protestantism to make material advances among the Latin peoples of Southern Europe and their descendants. The Protestant churches of the world have a membership of 163,300,000.

PROTOPLASM (prō'tō-plāz'm), the elementary living matter of plant and animal structures. Its chemical constituents are about eighty per cent. of water and about twenty per cent. of solids, chiefly proteids. The proteids found in protoplasm consist mainly of peptones, albumoses, and globulins, with small quantities of salt, fat, and carbohydrates. All organized bodies contain protoplasm. It is seen in its simplest form in the lowest animals, as in the protozoa. Protoplasm is transparent and can absorb, excrete, secrete, grow, move, and multiply. It is not elaborated from minerals by animals, but they derive it from plants or other animals by converting the dead into living protoplasm. However, plants derive it from the air and mineral substances, thus providing a supply of this essential substance for the use of animals. Huxley spoke of protoplasm as the physical basis of life, since it seems to be the original life principle, and is found in all organized bodies.

PROTOZOA (prō-tō-zō'ā), one of the subdivisions of the animal kingdom. It is a division of the invertebrate animals, embracing those that have a simple structureless organism, reducible to a cell or cell contents, without any distinct separation of system or organs. Cuvier and Agassiz include the vertebrates, articulates, mollusks, and radiates among the distinct divisions of the animal kingdom, while others add

a fifth branch, the protozoa. However, the last mentioned, as formulated by some writers, includes forms of life that are now known to be plants and others are embryonic forms of crustaceans, mollusks, and worms. As generally defined, the protozoa includes the foraminifera, rhizopods, and some of the infusoria. All the animals belonging to this division are minute and but few can be seen without the microscope. While a few live in moist earth or as parasites on or in other living organisms, the larger number are found in fresh and salt waters. The food is taken into the protoplasm, the name applied to their nearly structureless substance, either by a specialized mouth, or by any part of the cell substance, in the form of particles. As a rule they are incapable of assimilating nitrogen, since their cells consist largely of nitrates or carbonates. Reproduction is usually by spore formation, fission, or gemmation. Sponges belong to the protozoa and constitute the largest form. An infusore is said to be the cause of hay fever and other diseases, but many species are important in that they act as scavengers. Extensive beds of rocks have been built up by the skeletons of these animals.

PROTOZOIC ERA. See **Geology.**

PROVENÇAL (prô-vän-säl'), the name used to designate the different Romanic dialects formerly spoken and written in the south of France, which are employed at present by country people in the region included in the former province of Provence. Collectively they are classed as one of the six chief Romance or neo-Latin languages and sometimes as a dialect of French. Provençal is inflected more than the other dialects of its class and was the first to be fixed grammatically. The earliest writings in the Provençal language date from the 9th century, and in the 11th and 12th centuries its literature spread over a large portion of southern France and into northern Italy and Spain. Its widest use and highest development were reached in the later part of the 12th century. The highly inflectional properties make it particularly adaptable to the production of poetic forms, though in modern times it is more simply inflected than in the ancient, and a considerable number of French words and terms have been incorporated with it. Provençal literature was revived notably in the 19th century.

PROVERBS (pröv'ërbz), the wisdom of experience condensed into brief and pithy sayings. Many definitions have been applied by numerous writers and much energy has been devoted to forming and collecting proverbs from the different races and ages. Aristotle spoke of prov-

erbs as remnants that were saved from the ruins of ancient philosophy on account of their shortness. Agricola considered them short sentences into which the ancients compressed life, Erasmus regarded them as well-known forms framed from somewhat uncommon sayings, and Bacon defined them as the genius, wit, and spirit of a nation. Sayings that contain wit and truth, but are applicable only in one line of conversation or to illustrate a specific idea, are not properly proverbs, since a proverb must be a saying that has long been in general use and has been accepted by the people. As a rule a proverb originates of its own accord by the sense and method contained in it, and usually reflects the people with whom it originated. Thus a proverb does not originate from any one individual, but springs into use by popular approval, and ultimately passes from nation to nation until it becomes the heritage of the race. Many of the proverbs in general use are of very early origin, some of them coming from Arabia and Persia, though as a rule it is quite difficult to determine whence the best and most popular proverbs now in use first sprang into existence.

The first collection of Arabic proverbs dates from the 11th century, and different nations have made similar collections and adopted many of those drawn from other sources. It may be said that the Spanish people have the largest number of proverbs, estimated at about 25,000. The literature of Iceland is rich in proverbs and so is that of the German and Scandinavian languages. The Arabs have the largest number of proverbs of Asiatic nations, but those of Persia, Hindustan, and Turkey are likewise numerous. Such proverbs as "Time is money," "God tempers the wind to the shorn lamb," "Hit the nail on the head," "Strike while the iron is hot," "Put the matter in a nutshell," and many others are practically in universal use. The *Book of Proverbs* is a part of the Bible and contains a collection of popular sayings, but the book is not constituted exclusively of proverbs. It is generally attributed to Solomon, though many of the sayings do not appear to be founded solely on his own experience, but rest at least partly on the shrewd observation of the nation at large. It includes many sayings that were coined in earlier times. Many of the proverbs drawn from this book are in popular use, and the New Testament in many instances quotes directly from it.

PROVIDENCE (pröv'i-dens), the capital of Rhode Island, county seat of Providence County, 42 miles southwest of Boston, Mass. It is located on the Providence River, an arm of

Narragansett Bay, and has communication by the New York, New Haven and Hartford and other railways. The site includes about 20 square miles, being located on both sides of the Providence River, and the eastern limits extend to the Seekonk River. An undulating and somewhat hilly surface is in the eastern part, while the west side is a somewhat sandy plain. Beautiful sites for residences are plentiful in the higher section, where the elevations reach about 200 feet. Along the river and bay is a considerable tract that has been made by grading, and here are some of the largest and most substantial business houses.

All parts of the city are regularly platted, but some of the thoroughfares in the older part are narrow and crooked. Nearly 250 miles of streets are covered with pavements, constructed largely of stone and macadam. Boulevards extend through the residential portion and to Roger Williams Park, which consists of 540 acres. It has a fine statue of Roger Williams, zoölogical gardens, and artificial lakes. Near the city hall is a statue of General Burnside and in front of this building is the Soldiers' and Sailors' Monument. The State capitol, a massive structure of marble and granite, was completed in 1900. Other prominent buildings include the city hall, the post office and Federal building, the county courthouse, and the union railway depot. Providence has many large business and office buildings, such as the Barton Block, the National Exchange Bank, the Athenaeum, and the Equitable, Bannington, and Industrial Trust buildings.

The city has a well-organized system of public schools, ranging from the kindergarten to the high school. It is the seat of a State normal school, the Rhode Island School, and the Rhode Island School of Design. In its public library are 92,500 volumes. Brown University, located on the east side, has a large and well-selected library. Other extensive collections include those of the State, the Young Men's Christian Association, and the Providence Athenaeum. Many charitable institutions are maintained, including the Rhode Island hospital, the State institute for the deaf, and Dexter Asylum for the poor. The Friends' School, founded in 1818, is celebrated as a center of learning. All the leading Christian denominations have fine churches. They include the Central Baptist, the Saint Stephen's Episcopal, the First Universalist, the Roman Catholic Cathedral of Saint Peter and Saint Paul, the Trinity Methodist, the Grace Episcopal, and the Union Congregational.

Providence ranks as the second commercial city of New England, being exceeded only by

Boston. It is a port of entry and has an extensive harbor. Although the larger part of the trade is domestic and coastwise, it handles a large volume of foreign commerce. As a wholesale and jobbing center it takes high rank and carries a large business in coal, grain, live stock, and manufactures. In the output of jewelry it holds a high place among the cities of the United States. Silverware, files, screws, cotton and woolen goods, engines and boilers, and machinery are produced extensively. It is a slaughtering and meat-packing center and has large interests in dyeing and finishing textiles. Other products include malt liquors, rubber and elastic goods, boots and shoes, firearms, and tobacco products.

Communication within the city is by an extensive system of electric railways, from which branch lines extend to suburban and interurban points. Municipal lighting is by gas and electricity. It has an extensive system of waterworks and well-organized police and fire departments. The city is located on a tract of land which was settled by Roger Williams in 1636. He established the first Baptist church organized in America, separated the temporal from the spiritual affairs, and extended religious toleration to all. During the Revolutionary War the city suffered considerably, but it became more prosperous after the War of 1812. In 1832 it was chartered as a city. At present it ranks among the wealthiest and most prosperous cities in the United States. Population, 1910, 224,326.

PROVO CITY (prō'vō), a city in Utah, county seat of Utah County, on the Provo River, about 45 miles south of Salt Lake City. It is on the Rio Grande Western and the Oregon Short Line railroads. The noteworthy buildings include the Brigham Young Academy, the State Insane Asylum, the Proctor Academy, the public library, and the high school. Utah Lake, Provo Cañon, and Bridal Veil Falls are attractions in the vicinity. It is surrounded by a fertile farming region and has a large trade in cereals, live stock, and merchandise. The manufactures include flour, leather, machinery, and woolen goods. Electric lights and waterworks are among the municipal facilities, and, being easily accessible by railways, it is a favorite resort for summer tourists. Provo City was settled in 1849 and incorporated in 1851. Population, 1900, 6,185; in 1910, 8,925.

PRUNES, the dried fruit of any one of several species of the common plum. Prunes are produced extensively in California and in the southern part of Europe, and are known in the market from the country producing them, as California, Spanish, German, Turkish, and

French prunes. They are used extensively as a food, after being prepared by stewing, and in some countries brandy is distilled from them.

PRUNING, the act of cutting off superfluous branches, shoots, or roots of trees and shrubs for the purpose of bringing the plants to a particular form, or with the view of strengthening the growth of the parts remaining. Many plants throw out unprofitable growths, thus decreasing the production of flowers and fruit, while some assume a form either undesirable or illy calculated to withstand the effect of wind and weather. The ultimate result of judicious pruning is an increase in the vitality of the plant and in the size and quality of its fruit. This result is due to the removal of excessive branches, thus exposing the inner limbs to a greater amount of sunlight and causing a larger quantity of vital sap to flow to the flowers and fruit. In some countries forest trees are pruned with the view of influencing the growth of their trunks as to size and direction, while in flower culture plants are trimmed to increase the size and vigor of their ornamental parts. *Root pruning* is generally effected to increase the beauty and size of flowers. Both classes of pruning depend upon the plants to be improved, since the removal of a large number of roots and branches may impair general growth. Pruning out of season is particularly harmful.

PRUSSIA (prūsh'ä), in German *Preussen*, a kingdom of Europe and the most important state of the German Empire. It is situated in the northern part of Germany and is divided into the following thirteen provinces: East Prussia, West Prussia, Brandenburg, Pomerania, Posen, Silesia, Saxony, Schleswig-Holstein, Hanover, Westphalia, Hesse-Nassau, Rhenish Prussia, and Hohenzollern. Silesia is the largest province, area 15,568 square miles, and Hohenzollern is the smallest, area 441 square miles. The total area is 134,548 square miles. Berlin is the capital and largest city. Other cities of importance include Breslau, Cologne, Danzig, Düsseldorf, Frankfurt, Hanover, Königsberg, Magdeburg, Altona, Elberfeld, Barmen, Stettin, Krefeld, Aachen, and Halle.

DESCRIPTION. The western part of Prussia is more or less hilly and mountainous, but the general surface of the vast territory lying toward the north and east is included in the plain stretching from the Ural Mountains to Holland and its surface is quite level or undulating. The general drainage is toward the north into the Baltic Sea and the North Sea. Among the principal rivers are the Weser, Elbe,

Oder, and Vistula, all having their source near the southern boundary, while the Nieman flows through the northeastern part and the Rhine through the western part. Other streams include the Eider, Ems, and Pregel. The principal rivers have been improved for navigation by a network of canals and all parts of the kingdom have an adequate railway service. Formerly the region was covered by a vast expanse of forests, and about 21 per cent. of the surface is still covered with timber. Indeed, forestry is an important industry, the production of timber being a source of great wealth. Much of the soil is exceedingly fertile, though in some portions marshes and peat moors are extensive, while in others the soil is of a light, sandy formation, as is the case in both East Prussia and West Prussia. The Rhine valley is noted as the most picturesque and fertile part of Germany. It is famous on account of its fine orchards and vineyards.

INDUSTRIES. Farming is one of the leading enterprises and the soil is tilled with much care. Among the leading products are wheat, barley, oats, maize, potatoes, sugar beets, and garden produce. It has a large yield of tobacco, flax, hemp, and domestic animals, particularly horses, cattle, sheep, swine, and poultry. Mining is an important industry, the products including coal, peat, iron, zinc, lead, copper, cobalt, silver, salts, copperas, manganese, and nickel. Among the manufactures are beet-root sugar, tobacco products, cotton and woolen goods, chicory, scientific instruments, machinery, ships and sailing vessels, engines and boilers, and utensils. The railroad and canal trade is of growing importance and its seaports have been noted as centers of commerce for centuries. It has a vast trade in textile fabrics, chemicals, metal wares, leather, glass, coal, stoneware, timber, and live stock. The leading port cities include Stettin, Flensburg, Königsberg, Memel, Stralsund, Kiel, and Pillau on the Baltic, and the North Sea port of Altona.

EDUCATIONAL. Prussia is particularly famous on account of its splendid educational institutions. Attendance at all the public elementary schools is compulsory. Education is supported by local and state aid. The period at which children are required to attend ranges from six to fourteen years, and the population within this limit aggregates 6,750,000. Among the noted institutions that have made Prussia famous are the ten universities of Berlin, Halle, Göttingen, Königsberg, Greifswald, Münster, Breslau, Kiel, Bonn, and Marburg. These institutions have about 1,450 professors and teachers and an attendance of 18,500 students. They

are uniformly equipped with modern apparatus, museums, and libraries. The Royal Library at Berlin is one of the most famous in the world. Many literary, scientific, and artistic schools and societies are maintained, such as the Academy of Arts, founded in 1699, the Antiquarian Society of Stettin, the Royal Museum of Arts of Berlin, and the Breslau Historical Society.

INHABITANTS. Practically the entire population belongs to the German race, the principal exception being about 400,000 Jews and 2,150,000 Poles. The original inhabitants, known as the old Prussians, have been absorbed by the Teutonic element. The Poles are confined largely to Posen and Silesia. Population, 1905, 37,293,324.

GOVERNMENT. The government is a constitutional monarchy and the crown is hereditary in the male line. The king is assisted by a council of ministers appointed by royal decree. It has a legislative assembly called the *Landtag*, composed of two chambers, the *Herrenhaus* and the *Abgeordnetenhaus*. The upper chamber has a membership of about 300, including princes, titled noblemen, and life peers; while the second chamber includes 433 members chosen by popular suffrage, the membership being based on a ratio of the population in the different provinces of the kingdom. Prussia is the most potent factor in the German Empire. The King of Prussia is the Emperor of Germany and his chief ministers of state are the same as those chosen for the empire. The army and navy are an integral part of those of Germany, while the representation in the national *Bundesrath* is numerically the largest. It has 17 members in that body, and 236 deputies in the diet or *Reichstag*.

HISTORY. It is thought that when the Phoenicians visited the North and Baltic seas, in the 4th century B. C., they found Slavonic tribes occupying the region at present comprised in northern Prussia, but little is known of these people until in the 10th century, when they are mentioned by a number of writers as Borussi or Porussi. Their fear of losing independence caused them to battle against the advance of Christianity with marked determination, and in 997 Bishop Adalbert of Prague was martyred by them. The Knights of the Teutonic Order of Saint George entered upon a crusade against them in the middle of the 13th century and formally established the Christian faith. A considerable part of Prussia was governed by the Teutonic Knights under a despotic form until 1466, when their power was overthrown by the allied forces of the Prussians and Poles. At that time West Prussia became a part of

Poland and East Prussia was made a Polish fief, but in 1618 the duchy of Prussia was established and John Sigismund, Elector of Brandenburg, became Duke of Prussia, and since that time the government has been vested in the Hohenzollern-Brandenburg dynasty.

Prussia was a noted seat of action in the revival of learning and the center of activity in the Reformation. It was connected more or less prominently with the early German Empire that included Austria and Italy, and took a large part in the contests that led to the overthrow of Napoleon in 1815. The larger importance of Prussia in modern times dates from 1866, when it undertook an aggressive movement against the power of Austria, which not only consolidated many of the German states with Prussia, but resulted in the organization of the German Empire after the Franco-German War of 1870-71, the Prussian king assuming the title of Emperor of Germany. See **Germany**.

PRUSSIC ACID (prüs'sik), a colorless liquid discovered by Scheele in 1783, known scientifically as hydrocyanic acid or cyanide of hydrogen. It has a specific gravity of .7, boils at 80°, and solidifies at 5°, forming feathery crystals. Prussic acid is obtained from many sources, including the kernel of the bitter almond and the fruits of the peach and apricot families. It is derived from the leaves of the cherry, laurel, and peach and from different parts of various plants. A weak solution of prussic acid is useful in treating bronchitis and affections of the mucous membrane, but, when administered in excessive doses, it acts as a dangerous poison and death results almost instantly.

PRUTH (prōōth), a tributary of the Danube River, rising near the boundary of Galicia and Hungary, on the northeastern side of the Carpathian Mountains. After a course of about 500 miles toward the southeast it joins the Danube at Galatz. It forms the boundary between Rumania and Russia, has a deep valley, and is navigable to Jassy.

PSALMS (sämz), **Book of**, a book of the Old Testament, containing the songs of praise used by the Jews in their worship in the temple. It contains 150 psalms, or sacred lyrics, and was arranged by the Hebrews in five books, each having a particular superscription and terminating with a doxology. It is evident that the book was brought together from many sources and that its composition and compilation extended over many centuries. Some writers have assigned it almost entirely to David, but others think that Solomon wrote a number of the

psalms. It is certain that some of them were not written until after the Babylonian captivity, and still others in the time of the Maccabees. About seventy allusions were made to the Psalms by Jesus and his apostles. It is mentioned by the apostles more frequently than any other book of the Old Testament. No serious doubt as to its canonical authority has ever been expressed, and the Christian Church has made it the recognized psalter.

PSEUDONYMS (sū'dō-nīmz), the fictitious names assumed by writers to conceal their identity. They are frequently called *nom de plumes*. The practice of publishing books and magazine articles under a false name originated with persons who wanted to induce people to believe them the works of those whose names they bore, and because the writers did not care to be spoken of in connection with their publications. Many young authors have become connected with pseudonymous names for the reason that they did not wish to risk revealing their identity, and later the assumed names clung to them and became more widely known than their real names. This is particularly true of such writers as Marian Evans and D. R. Locke, who are better known by their respective pseudonyms, *George Eliot* and *Petroleum V. Nasby*. The following is an abbreviated list of pseudonyms adopted by famous authors:

Adeler, Max.....	Charles Heber Clark.
Atlas.....	Edmund Yates.
Bab.....	W. S. Gilbert.
Bell, Acton.....	Anne Brontë.
Bell, Currer.....	Charlotte Brontë.
Bell, Ellis.....	Emily Jane Brontë.
Bickerstaff, Isaac.....	Dean Swift.
Biglow, Hosea.....	James Russell Lowell
Billings, Josh.....	Henry W. Shaw.
Blouet, Paul.....	Max O'Rell.
Boz.....	Charles Dickens.
Breitmann, Hans.....	Chas. G. Leland.
Bystander.....	Goldwin Smith.
Carmen, Sylva.....	Queen of Rumania.
Caxton, Pisistratus.....	Lord Lytton (First).
Crayon, Geoffrey.....	Washington Irving.
Creyton, Paul.....	J. T. Trowbridge.
Elia.....	Charles Lamb.
Eliot, George.....	Marian Cross Evans.
Fern, Fanny.....	Sara P. Parton.
Graduate of Oxford.....	John Ruskin.
Greenwood, Grace.....	Mrs. S. J. Lippincott.
H. H.....	Helen Hunt Jackson.
Hamilton, Gail.....	Mary Abigail Dodge.
Harland, Marion.....	Mrs. M. V. Terhune.
Ian Maclaren.....	John Watson.
Ik Marvel.....	D. G. Mitchell.
Jean Paul.....	J. P. F. Richter.
Johnson, Benj. F.....	James Whitcomb Riley.
Kerr, Orpheus C.....	R. H. Newell.
Knickerbocker, Diedrich.....	Washington Irving.
Lyll, Edna.....	Ada Ellen Bayly.
Meredith, Owen.....	Earl of Lytton.
Miller, Joaquin.....	C. H. Miller.
Nasby, Petroleum V.....	D. R. Locke.
North, Christopher.....	John Wilson.
Nye, Bill.....	Edgar Wilson Nye.
Opium Eater.....	T. de Quincey.
Optic, Oliver.....	W. T. Adams.
Ouida.....	Louise de la Ramée.
Paolo, Frà.....	Paolo Sarpi.
Pindar, Peter.....	John Wolcott.

Quad, M.....	C. B. Lewis.
Rob Roy.....	John Macgregor.
Sand, George.....	Madame Dudevant.
Shirley.....	John Skelton.
Slick, Sam.....	T. C. Haliburton.
Titcomb, Timothy.....	J. G. Holland.
Titmarsh, Michael Angelo.....	W. M. Thackeray.
Twain, Mark.....	Samuel L. Clemens.
Uncle Remus.....	Joel Chandler Harris.
Ward, Artemus.....	Charles F. Browne.
Wetherell, Elizabeth.....	Susan Warner.

PSYCHOLOGY (sī-kōl'ō-jÿ), the science of the human soul, treating the phenomena of its attributes and operations as manifested in connection with the body. The study of this branch of knowledge has been variously designated as mental science, mental philosophy, and metaphysics, though the last stated term in its scope often designates more than psychology, and at other times less. As a science it is to be classed with the inductive group, since its laws are discovered by observation, either through the agency of personal study or by the testimony of others. Although a knowledge of psychology is of much value to all, especially to teachers and professional men, its study is either limited or neglected, largely because it demands close observation, careful reflection, and precision in making discrimination. Besides, there are many differences of opinion regarding divers matters of interest in relation to the nature and operation of the different faculties of the mind. However, the multiplication of text-books and greater interest in professional associations are fast extending study and broadening research.

MENTAL POWERS. Though man is known to be constituted of mind and matter, the nature of neither is definitely understood, and we may study them only by their acts or effects upon each other and upon external things. Both the mind and the body have certain powers, or ability to act and do. The powers relating to the body are known as *physical*, and those pertaining to the mind as *psychical*, both showing close dependence upon each other. All the powers of the mind are grouped in three classes, known respectively as intellect, sensibility, and will. The *intellect* comprises the powers by which we are able to know; the *sensibility*, those by which we feel; and the *will* is the power by which we choose and execute. This division of mental powers does not imply that the mind is composed of organs or parts. On the contrary, it is one indivisible thing. It is the mind as a whole that knows, feels, and wills. There is a close relation between the body and the mind, but the relationship is especially intimate between the mind and the nervous system, particularly the brain. It is not difficult to realize this relationship when we contemplate the effect that a severe physical pain, such as tooth-

ache or a wound, has upon the mind, or what influence mental exhaustion exercises on the bodily functions.

CULTURE OF THE INTELLECT. The intellect, being the power to know, cannot be cultivated without bringing the mind in contact with objective realities. An object that has no real existence cannot be known, though psychical objects are considered as real as the objects of material nature. Among the objects of knowledge are the acts and states of the mind; the product of mental acts, such as concepts and thoughts; and external material objects. Writers generally agree that we can be conscious only of our mental acts and states, that we know only what we can recall into consciousness, and that the degree of consciousness is increased by applying the mind vigorously to the acts or states perceived. The power of self-direction possessed by the mind is called the attention, which varies in degree from a slight energy to an intense concentration of the mind on one object to the exclusion of all others. Attention being under the control of the will, it can be cultivated by the exercise of will power over the movements of the mind. An enlargement of ability to apply attention is followed by greater power of perception. The whole process of acquiring knowledge involves a succession and network of mental activities. These include sensation, discrimination, perception, analysis and synthesis, comparison, judgment, conception, and reasoning.

Sensation comprises the conscious state resulting from the action of some organ of sense under nervous stimuli, and is the first step in acquiring knowledge. *Discrimination* is the discernment of distinctions while the mind is undergoing sensations, thus leading to a *perception*, which may be defined as the power of acquiring immediate and fundamental knowledge. *Analysis* involves a separation of parts into their elements, while *synthesis* implies the combining of several constituents to form wholes. The term *comparison* implies the discernment of likeness and unlikeness between several objects, thus leading to the formation of a primary judgment, and ultimately to conception and reasoning. Though the acquirement of knowledge depends to a large extent upon the power to give attention, the latter is again dependent upon *interest*, which invites and sustains attention, and thus bears directly upon successful study. *Memory* represents to the mind objects previously known, while *imagination* represents objects not as they are or were, but as they may be or might have been. Both are susceptible of training, and by right use

constitute elements of vast importance in mental culture.

The powers of the intellect may be subdivided into four groups, namely, the presentative, representative, reflective, and intuitive. By the *presentative powers* we acquire knowledge of the outside world through the five senses—hearing, seeing, tasting, smelling, and feeling—and to these some writers add the sense of muscular resistance. The *representative powers* include memory and imagination, the former involving the two mental acts of reproduction and recognition. The *reflective powers* make it possible for us to establish the relations and connection of objects, while the *intuitive powers* enable us to know certain fundamental facts intuitively. According to most writers, we acquire at least seven fundamental ideas by intuition. They include the idea of *space, place, being, time, right, cause, and personal identity*, each of these being as self-evident as the truth that a part is not equal to the whole, and that a person cannot be in two places at the same time.

SENSIBILITY. Since all feelings are actions or states of the soul, they are classed as psychical. However, those arising in the bodily organism are generally termed corporeal to distinguish them from those originating exclusively in the mind. The *corporeal feelings* include sensations, appetites, and instincts. Sensations arise from some excitement of the nervous system, while appetites are occasioned by the wants of the body, and instincts attend sensations and appetites, but are not governed by a directing intelligence. The *psychical feelings* proper are divided into emotions, affections, and desires. It may be said that all feelings are pleasurable or painful, and that they are induced and extended largely by education and early training.

WILL. The will, being the power of choice and execution, enables us to decide upon our conduct and to put forth the necessary volitions. Both choice and execution are necessary to constitute a completed act of the will. It is man's power to use deliberation in making a choice and to exert force in execution that he stands preëminent above all other creatures. Not what a man knows, or what his feelings may be, count as much in estimating character as the choice of conduct and the execution of his designs. Writers do not agree whether man possesses freedom of the will. Those holding that the will is not free generally agree that education, sensibilities, and environments operate to limit and modify, while those of the opposite school think that man has perfect freedom to choose and unlimited power to put forth volition. The responsibility resting upon

those who presume to teach and direct in daily conduct should not be underestimated. It should be their aim to stimulate the power of the will by wise activity and to inculcate promptness in forming decisions. Only when the will is developed in harmony with the intellect and the sensibility can a definite and stable character result. See **Education; Pedagogics.**

PTARMIGAN (tär'mĩ-gan), the name of several species of grouse, differing from the other birds of the same family in that the legs are densely feathered to the claws and the nasal grooves are covered with feathers. They have sixteen to eighteen feathers of considerable length in the tail. In most of the species the feathers become white in winter. They inhabit the northern and snow-covered regions of both hemispheres, where they feed on mosses, lichens, small fruit, and insects. The plumage harmonizes with the rocky barrens in summer and the snow in winter, and the plumed feet enable them to walk upon the snow without sinking into it. About June the female incubates, but the male assists in rearing and feeding the young. Both fly rapidly with a whirring noise and are swift runners. The females cackle like a hen, but the males have a loud, harsh cry. Two species, the *rock ptarmigan* and the *Welsh ptarmigan*, are widely distributed in North America. The former is seen in Greenland and both ranges far north in Canada.

PTERIDOPHYTES (těr'ĩ-dō-fĩts), one of the four orders into which the nonflowering plants are divided, including the ferns, scouring rushes, and club mosses. They are associated with the seed plants, since they are larger in size and display a larger growth of foliage than the moss plants. The general name *cryptogams* is applied to all plants that do not bear seed, hence the pteridophytes are frequently termed *vascular cryptogams*. They do not possess a stem, but have real roots. About 4,500 species have been described. The greater number of these plants are tropical.

PTERODACTYL (těr-ō-dāk'tĩl), the name of a genus of extinct flying reptiles, which lived in the Mesozoic or Reptilian age. They included a large number of species and are usually classed as bird lizards or wing lizards. It is presumed that they did not precede the birds, since they appear to have originated from dinosaurian ancestors. These animals had skeletons with hollow bones, fitted to fly, but exceedingly strong, and large teeth were set firmly in the jaws. Later species seem to have lost the development of teeth, but in these the jaws were larger and more powerful. In the larger forms the wings had a spread of twenty feet and some

of the species were exceedingly powerful both in water and while flying, though they were less favorably adapted to move about upon the dry ground. The skin seems to have been smooth and uncovered, since no traces either of scales or feathers have been found. Fossil remains are very extensive in some sections and in general are widely distributed, especially in the limestone formations of Europe.

PTOMAININE (tō'mā-ĩn), the name of certain poisonous substances found in animal matter while in the state of decay. It resembles in its properties the vegetable alkaloids. The ptomaines are the products of the vitality of microbe organisms.

PUBLIC SCHOOLS. See **Education; Schools.**

PUEBLA (pwā'blā), a city of Mexico, capital of the state of Puebla, 68 miles southeast of the City of Mexico. It is located on a fertile plain about 7,000 feet above sea level, has railroad connections, and is the center of a large trade in agricultural produce and manufactures. The streets are regular and wide, intersecting each other at right angles. It has many substantial buildings, including the museum, the theater, several colleges, and a splendid cathedral. The manufactures have long been among the most important of Mexico. They include cotton and woolen goods, boots and shoes, glass, leather, soap, earthenware, and machinery. The city was founded in 1533 by the Spaniards. Santa Anna made an unsuccessful effort to capture it in 1845 and Maximilian reduced the place on May 17, 1863, after a siege of two months. Population, 1909, 96,478.

PUEBLO (pwēb'lō), a city of Colorado, county seat of Pueblo County, on the Arkansas River, 115 miles south of Denver. Communication is furnished by the Missouri Pacific, the Colorado and Southern, the Denver and Rio Grande, the Chicago, Rock Island and Pacific, and the Atchison, Topeka and Santa Fé railroads. It is the second city of the State and one of the most prosperous cities between the Rocky Mountains and the Missouri River. It has electric and gas lighting, public waterworks, sanitary sewerage, well graded and paved streets, and electric street railways. Among the noteworthy buildings are the county courthouse, the city hall, the high school, the McClellan Public Library (in a Carnegie building), the State insane asylum, and many fine schools and churches. The City Park and the Mining Palace Park are among the fine public resorts.

Pueblo is surrounded by a region which produces gold, silver, and other minerals. It has a large wholesale and jobbing trade. The

manufactures embrace wire, furniture, lumber products, carriages and wagons, farming implements, mining machinery, hardware, and earthenware. It is the seat of important railroad shops and smelting works. The vicinity was first settled by the Mormons in 1846 and soon after became a trading post. It was platted in 1859 and incorporated in 1873. Population, 1900, 28,157; in 1910, 44,395.

PUEBLO INDIANS, the inhabitants found by the Spaniards in Mexico, New Mexico, and Arizona, when exploring that region in the 16th century. Their state of society was of a semi-civilized character at the time of the discovery of America. They lived in villages and the tribe was divided into four groups, each speaking a different dialect. The men were about five feet tall, the women were somewhat smaller in stature, and their complexion was a fair olive. Their dwellings were largely in villages. They engaged in agriculture, mining, and manufacture. The villages were built in the form of rounded or oblong squares, and some of their habitations were large enough to contain a number of families, being several stories high and in many cases from 200 to 500 feet long. These dwellings were made of sun-dried brick with crossbeams and finishing of wood, and in them were apartments for different families of the tribe, each occupying an eating and a living room, a store room, and a kitchen. To provide against attacks of enemies, they made no doorways or entrances in the lower stories, but entered the dwellings by means of ladders from the roof or through upper apartments.

The Pueblos were skilled in weaving and spinning. They made pottery, baskets, utensils, and building material, and were considerably advanced in cultivating the soil. Many of their villages may still be traced and there are evidences of vast systems of irrigation in some parts of Arizona and New Mexico, indicating that they conducted the water by dams, ditches, and embankments for many miles to supply sufficient moisture for the germination and maturity of crops. Their clothing was made of cotton, fur, fibers derived from bark, and feathers. The weapons consisted of stone axes, lances, flint knives, bows, and javelins, and the warriors wore helmets and shields of the skins of animals. It is evident that they possessed considerable advancement in the use of medicines, had a system of instruction, and conducted spiritual worship.

When the Spaniards conquered Mexico, fully 30,000 Pueblos were resident in Mexico and the regions immediately north. It is evident that large numbers of these people resided in

Texas, Utah, Colorado, and Nevada at different times, since many ruins of houses and villages have been discovered, some being now covered by sands. It is thought that they were prevented from spreading farther to the north by hostile Indians and that they were driven from their northern possessions in different periods. Some writers think that the cliff dwellers were the ancestors of the Pueblos, since many ruins of cliff dwellings discovered in the cañons of Mexico, Arizona, and Colorado bear some marks of similarity to the dwellings constructed by the Pueblos.

Among the noted cliff dwellings are those of the San Juan cañon, where remarkable habitations were occupied fully 1,000 feet above the Mancos River. In other places clusters of dwellings were constructed upon terraces formed by the wearing away of the soft strata of limestone or sandstone. Some of these dwellings occupied a position between upper and lower terraces, the two forming a natural floor and roof, while the openings were faced with walls of sun-baked brick and coated with a natural cement to closely resemble natural cliff formations. At present there are about 10,000 Pueblos, who are direct descendants of those discovered by the Spaniards, and their modes of living and industries closely resemble those of their ancestors. Most of the Pueblo settlements are in the valley of the Rio Grande and the valleys of its tributaries. Among the most important villages is Zuñi, situated near the western boundary of New Mexico, and in the northeastern part of Arizona are the seven Moqui villages. Christian missionaries have induced some to embrace Christianity, but the greater number still hold to their ancient traditions, though their civilization and industries have been materially affected by the teachings of the whites.

PUERTO PRÍNCIPE (pwâr'tô prên'sê-pâ), a city of Cuba, capital of the province of Puerto Príncipe, 300 miles southeast of Havana and 25 miles from the Atlantic Ocean. A railroad connects it with Nuevitas, its port on Nuevitas Bay, an inlet from the Atlantic. It is surrounded by a fertile country and yields sugar, tobacco, cereals, and cattle. The features include the post office, the cathedral, the townhall, the railway station, and the ruined military post. Among the manufactures are cigars, clothing, earthenware, and utensils. It has a growing trade and good municipal improvements. Population, 1908, 29,481.

PUFF ADDER, a species of poisonous serpents native to Africa, but most abundant in the regions south of the Equator. It is one of the

most dangerous serpents of Africa. The length is from four to five feet, and it is quite thick in proportion to its length. It is so named because when irritated puffs appear on the upper part of its body. The Bushmen poison their arrows with its venom.

PUFFBALL, the name of any fungus of the genus *lycopodon*, so called from the shape and from its puffing out dark colored dusty spores when the matured plant is broken open. Puffballs grow in roundish form on the ground or on decaying wood, and when immature have a firm and fleshy interior, which later becomes a powdered mass. The spores are borne in cavities in the interior of the globular mass, and, when the surrounding tissues become dried and ruptured, they escape in the form of fine dust. Some species grow without a stem, while others appear at the upper part of a fleshy prominence and often acquire a circumference of several feet. Many are edible and their fumes are used in some countries instead of chloroform for anaesthetic purposes.

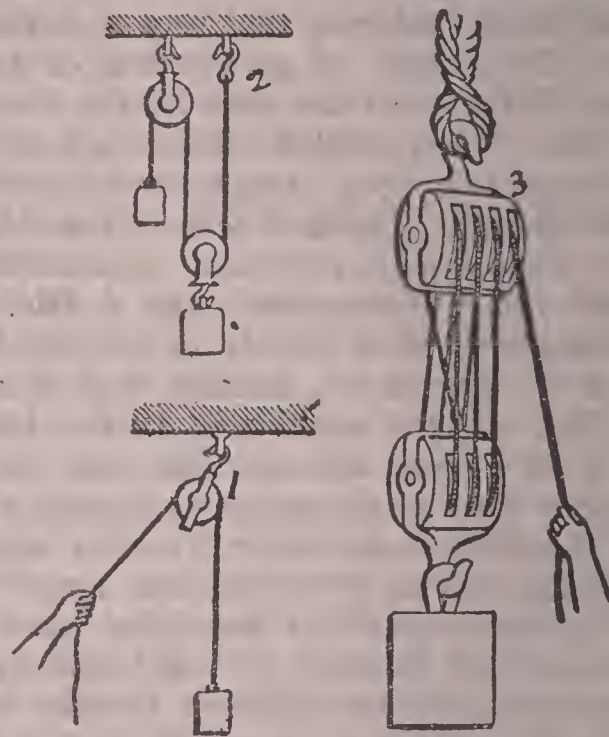
PUFFIN (pūf'fin), a genus of diving birds of the auk family, native to the Arctic and northern temperate regions. The bill is deep and excessively compressed, with naked skin at the outer and back part of the mouth, and the upper mandible extends to the top of the head, both mandibles being transversely grooved. The wings, tail, and legs are short, and, like the auks and penguins, they rest or sit in an upright position. Though able to fly rapidly, they cannot sustain long flights, but have much skill in swimming and diving. The puffins are migratory birds and are seen in large flocks. They feed on fish, insects, and many forms of shell life. The flesh and eggs are alike wholesome for food. Thousands of puffins may be seen in the North Atlantic and Pacific oceans, especially in Kamchatka and the Kurile Islands.

PUG, the name of a small breed of dogs which is grown chiefly for use as a house pet. The nose is short, the forehead is wrinkled, and the hair is short. Most of the full-blooded specimens have a fawn color, while the body is stout and the eyes are large. This breed of dogs seems to have been brought from the East Indies to Holland, whence it was taken to other countries and finally to America.

PUGET SOUND (pū'jēt), an inlet from the Pacific Ocean, on the northwestern coast of Washington, which it separates from the island of Vancouver. It is the southern continuation of the Strait of Juan de Fuca and Admiralty Inlet, has a coast line 280 miles in length, and contains a number of important islands and bays. Ships of the largest size may sail safely

in all parts of the sound, since its shores are high, and deep water extends very near to the land. The surrounding country is fertile and richly timbered, while canal and railroad improvements have greatly enlarged its commercial importance. The principal cities on its shores are Olympia, Tacoma, and Seattle.

PULLEY (pul'ly), one of the six simple machines or mechanical powers. It consists of a grooved wheel mounted in a block and is used



PULLEYS.

to increase power and transmit it, by means of a rope or flexible cord, in a changed direction. The ends of the axis of the wheel are supported by a framework called the *block*, and a groove cut in the edge of the wheel prevents the rope from slipping off when it is put around the pulley. Pulleys may be *fixed* or *movable* as shown in the accompanying figures; the former are those in which the block containing the pulley is fixed, as in figure 1, while the block in the latter class is adjusted to move with the raising or lowering of the rope, as shown in figure 2. There is neither gain nor loss of power with a single fixed pulley; for, as the tension in every part of the rope is the same, if a weight be suspended at one end, an equal weight must be applied at the other end to maintain equilibrium. Hence, the effect of a fixed pulley is simply to give advantage in changing the direction of a force. However, by combining several pulleys in various ways, an instance of which is shown in figure 3, it is possible to gain purchase or mechanical advantage, this depending more or less upon the mode of combination and the number of pulleys utilized.

The advantage of a system of pulleys may be computed by comparing the velocity of the

weight raised with that of the moving power; hence, it may be considered that a single movable pulley gives a mechanical advantage equal to two, or the weight may be said to be twice the power. A single fixed pulley is considered a lever of the first class, a single movable pulley is a lever of the second class, and in combinations the utility of both is more or less exemplified. In theory the advantages are increased as the movable pulleys are multiplied in combination, but advantages that would ordinarily result are to some extent overcome by the friction caused by imperfect flexibility of the ropes. This is due also in part to the friction of the pulley sheave upon its axis, which is now quite largely overcome by making the framework of iron or steel and adjusting the axis so that ball bearings may be utilized. The term *pulley* is variously applied in machinery, particularly to a wheel on which a band or belt runs for changing the direction of motion, or one in which power is transmitted to or from different parts of the machinery.

PULQUE (pul'kâ), a vinous beverage made in many sections of Spanish America, especially in Mexico, by fermenting the juice of several species of the agave. It is milky, resembling thin buttermilk, and has a sour taste and an ill smell to those not accustomed to its use. The maguicy species of agave, also called the *American aloe*, is used mainly, since it contains the greatest amount of sugar, and the pulque is made by fermentation.

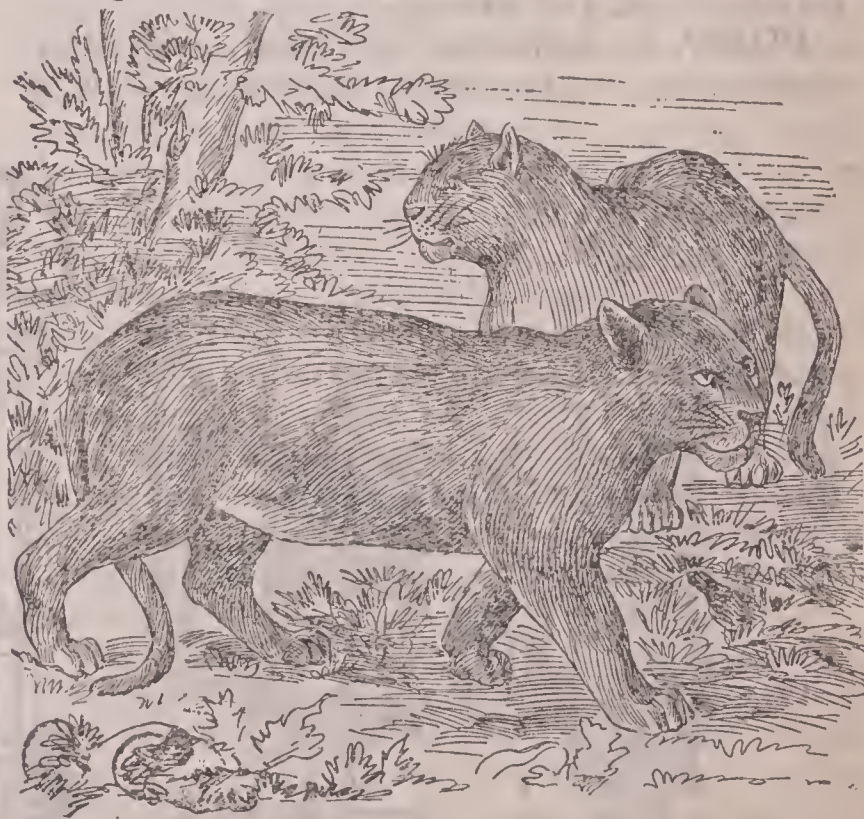
PULSATILLA (pŭl-sâ-tî'lâ), or **Pasque Flower**, a genus of flowering plants native to Europe. The species are perennial, have bell-shaped flowers of a bluish color, and bear long, feathery awns on the fruit. The plants are narcotic and acrid. They yield a preparation known as *pulsatilla*, a medicine used in catarrhal inflammation, bronchitis, and other ailments. The flowers yield a bluish-purple coloring matter used quite largely in preparing Easter eggs.

PULSE, the beating of the arteries, due to the passage of the blood waves caused by the successive contractions of the heart. It is noticeable, more or less, in many parts of the body in the state of poor health, but during health it is present only in the arteries, and may be felt by placing a finger lightly upon an artery running over a bone, as the radial at the wrist, or the temporal in front of the ear. The pulse varies at different ages and under different conditions. At birth the number of beats is about forty per minute; at the end of the first year, 120; at the end of the second, 110; during middle life, between 70 and 80; and in old

age, usually a little more. Males have from five to eight beats less than females. The pulsations are more numerous during excitement or exertion, but they are noticeably diminished while reclining or sleeping. The force and rate of pulsations are taken as an indication of the condition of health, but they cannot be considered reliable symptoms of a particular disease without considering other conditions. In some diseases, particularly those affecting the heart, it is not infrequent for the pulse to beat as low as 25 pulsations per minute, while in fevers and other ailments they sometimes reach 200. In diseases of the brain or organic affections of the heart, it is quite common to notice much irregularity of the pulse, though it is natural to some persons to have irregular pulsations. An irregular pulse is due either to the motions of the artery being unequal in number and force, a few beats being from time to time more feeble than the rest, or to a pulsation being left out entirely, thus causing intermission of the pulse from time to time.

PULTOWA. See **Poltava**.

PUMA (pŭ'mâ), or **Cougar**, an American carnivorous mammal, ranging from Canada to Patagonia. It has a reddish-tawny color above



PUMA.

and paler shades beneath. The adult is about three feet high and four feet long, measured from the nose to the tip of the tail. The puma is an expert climber, but is not confined to the timber districts. It is seen frequently among shrubs along the banks of rivers and on the open prairies and pampas. Its habits are much like those of the leopard, killing many more of the animals upon which it preys when con-

venient than it is able to devour, either for the sake of securing warm blood or gratifying an instinct to destroy. Pumas prey on cattle, sheep, swine, and other domestic or wild animals, but rarely attack man. When pursued they seek safety by ascending lofty trees. The name *cougar* was first applied by the French, while the Spaniards still call it *leon*, and hunters of the United States know it generally as *panther*. The puma may be domesticated with little difficulty.

PUMICE (pūm'is), a light mineral substance of volcanic origin, formed under the action of bubbles of steam or gas which accompany lava during a liquid state. It is highly porous and may be said to be a spongy, frothlike lava. Pumice is found principally in the vicinity of volcanoes, whence it was ejected, and its color is whitish or gray, though there are slate-blue and reddish tints. Its numerous pores render it so light that it floats readily on the surface of water, sinking only after being thoroughly saturated. Pumice is obtained largely from Iceland, the Lipari Islands, at Andernach on the Rhine, and the volcanic regions in America. It is of value in polishing ivory, wood, leather, marble, bone, and metals.

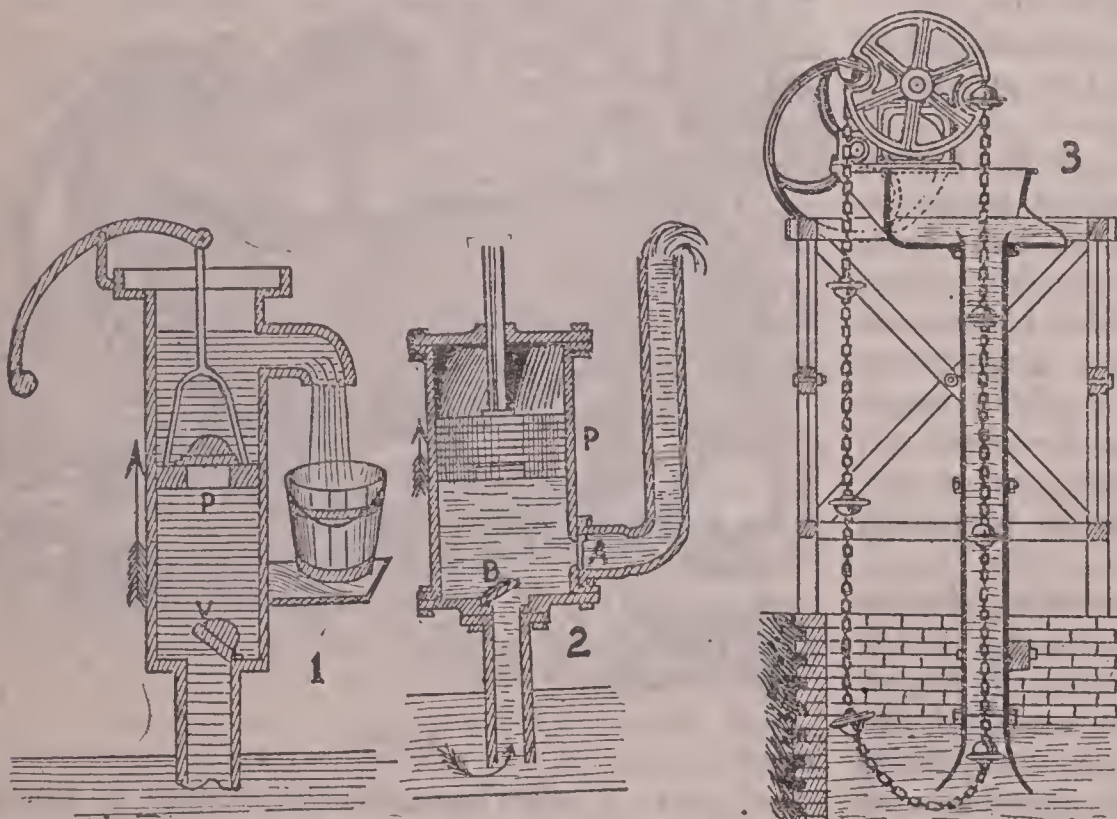
PUMP, an apparatus for raising, exhausting, compressing, or circulating a fluid by drawing

lifting pump, the force pump, and the centrifugal or rotary pump. The *suction pump* is the most common of these four classes and is in general use for household purposes. It has a piston that works air-tight within a hollow cylinder or barrel, which is moved up and down by a handle connected to the piston rod, and has a valve (*P*) opening upward, as is shown in figure 1. Another valve (*V*) opening upward is at the bottom of the barrel, and, as the piston is raised, a vacuum is left below it in the pump barrel, into which the water of the well is forced by the pressure of the air. As the piston descends the valve at the bottom of the barrel closes and the valve in the piston opens, thus making a passage for the water above the piston. By successive movements of the piston the water reaches the mouth of the pump and escapes.

The suction pump and the force pump cannot exceed about 35 feet, since a column of water of that height exerts a pressure equal to that of the atmosphere, though in practice pumps seldom raise water higher than 28 feet from the lower valve to the level of the well. The *lift pump* is not limited in this way, since in this class of pumps the tube is placed a considerable depth into the well, and the piston is near the bottom of the pump tube. In the piston is a valve opening upward, thus allowing the water in the well to pass through it, and when the piston is drawn up its valve closes, while the valve near the mouth of the pump allows the water to pass through it, but when the piston descends it closes and does not permit the water to return. Thus, by a succession of movements, the water may be lifted from any depth, but the weight of the water makes it quite laborious to operate a lifting pump from great depths.

The *force pump* is used to force water into the higher stories of buildings, into stand-pipes or reservoirs of city waterworks, and to throw water over gardens or burning buildings. It has a solid piston that works air-tight in a tube

or box (*P*) at the top of the pump barrel, and, as it is moved upward, the water rushes into a vacuum beneath it. When the piston or plunger moves downward, the lower valve (*B*) closes, while the valve (*A*) in the side pipe opens be-



PUMPS.

1, Suction Pump; 2, Force Pump; 3, Chain Pump.

or pressing it through pipes or apertures. Many varieties of pumps have been invented, differing more or less in construction according to the purposes for which each is intended. The most important are the suction pump, the

fore the water that is forced outward by a pressure equal to the downward pressure of the piston. Force pumps are made also with double action, thus causing a continuous stream to flow from the mouth of the pump. The *chain pump* is used successfully where the supply of water near the surface is abundant. It consists of an endless chain passing over two fan-shaped wheels, one at the bottom of the well and the other at the surface. As the chain is put in motion by a crank the cups passing upward through a pipe carry the water to the mouth of the pump. *Centrifugal*, or *rotary*, pumps are capable of lifting large quantities of water at short distances, and consist of a fan-shaped wheel that is rotated rapidly in a casing. The wheel is connected with the water by a pipe, and the rapid movement causes the water to flow by means of centrifugal action.

PUMPKIN (pŭmp'kĭn), a trailing plant of the gourd family native to India, but now naturalized and cultivated in practically all countries. The leaves are heart-shaped, the flowers are large with yellow petals, and the vine often grows to a length of ten to twenty feet. Many species of pumpkin are grown, the fruit ranging in size from a few inches to two feet in diameter. The seeds are situated in rows within the fruit. They are small, white, and flat, and yield valuable medical properties useful in cases of tapeworm. Pumpkins are cultivated extensively in many localities of North America for domestic food and as food for cattle. The fruit is yellow or reddish. It is used in making pies and butter and is eaten when baked.

PUNCH, a tool for indenting or perforating sheets or plates of various materials, such as iron and steel, and for driving out or in an object inserted in a hole. It is usually made of steel and its shape depends upon the uses for which it is intended. Punches for cutting steel pens, buttons, jewelry, and other similar articles are hollow and sharp-edged, while those for stamping dies, perforating, and driving objects into or out of metallic plates are solid. The name *punch* is applied to an alcoholic beverage made of wine and spirits. It is sweetened and flavored with orange or lemon, and commonly diluted with water. The *London Punch* is a weekly magazine devoted to comic, satirical, and humorous literature. It was founded in 1841 by Mark Lemon and Henry Mayhew, and is now as important in the publication of comic sketches in prose, verse, and caricature as is the *Puck* in America or the *Kladderadatsch* in Germany.

PUNCH AND JUDY, or *Punchinello*, in

Italian *Pulcinella*, a popular puppet show of Italian design. Its origin is ascribed to Silvio Fiorello, a comedian who flourished about the middle of the 17th century. The principal figures are Punch and Judy, two cleverly contrived puppets worked by a person within a box, while a second person stands on the outside to keep up the dialogue, which is carried on with the person inside, though it is represented that the figures do the talking. Punch and Judy represent various scenes in domestic and public life, though generally a man and his scolding wife, the latter being carried off by a policeman or demon as the closing scene.

PUNCTUATION (pŭnk-tŭ-ā'shŭn), the art of dividing written discourse into sections by means of points for the purpose of marking the grammatical connection and dependence, and making the sense more obvious to the eye. In ancient writing words run together successively without break or pause, though in the later specimens points are used for oratorical purposes. Aristophanes, the Greek grammarian of Alexandria, invented a system of punctuation, but this was forgotten to such an extent that Charlemagne employed several scholars to restore it. Aldus Manutius, a printer of Venice, Italy, in the latter part of the 15th century invented the main features of the modern system of punctuation. As there is no arbitrary punctuation, it is necessary to exercise good judgment and taste for the purpose of avoiding defects, ambiguity, or confusion in the construction of a sentence. A sentence unpointed and unspaced in the manner of the ancients is difficult to read, and at first sight appears to be written in an unknown tongue. The following is an example of the two methods, one written solid, and the other properly spaced and punctuated: Readingmakethafulmanconferenceareadymanwritinganexactman. Reading maketh a full man; conference, a ready man; writing, an exact man.

The chief use of punctuation is to divide discourse into sentences, and these again into parts, in a manner so as to show the relation of the several parts to each other. It is based largely on grammatical analysis, requiring accurate discrimination. A change in the punctuation of a sentence generally produces a change in the meaning. This is nicely illustrated by an incident connected with the proceedings of the English House of Commons, where a member was required to publicly apologize for calling another a liar. This he did, while standing in the presence of the body, in these words: "I said he was a liar, it is true; and I am sorry for it." The apology was generally accepted as satis-

factory, but a London newspaper gave it a different meaning by publishing it in this manner: "I said he was a liar; it is true, and I am sorry for it." Another example of the necessity of care in punctuation is the following:

John Keys, the lawyer, says he is guilty.
 John, Keys the lawyer says he is guilty.
 John Keys, the lawyer says he is guilty.
 "John Keys the lawyer," says he, "is guilty."

The principal European languages employ six chief points in punctuation. These include the *period* (.), placed after every declarative or imperative sentence and after every abbreviated word; the *comma* (,), employed to denote the least degree of separation, and for separating the members of a compound sentence and dependent clauses; the *semicolon* (;), used to separate parts of sentences less closely connected than those separated by commas; the *colon* (:), employed to separate parts of sentences less closely connected than those separated by the semicolon; the *interrogation point* (?), used to show that a question is asked; and the *exclamation point* (!), used to indicate some emotion.

Many miscellaneous marks are used for different purposes in writing. These include the *dash* (—), employed to indicate an omission, a sudden pause, a sudden or abrupt change in the construction of a sentence, and sometimes to add effect to other marks; the *parentheses* (), used to inclose words that break the unity of the sentence; the *brackets* [], employed to inclose some word or words necessary to explain or correct an error; the *quotation marks* (""), used to inclose quotations from the language of another person; and the *apostrophe* ('), employed to indicate the omission of a letter. The *section* (§) denotes the small divisions of a book or chapter, the *ellipsis* (****) indicates the omission of words, and the *caret* (^) is used to show that something has been omitted. Various marks are employed to refer to marginal notes, such as the *asterisk* (*), the *dagger* (†), the *double dagger* (‡), the *section* (§), the *paragraph* (¶), and the *parallel* (||). The *index* (☞) is used to designate some important statement or sentence, and *dots* (.....) indicate that words have been omitted from a quotation.

PUNIC WARS (pū'nīk), the name of three great wars between the Romans and the Carthaginians. The First Punic War was a contest for the possession of Sicily. It covered a period of 23 years, from 264 to 241 B. C., and was finally won by the Romans. Hannibal instigated the Second Punic War to capture Saguntum and other territory. It began with the great invasion of Italy in 218 and ended by the

Roman victory at Zama in 202 B. C., lasting a period of 16 years. The Romans undertook the Third Punic War with the intention of destroying Carthage and thus humiliate its rival. This war lasted three years, from 149 to 146 B. C. Although Carthage made a most heroic defense, it was utterly destroyed never to rise again.

PUNJAB (pūn-jāb'), or **Panjab**, the most northerly province of India, so called because the region is drained by the five tributaries of the Indus—the Ravi, Beas, Sutlej, Chenab, and Jhelum rivers, the word Punjab meaning *five rivers*. The province is somewhat larger than the Punjab proper. It lies immediately east of Afghanistan and Beluchistan, south of Cashmire, west of the Northwest Provinces, and north of Rajputana and Sind. It has a total area of 110,675 square miles. Ranges of the Himalayas traverse the northern part, but in the southern portion the surface is either level or undulating and consists of a great alluvial plain. Extensive deposits of rock salt and alum beds abound, and there is an abundance of limestone for building purposes. The principal products are tobacco, wheat, barley, opium, rice, cotton, sugar cane, maize, indigo, tea, and flax. Valuable forests are abundant, but there is a scarcity of rainfall in some sections, making it necessary to irrigate from wells and reservoirs in a portion of the region. Lahore, the capital, is situated in the center of the province. Other cities are Delhi and Amritsar. Manufacturing enterprises are successfully carried on in the cities. It has extensive interests in rearing live stock, including camels, cattle, sheep, and goats. The people are mostly Mohammedans. Population, 1908, 22,346,108.

PURDUE UNIVERSITY, a coeducational State institution at Lafayette, Ind., established in 1869 and so named from John Purdue. It embraces departments of civil engineering, agriculture, science, pharmacy, electrical engineering, and mechanical engineering. Admission is upon examination or a certificate from a commission school. Students are required to do shop and field work in addition to pursuing the usual branches of study. It has a campus and a farm of ninety acres, a library of 15,000 volumes, and property valued at \$850,000. The average attendance is about 1,350 students.

PURGATORY (pūr'gā-tō-rĭ), a place of purgation or punishment in which Roman Catholics believe the souls of the just expiate the offenses committed in this life. They think that every sin, no matter how slight, deserves and will receive punishment either before or after death. While the guilt of sin and the eternal punishment due to grave offenses are

removed by the absolution of a priest in the sacrament of penitence, the temporal penalty which has to be undergone as a satisfaction of God's justice yet remains. Purgatory is a middle state for such as do not deserve hell and are yet not sufficiently pure to enter heaven. While in purgatory the souls are believed to receive relief from suffering through the prayers of the living. The Greek Church admonishes its members to pray for the dead, but does not believe in purgatory, and the doctrine is wholly rejected by the Protestants.

PURITANS (pū'rī-tānz), the name first applied in England, in 1564, to a class of Protestant members of the Church of England who desired to purge more completely the Roman Catholic ceremonies from the practice of the church. The liturgy and discipline arranged by Archbishop Parker still retained certain features of the Roman Church, which the Puritans wished to eradicate without destroying the existing establishment. They differed from the Separatists, or Independents, in that the latter preferred to abandon the established church. Among the Separatists were the Pilgrim Fathers who came to Massachusetts. Later the Puritans became either Presbyterians or Independents, both in England and the new settlements of America, and their spirit was one of severe moral earnestness, united with a Calvinistic theology.

The spirit of Puritanism exercised a marked influence on the policy of England in the reign of James I. and Charles I., both making vigorous efforts to exterminate it, but its power grew even more important when Laud and Charles sought to abridge the national liberties of the people. Cromwell was the recognized representative of the Puritans, and his triumph was made possible by the devoted efforts of Puritans in the Parliament and in the army. Many Puritans emigrated to America after the return of episcopacy with the restoration of 1660 and the Act of Uniformity of 1662. They are the founders of the New England states. The opposition to amusements grew into a spirit of persecution, but it began to relax at the beginning of the 18th century. Puritanism was the most rigid in New Haven and Massachusetts and exercised a molding influence in Connecticut, Rhode Island, New Jersey, Maryland, and South Carolina.

PUT-IN-BAY, a village and summer resort of Ohio, on South Bass Island, in Lake Erie, forming a part of Ottawa County. It is forty miles east of Toledo, with which it has communication by steamboats. On Sept. 10, 1813, Commodore Perry won a victory over the Eng-

lish under Captain Barclay, the seat of battle being about twelve miles northwest of this place. It is visited during the summer by many tourists and has many fine hotels. Population, 1900, 317.

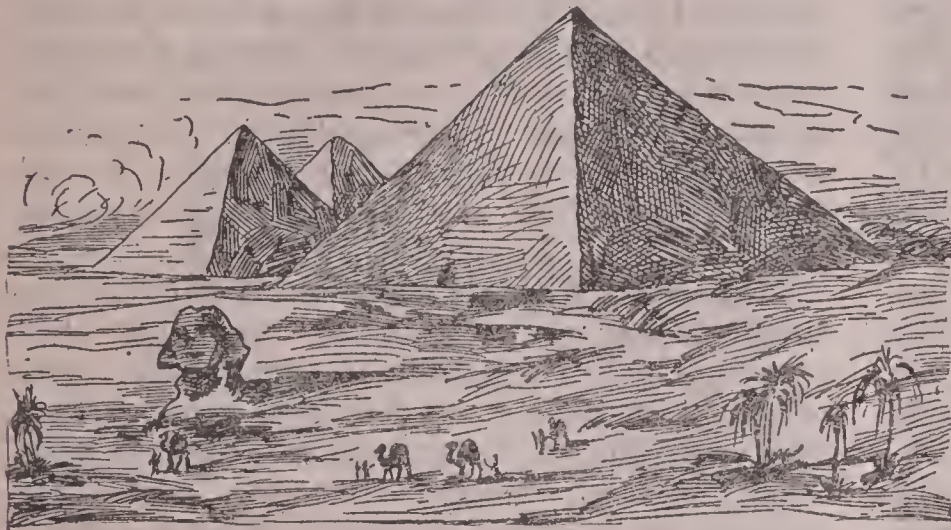
PUTNAM (pūt'nām), a city in Connecticut, one of the county seats of Windham County, on the Quinebaug River, 25 miles south of Worcester, Mass. It is on the New York, New Haven and Hartford Railroad and is surrounded by an agricultural region. Cargill Falls are in the vicinity. The chief buildings include the public library, the high school, and the Day Kimball Hospital. Putnam has a large trade in lumber and lumber products. Among the manufactures are cotton textiles, woolen and silk goods, boots and shoes, cutlery, machinery, steam heaters, carriages, and trunks. It was settled about 1855 and received a charter as a city in 1895. Population, 1910, 6,637.

PUTREFACTION (pū-trē-fāk'shūn), the decomposition of animal or vegetable substances, which is generally accompanied by fetid odors. It is now regarded as a kind of fermentation due to the growth of minute plants called *bacteria*, which enter the putrescible bodies—that is, those decomposing at a certain temperature in contact with air and moisture—in which they grow and multiply. Great numbers of spores of bacteria and kindred organisms are present in the air and water, but they develop most rapidly by the free contact of humid air at a temperature ranging from 60° to 30°. Putrefying animal matters give off more unpleasant gases than vegetable matters for the reason that nitrogen is more abundant in the former. Organic bodies of a higher order are changed in the process of putrefaction into lower organic compounds, but also into such inorganic compounds as ammonia and sulphuretted hydrogen, and into such substances as nitrogen and hydrogen. Putrefaction may be arrested or prevented under various conditions, such as keeping the substance perfectly dry, by the use of antiseptics, by keeping the substance in a temperature near the freezing point, by keeping it in a vacuum, or in a vessel containing air deprived of all organic germs, and by heating to the boiling point and then sealing to keep out all atmospheric air.

PYGMIES (pig'miz), the persons of very small size, or the tribes of people which are much smaller in stature than the average of mankind. The most notable races of pigmies include the Akka, Batwa, and Obongo tribes of Central Africa. Other similar tribes include the Andamanese and Kalangs in Malaysia. These peoples have a usual height of about four

and one-half feet and lead chiefly a pastoral life. Pygmies are spoken of in the fables and legends of Greece, and Homer mentions the attacks of cranes upon them on the coast of Oceanus. Many of the stories regarding pygmies have been regarded fabulous, though they are mentioned by Aristotle as existing near the sources of the Nile. This fact was verified by the German explorer, Schweinfurth, while traveling in Central Africa from 1868 to 1871. See **Dwarfs**.

PYRAMID (pīr'ā-mīd), an architectural structure of solid masonry, built for various



PYRAMIDS AT GIZEH, EGYPT.

purposes in different parts of the world. The most remarkable pyramids are those of Egypt, situated in a group at Gizeh, near Cairo. This group begins at a point nearly opposite Cairo, on the border of the Libyan Desert, and extends southward about 25 miles. They consist of colossal masonry, rising from a rectangular base, and terminating in a point so as to form four triangular sides. The principal material used in their construction is a durable limestone quarried from the hills near by, though there are great slabs and blocks of granite placed on the outside to increase durability, which were evidently taken from quarries at great distances from the location of the pyramids. It is supposed that these structures date from a period between 3000 B. C. and 2300 B. C., and that they were designed mainly as sepulchral chambers of the kings. The most remarkable group consists of nine pyramids about four miles southwest of Cairo, where stood the ancient city of Memphis.

The Great Pyramid belongs to this group and was reared above the tomb of Cheops, the second king of the fourth dynasty. It was originally 481 feet high and 756 feet square at the base, and is counted one of the Seven Wonders of the world. Some of the stones are of remarkable size, and it has long been a subject

for speculation as to how the ancients were able to provide mechanical power sufficient to quarry, transport, and elevate them to their proper places. Herodotus, the Greek historian, estimated that it required 100,000 men for a period of ten years to construct a causeway for the transportation of the stone from the quarries for this single pyramid, and that the labor of the same number of men was required for twenty years to complete the structure. The apex of this pyramid was once quite sharp, but now a flat about three yards square exists at the upper part. It has suffered from removal of a part of the material to construct mosques and temples at Cairo, but still covers thirteen acres and is 451 feet high. A series of steps averaging about three feet in height are at the outer surface, though these were originally hidden by a coating. In the interior are several chambers ornamented with red granite. They may be entered only through an opening on the north side, about fifty feet above the base. Some writers think that this pyramid was built as an astronomical observatory, since the ratio of its height to the perimeter of its base is as nearly as possible that of the diameter of the circle to its circumference, and there are other structural peculiarities in support of this view.

The Gizeh pyramid of second importance is one built by Chafra, third king of the fourth dynasty. It covers about ten acres, has a base 700 feet square, and is 448 feet high. In this pyramid are two sepulchral chambers that were opened in 1816, and, though once incased and ornamented with polished stones, only a portion of the casing remains. The third pyramid of this group was built by Menkaura, fourth king of the fourth dynasty, and is 354 feet square at the base and 212 feet high. It is the best constructed of the three greater pyramids, and still displays the best evidences of former beauty. The other six pyramids of the Gizeh group are smaller and of less interest. Another noted pyramid is about five miles northwest of Gizeh, at the village of Abou Roash. Several groups are in Nubia, probably built by the kings of ancient Ethiopia. Pyramids of considerable importance are situated in various parts of Assyria, China, India, Greece, and Italy.

The pyramids of Mexico have come down from the time of the Aztecs and rise as four-sided structures. The most important group still existing is at Teotihuacan, twenty miles northeast of the city of Mexico. It includes several hundred structures, but only two of importance. The largest has a base 900 feet

square, with a height of 160 feet, while the second is 130 feet high. The most noted of Mexico is that of Cholula, having a length of 1,585 feet and a height of 178 feet. The Mexican pyramids are inferior to those of Egypt and are less remarkable and durable in structure, but all are uniform in facing the cardinal points.

PYRENEES (pīr'ē-nēz), the lofty mountain range which separates France from Spain, extending from the Atlantic to the Mediterranean. The mountain range consists of two parallel chains, about 20 miles apart. Its length from the Bay of Biscay to the Gulf of Lyons is 275 miles, and its width is from 25 to 75 miles. Toward the center, nearly midway between the Atlantic and the Mediterranean, are the highest peaks, Mount Maladetta, 11,424 feet, being the culminating point. Only a few passes suitable for wagoning occur in the Pyrenees, but in 1885 two railway lines were authorized by France and Spain to penetrate the mountains, partly at the expense of each government. These railways are located near the extreme ends of the chains and are in successful operation. The Pyrenees slope most abruptly toward the south, but there are fine springs and health resorts in both countries, and the climate is delightful.

PYRITES (pī-rī'tēz), the name of any one of the native metallic sulphides that occur in rocks of all ages. Formerly the name was applied only to sulphuret of iron, but now the term has a general application, and the various groups are designated as iron pyrites, copper pyrites, cobalt pyrites, etc. The pyrites consist of metals compounded with sulphur or arsenic, or with both. The color is yellowish and the consistency is crystalline and hard. Sulphuric acid is derived from iron pyrites; cobalt, from cobalt pyrites; and copper, from copper pyrites. Nickel pyrites has a copper-red color and yields nickel and arsenic.

PYROMETER (pī-rōm'ē-tēr), an instrument for the measurement of high temperatures, ranging greatly above the ordinary thermometers. The first instruments of this kind were based upon the principle that metals expand when subjected to heat, but they proved of comparatively little value for the reason the expansion does not increase proportionally with the rise of temperature. Later graphite was substituted for the platinum rod that was used, and with it a very high temperature may be measured with considerable accuracy. The most accurate instrument is the *air thermometer*, which is made by placing a column of mercury above a bulk of air in a metallic tube.

Since the air expands as the temperature rises, the mercury is carried upward in the tube, and the temperature is indicated by the expansion of the air.

PYROTECHNY (pīr'ō-tēk-nŷ), the art of making and using fireworks. It is of great antiquity and was practiced among the Chinese with much skill before the art became known in other countries. While the Romans used candles, small rockets, and other similar articles, the Chinese developed a system of most brilliant mechanical arrangements, such as movable figures and devices, including those from which the figures of men and animals dart to surprise the company. Many of the forms and devices used in Europe at present are of Chinese manufacture or patterned after their productions. The manufacture of fireworks has grown to considerable importance in the United States, but notable importations are still made from China and Japan. See **Fireworks**.

PYROXENE (pīr'ōks-ēn), or **Augite**, a mineral of numerous varieties, composed of calcium, magnesium, and a small quantity of iron or zinc. Other minerals that enter the composition include lime, manganese, soda, and silicic acid. Minerals of this class are found in limestone and other rocks in which they are crystallized. Many igneous or eruptive rocks contain pyroxene.

PYTHIAN GAMES (pīth'i-an), one of the four great national festivals of Greece, celebrated every fifth year in honor of Apollo, at Delphi. It is said that they were instituted by Apollo after he had overcome the dragon Python, and until 586 B. C. they took place every eighth year, but at that time they came under the direction of the Amphictyons, who instituted their celebration every fifth year. They consisted of athletic sports, flute playing, and chariot and horse racing. Later contests in sculpture, painting, tragedy, and historical recitations were added. Prizes of gold and silver were awarded in the early history of the games, but afterward the laurel wreath and the palm branch were substituted. These games were in importance next to the Olympic games and continued to be played until about 394 A. D.

PYTHON (pī'thōn), a genus of snakes native to the tropical regions of Africa and Asia, closely allied to the boa. They differ from the boa mainly in having double plates under the tail, teeth in the intermaxillary bone, and pits in the shields around the margins of the upper and lower jaws. Pythons attain a length of from fifteen to thirty feet and crush their prey in their coils. The tail is prehensile, with which they suspend themselves from the branch-

es of trees near places where animals come to drink, and take them unawares by casting their coils about the neck and body. They are capable of strangling deer, tigers, buffaloes, and other animals. The two most important species are the *rock snake* of the East Indies and the *Natal rock snake* of Africa. Allied but smaller species are found in Australia and the Malay peninsula. The female python lays its eggs in a nest near a body or stream of water and hatches them by the heat of the body.

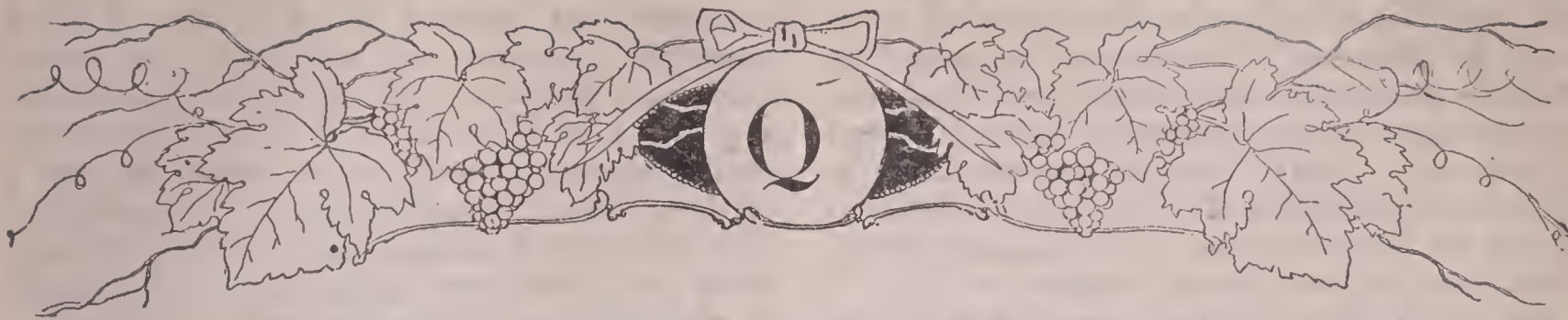
PYTHON, in mythology, a great serpent that came from the slime of Deucalion's Flood. It lived in the cave of Mount Parnassus, which no one approached without being killed. Apollo finally killed it with his golden darts. It is supposed that the python represented the unhealthy pools and marshes, while Apollo, the sun, dried up these swamps with his rays. The slayer of the python is represented by the statue of Apollo Belvedere.

PYX (pĭks), the vessel used in the Roman Catholic Church to contain the consecrated water that remains after service. It is shaped like a cup and is closed with a cover of the same material. The interior is either of pure

gold or is plated with gold. Formerly the pyx was made in the form of a dove and hung suspended over the altar.

The name pyx is applied to a strong box used in the mint to deposit specimens of the coinage. The coins kept in the pyx are examined by a commission of experts for the purpose of testing their accuracy as to weight and fineness. In Great Britain at least one examination is made every year by a jury of goldsmiths, and this examination is called the *trial of the pyx*. A similar examination is made in February at the mint in Philadelphia. It takes place before the judge of the district court of the United States for the eastern district of Pennsylvania, the assayer of the New York assay office, the comptroller of the currency, and other persons appointed by the President.

PYXIE (pĭks'ĭ), a small shrub native to North America, found in the region from Maine to North Carolina. It is a creeping or trailing plant and thrives best in a moist and sandy soil. The flowers are pink and white and appear early in spring. The plants grow wild, but they yield choicer flowers under cultivation.



Q

QUADRUPLE ALLIANCE

Q, the thirteenth consonant and seventeenth letter of the English alphabet. It has only one sound, that of *k* or hard *c*, and is always followed by *u*. It is used mostly as an initial letter of a word and never as the final letter. Since its office could be filled by *kw* or *k*, it is superfluous in English. The Anglo-Saxons did not use it, its sound being expressed by *ew* or *cu*, but later adopted it from the Latin-French. It is so named from the French word *queue*, meaning *tail*, its form being an *O* with a tail attached.

QUADRANT (kwöd'rānt), in astronomy, an instrument for measuring altitudes, so named because of its being graduated on a scale of 90°, the quarter of a circle. It consists of a graduated arc of 90°, with a movable radius for measuring angles on it, and has been largely superseded by the mural circle and the meridian circle. However, it is still used to some extent on shipboard to measure the altitude of the sun, but there it is giving place to the *sex-tant*, an instrument quite similar in principle and application. The quadrant is giving way to the other instruments named because it is less adapted than they are to secure reasonable exactness of the whole arc.

QUADRIGA (kwöd-rī'gā), the name of a Roman car or chariot drawn by four horses abreast. It came into use during the Olympian games of Greece, but was later adopted by the Romans for races and performances in the circus.

QUADRILATERAL (kwöd-rī-lăt'ēr-əl), in military science, a combination of four fortresses, so situated that each may effectually support the others in case of an attack. Fortresses located in this manner make it necessary that an enemy employ a large army to attack successfully the combined position. The most remarkable quadrilateral is situated in the northern part of Italy and includes the four fort-

resses of Legnago, Mantua, Peschiera, and Verona. These form a powerful barrier in the northern plain of the Po River. They were important in the wars between Austria and Italy and when that section was invaded by Napoleon III. in 1859. The Polish quadrilateral is a similar combination of four defensive forts maintained by Russia in Poland.

QUADRILLE (kwā-drīl'), in French, *square*, the name of a dance of French origin, so called because the dancers are arranged into squares, each consisting of four couples. It originated in the 18th century and is in extensive use in Europe and America. The movements are consecutive, generally five in number, and are directed by a caller and accompanied by music.

QUADRUMANA (kwöd-ru'mā-nā), the name of a division of mammals which include the apes, monkeys, and lemurs, so called from their having a grasping hand on each of the four extremities. In this respect they are distinguished from the *Bimana*, or the human races, in which only the fore limbs have hands. However, they are usually classed with the true quadrupeds. They are almost exclusively confined to the tropical regions and feed principally on vegetable food in a state of nature. While the chimpanzee and gorilla approach the human types of organization, the lemurs and others seem to form an immediate place between the bats and the carnivora.

QUADRUPLE ALLIANCE (kwöd'ru-p'l), the name applied to several alliances formed by various European states with a view of counteracting political tendencies or promoting compliance with recognized treaties. The triple alliance contracted by Austria, France, and England, in 1718, was converted into a quadruple alliance the following year by Holland joining the contracting parties. It was occasioned by Spain seizing Sardinia, in 1717, and Sicily, in

1718, contrary to the terms of the Peace of Utrecht, and because Alberoni, the ambitious minister of the Spanish king, planned to acquire the throne of France for Spain and to influence the accession of the house of Hanover in England. Spain was compelled to abandon all these designs after a prolonged conflict of arms. The quadruple alliance formed by Prussia, Austria, Russia, and England, in 1814, was occasioned by the ambition of Napoleon I., and was one of the causes of the dissolution of the French Empire.

QUAESTOR (kwēs'tör), the title of certain magistrates of ancient Rome, whose offices were established in the early period of the Roman kingdom. The duties pertaining to the office included management of the public treasury, the receipt of tribute and taxes, and the payment of moneys on account of public service. Patricians were at first the only persons eligible to the office, but in 421 B. C. the number was increased from two to four, and the plebeians became eligible to service. With the annexation of acquired territory the duties of the quaestors were multiplied, and the number was increased accordingly. At the beginning of the First Punic War eight quaestors were provided for, and these were increased to twenty by Sulla and to forty by Julius Caesar.

QUAGGA (kwäg'gä), an animal of the horse genus, native to South Africa, but now extinct or assimilated with the zebra. This class of

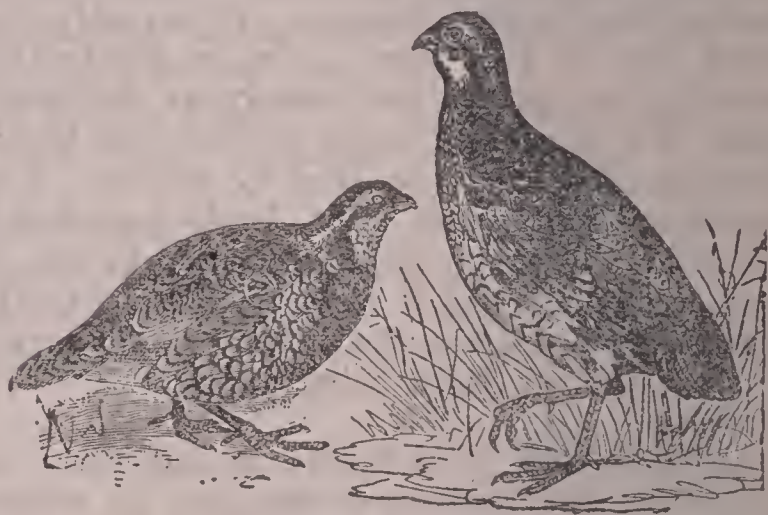


QUAGGA.

animals differed from the zebra in being stronger and heavier and in having no stripes on the limbs, though the head and neck closely resembled those of the zebra. The color was a dark reddish-brown on the upper parts, with white bands on the head and neck, and a black line running along the spine. They had no warts on the hind legs, the mane was short and upright, and at the shoulders they were about

four feet high. The lower parts of the body were white, but there were bars of a brown or black tinge at the upper parts of the legs. They were so named from the voice, which somewhat resembled the bark of a dog. They did not generally associate with the zebra, but, since they were gregarious in habits, the remaining numbers joined the herds of zebras. Formerly many quaggas roamed on the plains of South Africa. They became extinct on account of their skins being valuable in the manufacture of boots and shoes, for which they were hunted by the Boers and other European settlers.

QUAIL, a class of birds of the partridge family, differing from other partridges mainly in being smaller and having longer wings and



COMMON QUAIL.

a shorter tail. They are capable of enduring flight more successfully than the grouse. The average length of the body is about seven inches, but they differ greatly in size, ranging from the large species of Europe to the small quails, about four inches in length, found in China. Twelve American species have been described, the best known being the common quail, which is sometimes called *bobwhite*. The latter name is applied because of its call note. It is mainly reddish-brown in color, with mottled markings of a darker hue, and is about ten inches long. Its claws are acute and slightly curved. Another American species, the *California quail*, is found mostly in Mexico and the southwestern part of the United States. It is known for its crest of a few feathers. The common quail of Europe is migratory, but those of North America do not migrate. Quails feed on grain, seeds, and insects. The young brood is guarded carefully by the mother, though in habit quails are somewhat quarrelsome among themselves. The female builds a nest in the ground, where from eight to fifteen eggs are laid. They never perch in trees, but rest on the ground at night and seek shelter in the winter by gathering in packs under shrubs,

grasses, and vines. The flesh is considered a great delicacy on account of its fine flavor and tender qualities. In many states quails are protected from extermination by statutory law.

QUAKERS (kwāk'ērz), or **Society of Friends**, a Protestant sect founded in England by George Fox in 1648. The founder was a man of zealous devotion and pure life, and, after preaching for some years in churches and public places, gathered about him a large number of preachers, who assisted in promulgating his doctrines. Many persecutions were perpetrated upon him and his devoted followers, and some were even transported to penal colonies by the authorities, but through persevering efforts the doctrines secured a strong foothold in Great Britain and America. At first no particular organization and discipline were adhered to, but such scholarly and learned men as William Penn and Robert Barclay not only stimulated organization, but took an important part in their colonization in the New World, especially in Pennsylvania and New Jersey. The Quakers have not been particularly numerous, either in Europe or America, but their purity of life and firm and uncompromising position on various important questions have given them a wholesome influence in public affairs.

Among the doctrinal tenets of the Quakers is the view that the spirit of God is revealed immediately to each soul, a doctrine founded chiefly on passages in the first chapter of the gospel of Saint John, where the Word is spoken of as the life and light of man, and as "the true Light, which lighteth every man that cometh into the world." Thus, it is held that this light comes both to the heathen and the Christian, and manifests the love and grace of God toward all mankind. They deny the necessity of the practice of the sacraments of baptism and the Lord's supper; maintain no stated ministry, holding that the form of worship in which a person waits in silence and patience upon God is best; and practice remarkable simplicity in their dress, speech, household furniture, marriages, and funerals. Much stress is laid upon earnestness and honesty, holding their members duty bound to pay their debts in full, even after having been released from legal payment by bankruptcy or the statutes of limitation. In the main they agree with other sects in the doctrines of Christianity, holding the Scripture as proceeding from the spirit of God and believing in the Father, Son, and Holy Spirit. They accept the atonement of Christ and believe in sanctification by the spirit. The Quakers have been consistent in supporting every form of temperance and in opposing slavery and war.

At present there are four principal divisions of Quakers, known as Orthodox, Hicksite, Wilburite, and Primitive Friends. The *Orthodox Friends* represent the original organization and are the most numerous. At present they have 840 churches, 1,290 ministers, and 95,000 church members, distributed more or less over the United States, but numerically strongest in Indiana, Iowa, Kansas, and Ohio. The *Hicksite Friends* comprise a division organized in 1827 by Elias Hicks, who held that all the Scriptures are not inspired and denied the spiritual conception and divinity of Christ. Fully one-half of the American Quakers followed his leadership and at present the division includes 115 ministers, 210 churches, and a membership of 22,850. The *Wilburite Friends* are followers of John Wilbur of Rhode Island, who, in 1843, dissented from the Orthodox Friends on the ground that their position inclined too much toward the evangelical. They maintain 53 churches, and 40 ministers and have 4,500 members. The *Primitive Friends* claim to adhere most closely to the primitive customs of the society. They have 10 churches and 12 ministers and their membership is about 250.

The most recent reports show that the Quakers of the United States maintain eight institutions of learning, with 95 professors, 850 students, and endowment funds amounting to \$1,500,000. Their principal educational institutions are Haverford College, near Philadelphia; Swarthmore College, near Philadelphia; Bryn Mawr College; and smaller institutions at Wilmington, Ohio, Richmond, Ind., Oskaloosa, Iowa, and Newberg, Ore. They have effective missions in China, Japan, India, Syria, Madagascar, and the West Indies. Their periodicals include the *Christian Worker*, *Friends' Intelligencer*, and *Friends' Review*. Quakers are disposed to be in favor of peace and good will, maintain a simple body government, and have four classes of meetings, known respectively as preparative, monthly, quarterly, and yearly. In these all matters of discipline and government are discussed. The ministry depends largely upon individuals being moved by the spirit.

QUAMASH (kwöm'āsh), or **Biscuit Root**, a plant of the lily family, closely allied to the hyacinth. It bears purple flowers, has an erect stem, and yields a bulb of considerable size. These bulbs are a nutritious food with an agreeable taste and are eaten after being roasted by the Indians. Several species of quamash are found in the western part of North America, especially on the prairies.

QUAPAW (qwä'pā), a tribe of North American Indians, belonging to the Sioux family.

They speak a dialect of the language spoken by the Kaw, Omaha, and Osage tribes. Formerly they occupied a large region along the lower Mississippi, from the mouth of the Ohio to the Gulf of Mexico. In an early date of the Louisiana Colony they were allies of the French. At present they number a few hundred and are on reservations in Oklahoma, but they are mixed largely with other tribes.

QUARANTINE (qwör'an-tēn), an enforced isolation of any place or person infected with a contagious disease. The term originally implied isolation for a period of forty days. Quarantine regulations were first established in Venice about 1448. For many years it was customary in the leading ports of the world to inspect vessels coming from foreign or adjacent ports and to make an examination of their sanitary conditions. Ships found infected with epidemic diseases were required to forbear all intercourse with the port at which it arrived for forty days, but now the length of time varies according to the circumstances of the case, and is dependent upon the time in which all danger of infection passes away. A yellow flag is displayed from the head mast of a vessel under quarantine, while at night a white light is displayed similarly. National quarantine stations were established by the United States in 1888, and an act of Congress makes violations of their regulations punishable by fine or imprisonment, or both. Protection against contagious diseases in cities, towns, and minor divisions is vested under the general laws of the states or provinces in the local boards of health, which have power to establish quarantines in their respective districts.

QUART, a measure of capacity, both dry and liquid, in the English system of weights and measures. In dry measure it contains 67.2 cubic inches, is divided into two pints, and is the eighth part of a peck. The quart in liquid measure contains 57.75 cubic inches, is divided into two pints, and is the fourth of a gallon.

QUARTERMASTER (kwār'tēr-mās-tēr), in military usage, an officer of a regiment or other body of troops, usually ranking as first lieutenant, in whom is vested the duty of assigning quarters, arranging camps, providing and issuing clothing and provisions, and furnishing storage and transportation. The quartermaster in the navy is a petty officer who assists the navigator and attends to the steering of the vessel, the compasses, signals, signal apparatus, lights, and other matters under the direction of a master.

QUARTET (kwār-tēt'), a musical composition for four voices or four instruments, writ-

ten on the *obligato* plan; that is, each part is necessary to maintain the effect of the whole composition. The ordinary instrumental quartet is arranged for the first and second violin, a viola, and a violoncello. Three recognized quartets of singers are in general use, which are called respectively the mixed, male, and female quartets. The *mixed quartet* consists of the soprano, alto, tenor, and bass; the *male quartet* is made up of the first and second tenor and first and second bass; and the *female quartet* comprises the first and second soprano and the first and second alto. Haydn originated the quartet. Many compositions classed as quartets were later written by Mozart and Beethoven. Other great masters adding to this line of music are Schubert, Mendelssohn, Schumann, Spohr, and Brahms.

QUARTZ, a native oxide of silicon, which occurs either in a massive or crystalline state and varies greatly in luster, transparency, and color. It is diffused abundantly throughout nature in both states. In the massive state it is not pure silex, containing various foreign substances, but in the crystalline state it is pure, and is formed of six-sided prisms, terminated by a pyramid at each end. Among the most abundant colors are gray, white or milk, purple, reddish, green, blue, and brownish. It abounds in rocks and is an essential element of granite. Quartz is infusible in the blowpipe flame and resists all acids except hydrofluoric. It is positively electrified by friction and scratches glass readily, and two pieces may be rendered luminous by rubbing them together in the dark.

Particular names are applied to the principal varieties of quartz, such as common quartz, rose quartz, smoky quartz, milky quartz, rock crystal, yellow quartz, blue quartz, fat quartz, amethyst, hornstone, flint, floatstone, carnelian, Lydian stone, radiating quartz, chalcedony, sapphire quartz, and agate. Quartz enters largely into the manufactures and arts, being employed for making cups, chandeliers, optical instruments, several kinds of glass, and seals. It is important in the manufacture of pottery and porcelain of different kinds, for which purpose it is made into a powder. Quartz veins occur in metamorphic rock, and contain more metals than the masses of rocks through which they are distributed. Gold is found principally in quartz veins or in alluvial sands and gravel, but the quantities taken from alluvial deposits are mere fragments carried by weather and climatic conditions from their natural deposits in quartz veins.

QUARTZITE (kwartz'it), a mineral composed principally of quartz, forming a meta-

morphic rock. It originated from the alteration of sandstone, the grains of which were enlarged by the addition of silica while in a partial state of solution. This gives the appearance of a solidified and uniform rock, but the original rounded surface of the sand grains is revealed by the microscope. In many specimens are traces of iron, mica, and felspar.

QUASSIA (kwösh'î-â), the name of a small tree native to the West Indies and tropical America, so named from Quassi a Negro who



QUASSIA: FLOWER AND PLANT.

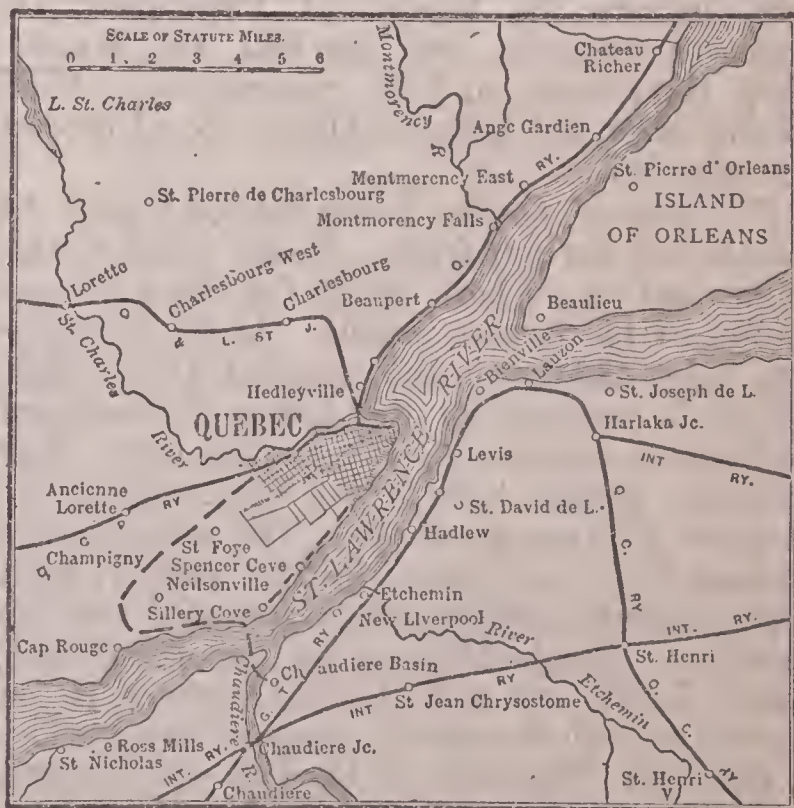
recommended the bitter bark as a remedy for fever. The bark of the quassia was introduced as a medicine into Europe about the middle of the 18th century, and is now used extensively as a tonic in cases of gastric debility and as a substitute for hops in making beer. When taken in excessive doses, it produces narcotic and irritant effects and sometimes causes vomiting. The wood is useful in cabinetmaking, since it is free from attacks by insects. The quassia bark and products sold in the market are obtained chiefly from Venezuela, Panama, northern Brazil, and Guiana.

QUATERNARY PERIOD (kwâ-tēr'nâ-rÿ), the division of time which embraces the post-tertiary strata. It is frequently referred to as the *Age of Man*, since it is coextensive with the period of the existence of mankind. In the classification of some writers the terms Quaternary and Pleistocene are used synonymously, while others divide the Quaternary into the two periods of Pleistocene and Recent. See **Geology**.

QUEBEC (kwê-bëk') the capital of the Province of Quebec, in Quebec County, at the junction of the Saint Charles and Saint Lawrence rivers. It is situated about 300 miles from the Gulf of Saint Lawrence, 175 miles northeast of Montreal, and is the focus of numerous railroads, including the Canadian Pacific, the Grand Trunk, the International, and other lines. The city occupies a promontory on the northeastern bank of the Saint Lawrence, known as Cape Diamond, and extends

partly into the lower valley of the Saint Lawrence. The highest point is 342 feet above the river and near it are a citadel and many fine residences. Access to this portion of the city is by an elevator, several flights of steps, and a steep but beautiful street. Trade and commerce are centered in the lower part of the site, and near the business section are the manufacturing districts of Saint Roch and Saint Sauveur.

DESCRIPTION. The architecture of Quebec is substantial and of good material, though many of the streets resemble those of Europe rather than the usual American thoroughfares. The public gardens and walks are in the upper part of the city, which contains the principal residences and churches. Dufferin Terrace, a promenade 1,400 feet long, is about 200 feet above the river and affords a fine view. The Governor's garden, located back of the promenade, overlooks the Saint Lawrence River and contains a monument erected to the memory of Wolfe and Montcalm. The suburb of Saint John is located west of the city, and near it are the Plains of Abraham. The last mentioned locality is famous as a battle ground in 1759, when General Wolfe lost his life at the point of victory. This event is commemorated in a column forty feet high. Other localities of interest include Montmorency Falls, where



QUEBEC AND VICINITY.

a battle between Montcalm and Wolfe took place; the Chaudière Falls; the three forts of Levis; Saint Anne de Beauport, which contains a noted church; and Beauport and its asylum.

PUBLIC UTILITIES. Communication is furnished by an extensive system of electric rail-

ways, which has lines to many suburban and interurban localities. The pavements are constructed largely of a fine grade of gray limestone, which is quarried in the vicinity, and many of the streets are macadamized. Power to propel the electric lighting plant and other establishments is obtained from Montmorency Falls, about six miles distant. Lake Saint Charles supplies the city with water through an extensive system. Other public utilities include gas lighting, sewerage, drainage, and a public library with a fine collection of books and pamphlets.

BUILDINGS. Quebec is the seat of Laval University, founded in 1663, and has many other educational and scientific institutions. Those of note include Morrin College (Presbyterian), which is connected with McGill University at Montreal, the Laval Normal School, the Ursuline Convent, which has a tract of beautiful grounds, and the Marine Hospital. It has many academies, high schools, and public and private schools. The leading churches include the First Methodist Church, the Anglican Cathedral, the Roman Catholic Basilica, the Saint Andrews' Presbyterian Church, and a number of others. The basilica mentioned above has a seating capacity for 4,000 people and contains paintings from many artists, including Ceracci and Van Dyck. The most prominent public secular buildings include the houses of Parliament, the county courthouse, the city hall, the Masonic Hall, the armory, and the customhouse. Many of the office and business blocks are of modern construction.

INDUSTRIES. Quebec is the seat of a large domestic and foreign trade. It has a safe harbor with wharves on both rivers for the accommodation of the largest vessels. At the mouth of the Saint Charles is the spacious Louis Basin, which is inclosed by the Louis Embankment, forming a fine promenade on the river front. Lumber, grain, hides, and merchandise are shipped in large quantities. The manufactures include boots and shoes, leather, cutlery, hardware, clothing, rubber goods, and steel and iron products. Shipbuilding is an important enterprise. Levis, across the Saint Lawrence, is connected with Quebec with a fine cantilever bridge.

HISTORY. The site of Quebec was occupied by an Indian town called Stadacona in 1535, when the Saint Lawrence was explored by Jacques Cartier. Champlain founded the city in 1608, while exploring that region for France, and it was named Quebec by its founder. Sir David Kirke captured the settlement in 1629 for the English, but it was restored to the French in 1632. The colony was made a royal

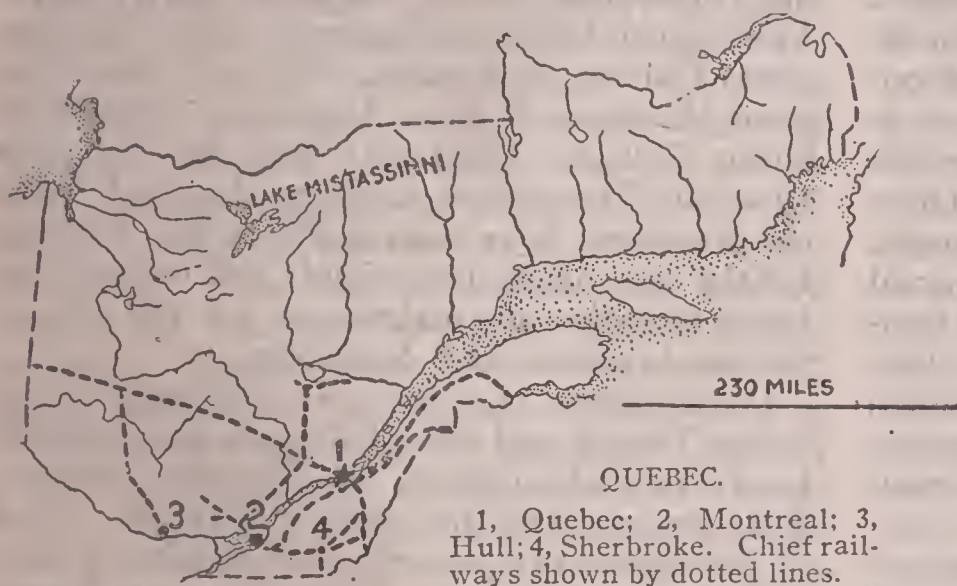
government in 1663, when Quebec became the capital. In 1759 General Wolfe gained his famous victory on the Plains of Abraham, and since that time the city has been a part of the British Empire. The Americans made an unsuccessful attempt to capture it in 1775, when General Montgomery was slain. It was the capital of Canada a number of years, but the capital was removed to Ottawa in 1858. About five-sixths of the inhabitants are of French descent, hence the French language is spoken very extensively. Population, 1901, 68,834.

QUEBEC, a province of the Dominion of Canada, formerly known as Lower Canada. It is bounded on the north by Ungava and Labrador, east by the Atlantic Ocean and the Gulf of Saint Lawrence, south by the Gulf of Saint Lawrence, New Brunswick, Maine, New Hampshire, Vermont, and New York, and west by Ontario and Hudson Bay. The length from east to west is 998 miles and the greatest width from north to south is 500 miles. It is separated in part from Ungava by the East Main and the Grand rivers and from Ottawa in part by the Ottawa River. The Strait of Belle Island separates it from Newfoundland. The total area, including a number of coast islands, is 351,873 square miles, of which about 2,900 miles are water surface.

DESCRIPTION. The surface is greatly diversified and in many localities the natural aspects are wild and grand. The Acadian region of Quebec lies south of the Saint Lawrence River, which includes a part of the Appalachian Mountains, known here as the Notre Dame and the Shickshock mountains. They extend along the south side of the Saint Lawrence, from the vicinity of Quebec to the Gulf of Saint Lawrence and comprise the predominating system. Their general elevation is about 1,500 feet, but they rise in places to heights ranging between 3,000 and 4,000 feet. This mountainous section is in part a wilderness that is exposed to summer frosts. A region of lowlands extends along the north side of the Saint Lawrence, from Quebec to the city of Ottawa, Ontario, and embraces an area of about 10,000 square miles. It is a plain from 300 to 400 feet above the sea and comprises a fertile area dotted with lakes. The northern part of Quebec is included in the Laurentian Mountains, or Laurentides, which stretch from Labrador to Ontario, forming the principal divide between the rivers that flow into the Saint Lawrence and its tributaries and those that enter James Bay and Ungava Bay. This section has an altitude of from 800 to 1,700 feet and much of it is either hilly or broken.

The Saint Lawrence is the most important stream. It enters the Province from the southwest and passes entirely through it in a direction toward the northeast, entering the Gulf of Saint Lawrence by an extensive estuary. Within the Province of Quebec it receives the Ottawa, the Saint Maurice, the Saguenay, the Bastard, the Chaudière, the Saint Francis, and the Richelieu. A large section in the northwestern part is drained into James Bay by the Ruperts, East Main, Nottaway, and Harricanaw rivers. The Northwest River drains the eastern part into the Strait of Belle Island. The beautiful sheets of water include Lake Mistassinni, Saint John, and Peretibbe. At the mouth of the Saint Lawrence is the island of Anticosti, which is 140 miles long and 30 miles wide. Fine forests of hemlock, pine, cedar, oak, elm, spruce, birch, beech, and other woods are abundant.

The climate is healthful, but the winters are long and cold, when the thermometer often falls



to 20° below zero. In summer it is warm but not excessive, and the temperature quite frequently approaches 90°. The mean annual temperature is 45° at Montreal and 29° in the northern part. Sufficient rain falls for the germination and maturity of all crops. Heavy snows occur in the winter, when sleighing continues fully five months. The spring is mild and pleasant and the autumn extends over a period of five or six weeks.

MINING. Quebec is particularly rich in minerals, but the resources are only partially developed. In the output of asbestos it has first rank and yields nearly the entire supply marketed in the world. Iron is mined extensively in the region south of the Saint Lawrence, especially east of the Richelieu River, and in many places of the north central part. Deposits of gold and platinum occur in the same fields, but the output is not large. In the basin of the Ottawa are deposits of mica, plumbago, phos-

phate, and lead. Although coal does not exist, the Province has an inexhaustible supply of peat, but the product is not used outside of small localities. Many building stones are abundant, such as granite, marble, and limestone. Clays suitable for pottery and brick are widely distributed.

AGRICULTURE. A large majority of the people are engaged in agricultural pursuits. The portion lying along the Ottawa and Saint Lawrence rivers are the most fertile, but large tracts suitable for farming and grazing are abundant in the river valleys. Wheat, oats, barley, rye, hay, and buckwheat are the leading crops. Extensive interests are vested in growing tobacco and vegetables, especially potatoes, turnips, celery, carrots, and sugar beets. Apples and grapes of a fine flavor are grown in the southern part, and small fruit is raised successfully in all sections where settlements have been established. Cattle are reared profitably for meat and dairy purposes. Other domestic animals include horses, sheep, swine, and poultry. Formerly the Province was looked upon as poorly suited for agriculture, but experience has demonstrated that it possesses unexcelled resources for diversified farming.

MANUFACTURES. The industrial enterprises are numerous and diversified, owing chiefly to extensive natural resources. Large quantities of fine timber are available, including oak, beech, white pine, spruce, cedar, walnut, and hickory. Lumber is sawed both for export and for material in manufacturing enterprises, such as making doors, furniture, and farming machinery. The fisheries yield a large output of lobster, cod, salmon, and herring, and these are cured and canned in large quantities. The manufacture of furs is important, a large supply of the material being obtained from the fur-bearing animals native to the Province, such as the mink, beaver, bear, caribou, and muskrat. Boots and shoes, tobacco products, cotton and woolen goods, chemicals, leather, paper, and steam and agricultural machinery are made in large quantities. Butter and cheese factories are operated in nearly every parish and the product is unrivaled in quality.

TRANSPORTATION AND COMMERCE. Large ocean steamers ascend the Saint Lawrence as far as Montreal, and smaller streams, such as the Ottawa and the Saguenay, furnish river transportation into the interior. James Bay and the Atlantic are navigated a part of the year. Railway building received early attention under aid by the Province and the lines now have a total

of 4,125 miles. The principal railways include the Canadian Pacific, the International, the Grand Trunk, and the Quebec and Saint John railroads. Electric railways are operated in the cities and many rural districts. Telephone and telegraph lines are used extensively in all sections. Navigation is facilitated by 125 light stations, 160 lighthouses, and numerous lightships.

Quebec has commercial advantages over every other Province of Canada, since its seacoast may be said to extend from its eastern extremity to Montreal. The natural advantages in commerce have been extended by the construction of numerous canals to overcome obstructions in the smaller rivers, such as the Grenville Canal, which overcomes the rapids in the Ottawa River, the improvement at Saint Ours to render the Richelieu navigable from the Saint Lawrence to Lake Champlain, and the canal that connects this lake with the Hudson River in the United States. The Lachine Canal, about eight miles long, carries vessels around the Lachine Rapids and overcomes the rise between Montreal and Lake Saint Louis. The rise between Lake Saint Louis and Lake Saint Francis is avoided by the Soulanges Canal, which avoids the Cedar, Cascades and Cauteau rapids. These canals, that is, the Lachine and the Soulanges, contribute to admit navigation from Montreal to the Great Lakes. The trade outside of Canada is largely with Great Britain and the United States. Among the exports are lumber, live stock, fish, asbestos, and dairy products. The imports include coal, raw cotton, and manufactured goods.

GOVERNMENT. Executive authority is vested in the Lieutenant Governor, who is appointed by the Governor General of Canada and is assisted by an executive council of seven members. Both the Governor General and the council are responsible to the General Assembly. Legislative authority is intrusted to the Legislature of two chambers, the legislative council of 24 members and the legislative assembly of 74 members. The former are appointed for life, while the latter are elected every five years by popular suffrage. Both the system of courts and the local government are administered under the French plan of administration, which is a privilege guaranteed at the time Quebec was made a part of the British Empire. At the time of the Confederation it was agreed that Quebec is to be represented in the Dominion House of Commons by not less than 65 members, which is the number at present, and it is represented in the Senate of the Dominion by 24 members.

EDUCATION. Although a general system of public education is maintained, it differs from

those of the other provinces in the Dominion in that the schools for Protestants and Catholics are separate from each other. A superintendent of public instruction is at the head of the schools, but the administration is represented by two committees, one each for the Protestant and Catholic inhabitants. Both receive support from the public funds, but the religious instruction differs according to the respective courses of study prescribed. Local boards have general charge of the individual schools. In 1908 the Province had 985 Protestant and 4,995 Catholic schools. Attendance upon the schools is free and compulsory for a prescribed period. Special attention is given to the study of agriculture.

Laval University, located at Québec, is a Catholic institution, but a Protestant branch is maintained at Montreal. Other institutions of higher learning include the Bishop's University, Lennoxville; the McGill University, Montreal; the Laval Normal School, Québec; the Polytechnic School, Montreal; the Wesleyan Theological College, Montreal; the Congregational College of Canada, Montreal; the Stanstead Wesleyan College, Stanstead; the Presbyterian College, Montreal; and the Montreal Diocesan Theological College, Montreal. Ample provisions have been made by the Province for the care of the incorrigible and unfortunate. Many charities are maintained for the care of the aged, infirm, and dependent.

INHABITANTS. Quebec was originally settled by the French and the inhabitants consist largely of French-Canadians. In language, manners, and temperament this class is French. Much of the architecture as well as the habits of dress and the tendencies in social life are French rather than American. The greater number of inhabitants are Roman Catholics, only about one-fifth being Protestants. The Episcopalians, Presbyterians, and Methodists are the strongest Protestant denominations. Although the increase in population has been comparatively small, it is greater than in any of the eastern provinces. About 10,700 Indians reside in Quebec. In 1901 the total population was 1,620,974. Quebec, on the Saint Lawrence, is the capital. Other cities include Montreal, Saint Henri, Hull, Sherbrooke, Levis, Montmagny, Three Rivers, and Saint Hyacinthe.

HISTORY. Jacques Cartier explored the Gulf of Saint Lawrence in 1534, when he claimed the Gaspé Peninsula as a dependency of France. Captain Champlain laid the foundations of Quebec in 1608, when he constructed a fortress on the promontory called Cape Diamond. It was little more than a trading post until 1617, when Louis Hébert and others began to develop farm-

ing. For many years the Indians were hostile to the advances of the whites and a force of English captured Quebec in 1629, but it was soon restored to its former owners. The royal governor was appointed by the King of France in 1663, exactly 100 years before the region was ceded to the British, in 1763.

An American army besieged Quebec in the American Revolution, but the people remained unfriendly to the invaders. Upper Canada was made a separate Province in 1791, when French-Canada, or Quebec, was organized as Lower Canada, which continued until 1841, when the union with Upper Canada went into effect. In 1867 the Confederation was organized, when both Quebec and Ontario became provinces in the Dominion of Canada. Since that time the Province has had an almost unbroken period of growth and progress. In 1908 the district of Ungava was placed under the direct jurisdiction of Quebec.

QUEBEC, Battle of, an important battle near the city of Quebec, on the Plains of Abraham. The French under Montcalm, numbering 16,000, held the heights on the north bank of the river and fortified themselves in June, 1759. When General Wolfe seized the heights on the south, the French decided to adopt the defensive plan. The British extended the line of defense by moving their ships past the city, and later landed their forces and entrenched themselves on the French left. The assault at Montmorency and several other points proved futile, but the British gained a decisive advantage on Sept. 13 on the Heights of Abraham, where both Wolfe and Montcalm were killed. This defeat of the French not only caused them to lose Quebec, but their entire possessions in the northern part of America.

Another attack was made upon Quebec at the beginning of the Revolution, which was a part of the scheme of the conquest of Canada. Benedict Arnold was sent against Quebec with an army by the way of Maine, while General Montgomery proceeded with another force by way of Lake Champlain and the Saint John's River. Arnold reached Quebec on Nov. 13 and Montgomery came on Dec. 3, 1775. The combined forces numbered 1,200 men. They made a systematic attack upon the town from opposite sides on Dec. 31, 1775, but were repulsed with considerable loss. Arnold was severely wounded and Montgomery was slain, while General Morgan and a company of Virginia marksmen were taken prisoners. The expedition proved an entire failure.

QUEBEC ACT, an act of the British Parliament, in 1774, which was passed to prevent

the Province of Quebec from joining the American colonies in the Revolutionary War. This act extended the boundaries of Quebec so as to include all the Northwest Territory, guaranteed to protect Roman Catholicism as the dominant religion, and permitted the institution of the French civil law. Since the thirteen colonies were almost entirely Protestant, they looked upon this act with indignation.

QUEEN, the wife of a king, or the female sovereign of a kingdom. In some monarchies women are excluded from the throne by the Salic law, but in England the succession devolves upon the eldest daughter or female heir apparent, if a deceased sovereign has left no male heir apparent. A *queen consort* is the wife of a reigning king; a *queen dowager* is the widow of a deceased king; and a *queen regent*, or *queen regnant*, is a sovereign princess who has succeeded to sovereign power and holds the crown in her own right.

QUEEN CHARLOTTE ISLANDS, an island group in the Pacific Ocean, off the coast of British Columbia, situated north of Vancouver Island. The group includes a large number of islands, but only two are of material importance. These are Graham Island and Moresby Island, which stretch from northwest to southeast a distance of 160 miles. They are separated from each other by a narrow channel called the Skidegate Inlet. The former has an area of 3,000 square miles and the area of the latter is placed at 1,500 square miles. Graham Island has a width of 70 miles at the northern extremity, and thence the land mass gradually narrows toward the southeast. The climate is moist, but healthful, and the islands have a considerable growth of magnificent forests. An abundance of minerals occurs in the islands, including iron, copper, anthracite coal, and gold-bearing quartz. By far the largest part of the inhabitants are Indians, who engage in hunting and fishing. The islands belong to the Province of British Columbia.

QUEEN CHARLOTTE SOUND, a channel of the Pacific Ocean, which separates the northern part of Vancouver Island from the mainland. It contains many islands, and numerous coast indentations extend from it toward the north and east. Edible fish, especially salmon, are abundant.

QUEENSLAND, a State of Australia, located in the northeastern part of that continent. It is bounded on the north by the Gulf of Carpentaria and the Pacific, east by the Pacific, south by New South Wales, and west by South Australia. The length from north to south is 1,260 miles, and its greatest width is 940

miles. It has a seaboard of 1,250 miles, being greatly enlarged by the extension of the Cape York peninsula toward the north. The area is 668,497 square miles.

DESCRIPTION. The Great Dividing Range, which extends along the entire eastern coast of the continent, runs parallel to the coast at a distance of 70 to 100 miles from the sea. From it numerous spurs extend in various directions. The highest peaks range from 3,000 to 5,750 feet above sea level. The coast region is generally fertile and has an abundance of timber, but the interior and western parts are generally dry and treeless. Chains of islands lie off the eastern coast, which is indented by numerous small bays, including Moreton Bay, the harbor of Brisbane. East of the mainland is the Great Barrier Reef, which is formed largely of coral and is from 20 to 150 miles from the coast. The sheet of water inclosed by it is about 1,000 miles long and contains numerous islets.

The drainage of Queensland is chiefly toward the southwest by the head streams of the Murray River, which discharges into the Indian Ocean, and by streams flowing into the salt lakes in the State of South Australia, though the coast region is drained quite generally into the Pacific and the Gulf of Carpentaria. Among the principal rivers are the Warrego, Cooper, and Herbert, flowing toward the southwest; the Brisbane, Burnett, Fitzroy, Pioneer, and Burdekin, flowing into the Pacific; and the Mitchell, Gilbert, Flinders, and Gregory, flowing into the Gulf of Carpentaria. In the western part are extensive treeless plains, but the soil is fertile and produces grasses and shrubs. Here the moisture sinks in the dry ground or collects in lake basins, which evaporate during the dry season.

Queensland is located partly in the Torrid and partly in the South Temperate zones. The interior is not affected by sea breezes, hence has an extremely hot and dry climate. At Brisbane, on the Pacific coast, the temperature ranges from 30° to 60°, with an average of 70°. Here the rainfall is 50 inches, but farther north it ranges from 80 to 150 inches per year. In the western part the temperature is extremely hot and the atmosphere is dry. From five to seven inches of rainfall occur in this section, and all of the State lying west of the Great Dividing Range has an uncertain precipitation.

MINING. Gold is the most important mineral and the output has an annual value of about \$13,500,000. Copper and tin are mined in large quantities and the output of silver is considerable. Other minerals include mercury, lead, tin, antimony, coal, and salt. The output of

coal has increased materially the last decade, owing to its larger use in manufacturing enterprises. Salt is abundant in the lakes and lagoons of the west, where it is deposited in large quantities when the water evaporates during the dry season. Metal mining is confined entirely to the mountain region. Granite, marble, sandstone, and limestone are widely distributed.

AGRICULTURE. Farming is confined largely along the coast, where the soil is fertile and the rainfall is abundant. Corn is the leading cereal, but it is followed closely by wheat, barley, oats, and rye. Sugar cane is one of the most important crops, and the cultivation of this plant is highly profitable on the rich lands at the mouths of streams flowing into the sea. Many species of tropical fruits, vegetables, and sugar beets are grown profitably. The culture of the silkworm and the mulberry tree has been introduced successfully. While stock is raised profitably on the coast plains, the larger interests in ranching are found in the region of the plains beyond the Great Dividing Range. Queensland exceeds all the other states of Australia in the number of cattle. It has very extensive interests in sheep raising. Other domestic animals include horses, swine, and poultry. However, the investments in cattle and sheep greatly exceed those of other live-stock industries, but the prevalence of drouths sometimes causes the loss of large herds through a lack of water and vegetable growth.

OTHER INDUSTRIES. Queensland maintains a large variety of industries, owing to its varied resources. The forests yield pine, cedar, rosewood, tamarind, myrtle, cypress, red cedar, and bamboos. Gigantic eucalyptus trees abound. It is estimated that about one-half of the surface was originally covered with timber, but the forests on the western slopes are thin or shrubby. Lumbering is a prolific source of income. Pearl fisheries along the coast are important and considerable interests are vested in catching shellfish and deep-sea fish. The manufactures include, sugar, flour, butter and cheese, spirituous liquors, leather, paper, and lumber products. Woolen and cotton goods are the leading textiles. Large interests are vested in preserving and packing meat, especially beef and mutton.

TRANSPORTATION. The rivers are not navigable, but many safe harbors are afforded by estuaries and bays. An extensive coastwise trade is facilitated by the long coast line. Railway building is encouraged by the government and the lines in operation have a total of 3,800 miles. They are built largely from points on the coast to mines and trade centers in the in-

terior, and several lines connect with the railway system in New South Wales and South Australia. Electric railways are operated in Brisbane and some interurban points. The exports exceed the imports. They include principally sugar, hides, wool, gold, lumber, and frozen meat. Textiles, clothing, machinery, and hardware are imported.

GOVERNMENT. The executive power is vested in a Governor appointed by the crown, who is assisted by an executive council of nine members, of whom eight hold portfolios. The Parliament consists of a legislative council of 44 members and a legislative assembly of 72 members. All members of the former body are appointed for life by the Governor on the advice of the ministry, while the latter are elected for three years by universal suffrage without regard to sex. The right to vote is based upon a residence of six months and the payment of a nominal tax on property. Local government is administered in the counties and towns, whose officers are elected by the people.

The State extends aid to maintain and extend a system of public education. School attendance is compulsory between the ages of six and twelve years and primary instruction is free and unsectarian. At the time of the last census, in 1901, the returns showed an illiteracy of only two per cent. among the adult white population. A number of charitable, correctional, and educational institutions are maintained at Brisbane and other places.

INHABITANTS. The population consists largely of Europeans, including principally English, Irish, Scotch, and Germans. The larger membership is in the Anglican Church. Other denominations well represented include the Roman Catholics, Presbyterians, Methodists, and Lutherans. About 20,000 of the inhabitants are Pagans and Mohammedans. Brisbane, on the southeastern coast, is the capital and largest city. It is located near the Darling Downs, hence has a large trade in grain and live stock. Other cities include Maryborough, Rockhampton, Marlborough, Gympie, Charters Towers, Ipswich, and Townsville. Population, 1901, 503,266. In 1906 the State had a population of 535,113.

HISTORY. Queensland was first settled in 1825, when a penal station was established near the present city of Brisbane. It had been explored by Captain Cook as early as 1770, when he made a chart of the coast from Moreton Bay to Torres Strait, but settlements were not attempted until the government sent convicts from England. After that free immigrants began to come in, but the larger part of the in-

habitants continued to be constituted of criminals. In 1839 the transportation of convicts was discontinued and the country was opened to settlers in 1842. The settlers who came before that time were known as *squatters*.

Queensland was organized as a part of New South Wales and continued to be governed in that way until 1859, when it became a separate colony. Gold was discovered in 1867 and shortly after many coolies were imported to work in the mines and on the sugar plantations. This caused an extended conflict between the labor party and the larger employers, with the result that public affairs were largely influenced by organized labor. This was the means of greatly extending government ownership to many of the public utilities, such as the telegraph, telephone, railways, and public service insurance. The colony became an important member in the Australian federation in 1899, when it ratified the constitution of the Commonwealth.

QUEENSTON HEIGHTS, Battle of, an engagement of the War of 1812, which took place at Queenston Heights, in Ontario, near Niagara Falls, on Oct. 13, 1812. The British and Canadian troops under General Brock were encamped on an eminence overlooking the Niagara River, while General Van Rensselaer and 700 Americans were stationed at Lewiston, opposite the village of Queenstown. The latter had been promised reinforcements and was charged with the duty of invading Canada. On the morning of October 13th the Americans crossed the river and made an attack, but their movements were detected by the British, who were compelled to fall back toward the village of Queenstown. Although the Americans at first were successful, the expedition proved a failure, since Van Rensselaer was not supported by the other American commanders, who plead that they were not to leave the soil of their own country. The Americans lost 190 killed and 900 prisoners, while the British lost a total of 130. General Brock was slain in action. A fine monument was erected to his memory upon the battle ground by the Province of Ontario. See **Niagara Falls**.

QUEENSTOWN, a seaport of Ireland, on the southern coast of Great Island, nine miles southeast of Cork. It is nicely located on an eminence rising from the harbor of Cork, and its streets present a picturesque appearance as they rise above each other. Strong fortifications are maintained on Spike Island and at the entrance of its well-sheltered harbor. The city has a fine Roman Catholic cathedral and several benevolent and educational institutions, and

is an important station for emigration. It has no manufactures of importance and but little trade, since the mail business is transacted chiefly at Cork. The delightful climate and beautiful scenery attract many visitors to Queenstown. Formerly its name was Cove of Cork, but in 1849 it was given its present name. Population, 1907, 8,046.

QUELPAERT (kwĕl'pärt), or **Tamra**, an island off the southern coast of Corea, about sixty miles from the mainland. The shores and surface are more or less rocky, but tracts of considerable extent have great fertility. The island is 20 miles long and 20 miles wide, and the area is about 780 square miles. Three extinct volcanoes are on the island, each of which has a lake in its crater. The chief products are rice, fruits, fish, cattle, and silk textiles. Chyei Chyu is the chief town and capital. For the purpose of government it belongs to Corea, and has been under the jurisdiction of Japan since the Russo-Japanese War. Population, 1907, 80,260.

QUERÉTARO (kă-ră'tă-rô), a city of Mexico, capital of a state of the same name, 110 miles northwest of the city of Mexico. It is situated on a plateau 6,370 feet above sea level, has good railroad facilities, and is surrounded by a fertile region. The city has extensive manufactories that produce cotton and woolen goods. These enterprises employ about 4,500 persons. Among the other manufactures are leather, machinery, clothing, tobacco and cigars, earthenware, and utensils. The city is well built and its streets intersect each other at right angles. It derives its water supply from an aqueduct about ten miles long, which is supported a part of the distance upon arches ninety feet high. Among the principal buildings are several fine churches, a number of educational institutions, and the government buildings. Emperor Maximilian was besieged at Querétaro by the republican forces and was shot here on June 19, 1867, by order of a court-martial. Population, 1908, 36,512.

QUERN (kwĕrn), a hand mill for grinding grain, used before the invention of water or windmills. It consisted of two circular stones, the upper of which was pierced in the center with a narrow funnel and the lower was slightly dished. A wooden or metal pin was inserted in the lower stone, on which revolved the upper when turned by means of a stick thrust into a notch in the edge. The grain was dropped with one hand into the central opening as the upper stone was turned with the other. Devices for grinding grain in this manner are of great antiquity, as is evidenced by remains of

querns dug up wherever regions were populated by Asiatic or European people. In some sections of Ireland, in the Shetlands, and in the Hebrides querns are still used to a limited extent. Specimens of querns now in the museums of Rome and other European cities give evidence that they were employed very extensively in the Roman period. Those dating from that time contain ornamentations of various Roman devices.

QUETZAL (kĕts'äl), or **Quesal**, the name of a bird native to Central America, belonging to the trogon family. In size it resembles the magpie, but the tail coverts of the male are greatly elongated, usually from twenty to thirty inches. It clings to the limbs of trees similar to the woodpecker, since its feet are not well adapted to walking. The male is richly colored and has fine plumes on the wings, while the female is less attractive. This bird has been adopted as the national symbol of Guatemala. Its plumes and feathers are used extensively for millinery trimmings.

QUETZALCOATL (kĕts-äl-kô-ät'l), the mythical hero and king of the Aztecs, who was worshiped as the god of commerce and the industries. It is supposed that he resided in the ancient city of Tula, or Tollan, about forty miles north of the present City of Mexico, and extended the influence of the Toltecs, so named from their chief city, over a large tract of country through peaceful means. According to some writers he predicted the conquest of Mexico by the Spaniards.

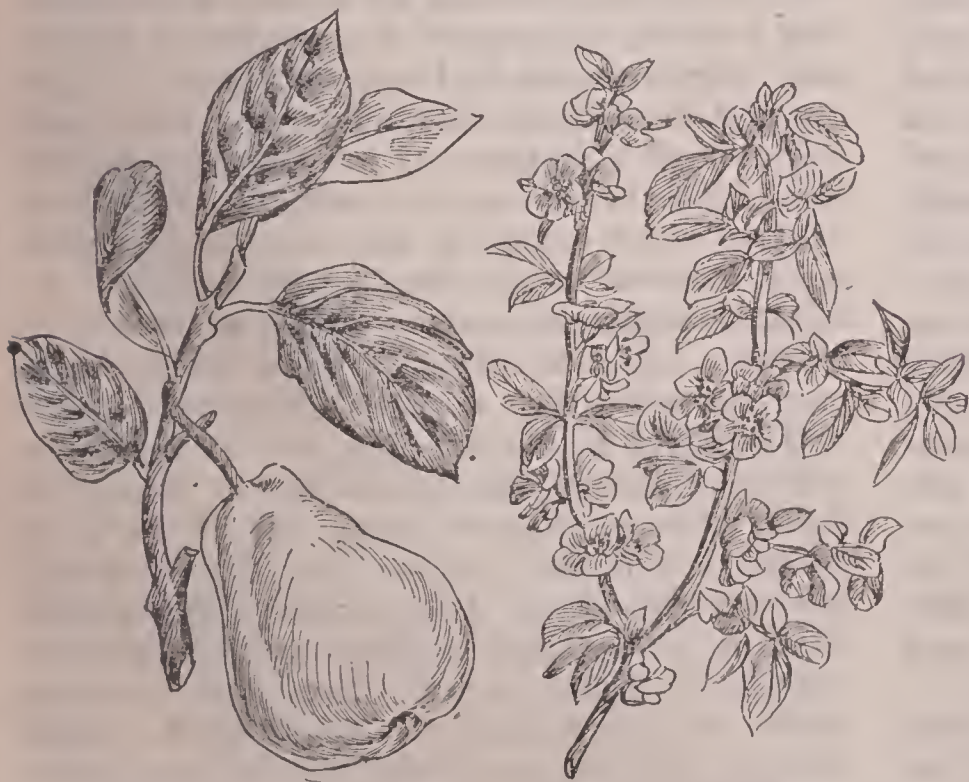
QUEZALTENANGO (kă-säl-tă-nän'gô), a city of Guatemala, Central America, capital of a province of the same name, 68 miles northwest of Guatemala. It is situated on an elevated tableland and has a fine cathedral and several government buildings. Among the manufactures are cotton and woolen goods. Alvarado founded the city in 1524. Population, 1908, 24,537.

QUICHUA (kĕ-chōō'à), the name of one of the four divisions into which the ancient Peruvians were divided, the others being the Changos, the Atacamas, and the Aymares (Incas). Each of these families spoke a distinct language, but those of the Quichuas and the Incas were quite similar, hence some writers regard them as dialects of a common tongue. The Quichuas became subject to the Incas and constituted the more powerful class in their empire, occupying Cusco, the capital, and a vast extent of the surrounding country. At present their descendants constitute about three-fourths of the Indian population of Peru and Bolivia, where their language is still spoken by a large

number. These people are small in stature, but have broad chests and are capable of enduring long and severe exertion. The skin is olive-brown or bronze, instead of being coppery like the Indians of North America. Previous to the conquest they had made considerable progress in science. They observed the solstices and equinoxes, had a decimal system of numeration, and cultivated music and poetry.

QUICKSANDS (kwik'sändz), the masses of loose and moving sand found at the mouths of rivers and on many seacoasts. They are formed on flat shores over beds of stiff clay through which water cannot penetrate, thus constituting a loose mixture of sand and water. Quicksands frequently occur in the vicinity of curves in narrow channels. In the latter case sand is carried by strong tidal currents to a favorable locality, where it is kept in a loose condition by moving water. Though not commonly of great extent, quicksands are dangerous to vessels or to persons, since they form an obstruction to passage and are so permeated with water that they are incapable of supporting the weight of a person. Quicksand is a term applied frequently to strata of loose sand, which in many regions carry large veins of water.

QUILLOTA (kêl-yō'tà), a city of Chile, on



PORTUGUESE QUINCE.

JAPAN QUINCE.

the Aconcagua River, 23 miles northeast of Valparaiso. It is one of the oldest cities of Chile and has railroad facilities. The surrounding country is rich in minerals, especially copper. It has a number of educational buildings, several churches, and a considerable trade. The city suffered severely from earthquakes in 1822 and 1851. Population, 1907, 13,382.

QUINCE, a tree of the apple family. It is native to the western part of Asia, but has been naturalized in many regions and is cultivated extensively for its fruit. The tree seldom exceeds a height of twenty feet. It has oval leaves, irregular branches, and white or pale red flowers. The fruit grows singly on young branches and has a yellow or orange color. When plucked from the tree it is hard and too austere to be eaten, but is valuable for boiling in sugar or to be made into preserves or jelly. A kind of preserve made from quinces is called *marmalade*. Quinces are used in making a beverage similar to cider. The seeds are demulcent and mucilaginous and are used to some extent in medicine. The *Japan quince* is a small tree, about six feet high, and is cultivated chiefly for its early and large, profuse flowers. The Greeks and Romans cultivated the quince extensively. At present it is grown in many sections of America and Europe.

QUINCY (kwîn'zī), the third city of Illinois, county seat of Adams County, on the Mississippi River, 260 miles southwest of Chicago. It is on the Chicago, Burlington and Quincy, the Wabash, and the Quincy, Omaha and Kansas City railroads, has a fine site on bluffs overlooking the river, and is the center of a large commercial and manufacturing trade. The streets are substantially paved and lighted by gas and electricity. A street railway system penetrates all parts of the city and has lines to many interurban points. The noteworthy buildings include the county courthouse the public library, the high school, the State Soldiers' and Sailors' Home, the Saint Mary's Institute and the Chaddock College (Methodist). It is the seat of the Saint Francis Solanus College. Other features include the Federal building, a conservatory of music, and Washington and Riverside parks. It has many fine churches. Among the manufactures are carriages and wagons, paper, furniture, musical instruments, tobacco products, packed meat, engines, hardware, and machinery. The place was platted in 1822 and was incorporated as a city in 1839. Population, 1900, 36,252; in 1910, 36,587.

QUINCY, a seaport of Massachusetts, in Norfolk County, seven miles southeast of Boston. It is on the New York, New Haven and Hartford Railroad, has a fine harbor on Quincy Bay, and is located between the Fore and the Neponset rivers. The area is about 21 square miles. In the vicinity are extensive granite quarries, which were connected in 1826 with the first steam railway built in the United States. The city has manufactures of earthen-

ware, boots and shoes, utensils, cigars, quarry products, and clothing. It has Adams Academy, a public library, and a home for infirm sailors. Other features include the Thomas Crane Library, the Wood Institute, and the city hospital. Quincy was the birthplace of John Hancock, John Adams, and John Quincy Adams, and the tomb of the two Presidents Adams is beneath the portico of the Adams Temple, a church erected in 1828. The first settlement in the vicinity of Quincy was made in 1625 and the town was a part of Braintree until 1792, when it was detached and named after John Quincy. Population, 1910, 32,642.

QUININE (kwī'nīn), the most important alkaloid obtained from true cinchona bark, first discovered in 1811. It is extracted from the bark with diluted sulphuric acid and, to precipitate the alkaloid, a quantity of lime is added to the solution. The deposit is then collected and dried and afterward it is exhausted with boiling alcohol, which dissolves the alkaloids. When the filtered alcohol solution is evaporated, the quinine is neutralized with sulphuric acid and the solution is concentrated until the sulphate crystallizes. Quinine is very bitter. It is



CINCHONA.

Fruit and Flower.

almost insoluble in water, but is soluble in about its own weight of alcohol and in 22 times its weight of ether. Its salts are used extensively in medicine on account of their tonic and antipyretic qualities, especially in malarial affections of all kinds. Its extraordinary value has given rise to a considerable trade in Peruvian bark, and the cinchona tree is now cultivated in many parts of America and Europe.

QUINOA (kwī-nō'à), an annual herb native to the tropical parts of America, closely allied to and resembling the common pigweed. It attains a height of from four to six feet and yields a white seed of value as food. The plant is cultivated in Chile, Mexico, and other countries, where its seed is ground and used in making cakes, porridge, and other articles of food. The *red quinoa* is a closely allied species and yields red seeds containing medical properties used in treating bruises and sores. The quinoa plant has been naturalized in Europe,

where the leaves are used as a substitute for spinach and the seeds serve as food for poultry

QUINSY (kwīn'zǎ); an acute inflammation of the throat, chiefly of the loose tissue surrounding the tonsils, hence frequently called *tonsillitis*. It is rarely confined to the tonsils themselves, but involves the soft palate, the uvula, the pharynx, and sometimes the root of the tongue. It is more prevalent during middle life and rarely affects children or persons advanced in years. The early symptoms are chills and discomfort about the throat, which are followed by severe pain and swelling of the tonsils. In severe cases it is difficult to move the jaws and delirium sometimes accompanies high fevers, but the malady is rarely fatal. It becomes dangerous through ulceration that sometimes involves a branch of the carotid artery. A mild purgative and the use of warm water as a gargle are common remedies, but stimulant and astringent gargles are used in advanced stages.

QUIPU (kē'pō), an aboriginal device for recording and conveying information, formerly used in various parts of Asia, Africa, and America. It consisted of a series of colored and knotted strings tied at one end to a thicker cord, and the order, color, and knots of the strings were used like elements of a written language. The earliest instrument of this kind is said to have been invented by Emperor Suy-yin of China, and the Chinese are thought to have used quipus until this form of keeping records was superseded by the art of writing. The Incas of Peru used quipus at the time those regions were invaded by the Spaniards, both for recording intelligence and conveying commands to officers. In some instances these devices were used for preserving accounts of historic events.

QUIRINAL (kwīr'ī-nal), one of the seven hills occupied by the ancient city of Rome, located a short distance north of the Palatine. West of it is the Campus Martius, which extends to the Tiber. In the time of the ancient Romans it contained a shrine of Fortuna, the temples of Quirinus and Flora, and the great baths of Diocletian and Constantine. Pope Gregory XIII. began the building of the Quirinal Palace in 1574. This structure was a summer residence of the popes until 1870, when it became the residence of the King of Italy. It is decorated with beautiful works of art, including Overbeck's painting that commemorates the flight of Pius IX., in 1848.

QUIRINUS (kwī-rī'nūs), one of the gods in the religion of the early Romans, ranking next to Jove and Mars. He represented the god of war during the time of peace, being in some

respects parallel to Mars, who was looked upon as the war god at all times. Some writers think that he was identical with Romulus, who was honored by the festival of Quirinalia, which occurred annually on the 17th of February, that is, the 13th day before the Calends of March in the Roman system. The temple of Quirinus was located on Quirinal Hill.

QUIRITES (kwī-rī'tēz), the name used by the Romans to designate the civil capacity of their citizens, while *Romani* indicated the military and political relation. While the term was a title of honor in the nation, the Quirites were looked upon with reproach in the army, since the soldiers regarded them fit only for civilians.

QUITCLAIM (kwīt'klām), the name of a deed which conveys the right or interest of a grantor in real estate without any warranty whatever of the title or quantity. In such an instrument the grantor or seller conveys to the grantee or buyer all his right, title, interest, and estate. The formal words employed usually in such an instrument are "remise, release, and forever quitclaim."

QUITO (kē'tō), the capital and largest city of Ecuador, in the province of Pichincha, near the eastern slope of the volcano of Pichincha. It is situated about 9,350 feet above sea level and its pleasant and temperate climate makes it one of the most beautiful cities of South America. The atmosphere is almost constantly clear and bracing, resembling that of perpetual spring. Its principal streets are regularly platted and well paved, but those in the older parts of the city are narrow and neglected. It has systems of waterworks and sewerage, but the street lighting still consists of gas and kerosene lamps, while the absence of railroads and substantial highways greatly interferes with commercial enterprise. Among the important buildings are those maintained by the government, including the capitol, the president's palace, the courthouse, and the townhouse. The University of Quito is the principal educational institution, but it has numerous schools and convents, a seminary, an observatory, several hospitals and asylums, a museum, and a public library of 25,000 volumes. The cathedral is a substantial structure, being well built and finely decorated, and it has a large number of other churches and monasteries. Quito is the seat of an archbishopric and is noted as a gathering place and the home of many priests, fully 500 residing here. Among the manufactures are cotton and woolen goods, spirituous liquors, jewelry, hosiery, thread, lace, and utensils. The city was founded by the Spaniards in 1534 and suffered at various times from the effect of earthquakes,

particularly in 1859, when many lives and about \$3,000,000 worth of property were destroyed. The inhabitants consist principally of descendants from Spaniards and Indians, but likewise include many pure-blooded Spaniards and Indians in the city. Population, 1906, 81,405.

QUOITS, a game in which the player strives to pitch a flattened ring of steel so as to encircle a peg or hob stuck upright in the ground. The rings measure from eight to ten inches in external diameter, the rim being one or two inches wide. Two pegs or hobs of wood or iron are set upright in the ground, usually eighteen yards apart, and the player who gets the greatest number of quoits nearest the pegs is the winner. Each player has two quoits, which are pitched alternately. If a player pitches a quoit nearer the hob than either of his adversaries, he gains one point; if both his quoits are nearer than those of his adversary, he scores two points. If a quoit leans against the peg, it counts three, but if it encircles the peg, it scores five. However, if both players encircle the peg with one or both of the quoits, only the upper one is counted. Horeshoes are used extensively in playing this game. Each side may consist of one or more players.

QUORUM (kwō'rūm), the name applied to such a number of persons of any deliberative or corporate body as is necessary for the legal transaction of business. If no specific rule as to the number required has been adopted by the body, a quorum consists of a majority of the members. It is customary for most bodies to adopt rules providing that a majority of the members shall constitute a quorum, though a greater number may be required for special purposes, and in some bodies less than a majority may be made a quorum by a rule. For instance, forty members constitute a quorum in the British House of Commons. The Constitution of the United States provides that a majority of each house of Congress shall constitute a quorum to do business, but a smaller number may adjourn from day to day, and may instruct the sergeant-at-arms to compel the attendance of absent members. It was held during the first fifty congresses of the United States that the constitutional quorum must be shown to be present by the count of votes, but in 1890 Thomas B. Reed, then speaker, ruled that he might decide a quorum to be present when enough members were visibly present, though some did not vote. This position has since been generally supported and it is now held that if a majority be present to do business, their presence is all that is required to make a quorum in either house of Congress.



R

R, the fourteenth consonant and eighteenth letter of the English alphabet, which is classed as a semivowel and a liquid. It is generally considered to have two sounds; one at the beginning of a word or syllable, or when it is preceded by a consonant, and the other at the end of a word or syllable, or when it is followed by a consonant. In the former case it is pronounced by an explosion of vocalized breath, the tongue almost touching the palate or gum near the front teeth with a tremulous motion, and in the latter it is formed by a vibration of the lower part of the tongue, near the root, against the soft palate. The former use is illustrated by such words as *tree*, *ran*, and *morose*; and the latter by the words *her*, *star*, and *beard*. The *Three R's*, a term familiarly used to designate the three elementary subjects of education, reading, writing, and arithmetic, originated with Sir William Curtis. In this relation they are often spoken of as *reading*, *'riting*, and *'rithmetic*.

RABAT (rä-bät'), a maritime city of Morocco, in the province of Fez, 135 miles southwest of the Strait of Gibraltar. It is situated near the place where the Bu-Regreg flows into the Atlantic Ocean and is defended by a wall, citadel, and batteries. It has many mosques and the tower of Beni-Hassan, a structure 180 feet high. The manufactures include silk and woolen goods, carpets, saddlery, waterproofs, and leather. It has a large trade in wool, dyestuffs, olive oil, wax, and tropical fruits, though commerce has somewhat declined on account of silt settling at the mouth of the river. Rabat was founded in the 13th century and was long a haunt of pirates. Population, 1908, 27,146.

RABBA (räb'bä), a city of Western Africa, in the native kingdom of Gando, on the Niger River, about 350 miles from its mouth. It has an extensive trade in ivory and tropical products. Among the manufactures are cotton and woolen goods. Formerly it was important as a slave market. Population, 1906, 41,040.

RABBAH, a city of the Ammonites, in the valley of the Jabbok, 25 miles northeast of the

RABBIT

Dead Sea, known at present as Amman. David and Joab captured it after a siege (II Sam. x-xii). It was afterward occupied by Ptolemy II., who renamed it Philadelphia. Among the Ammonites it was known as Ammon, but the same name was applied to several other cities, including the Ammon which was located in the mountains of Judea.

RABBI (räb'bī), a title applied to persons having judicative and other special authority among the Hebrews, corresponding in meaning to the English word *master*. The title was in common use among the Jews in the time of Christ, who was thus addressed by His disciples. It is now applied to any teacher who is not a priest, especially to learned doctors of the Jewish law. *Rabin* is the equivalent French form, meaning my master, and *rabbon* is an Aramaic form, meaning our master.

RABBIT, a genus of rodent mammals, belonging to the same family as the Hares, though



GRAY RABBIT.

they are smaller and have shorter ears and hind legs. It is thought that rabbits were found originally in the western portion of the Mediterranean basin, but they have been widely nat-

uralized and are met with in all regions, except those that have an extremely cold climate. The color in a native state is almost uniformly brown, but under domestication it may become varied, including black, white, gray, and spotted. Like the hare, it is timid and seeks safety by rapid and continuous running, and by retreating to burrows excavated in hill slopes and sandy pastures. It is gregarious in habit and in a wild state pairs for life, though in domestication it ceases to pair. The young are brought forth in litters numbering from three to eight, and are blind and naked at birth, but the mother attends to them with marked affection in burrows. They begin to breed at six months and have several litters each year. The average life of a rabbit is from seven to eight years. They have well-developed senses, but remain concealed the greater part of the day, coming out at early twilight to roam about in search of food. Rabbits feed on grass, herbage, vegetables, and bark, often inflicting considerable damage to young plants and orchards.

Many species of rabbits are widely distributed in North America, including the *gray rabbit*, or *cottontail*. This species is particularly abundant in the Mississippi valley and Southern Canada, where it is hunted in the fall and winter for its flesh. The best time to go upon a rabbit chase is directly after a newly fallen snow, when these animals may be tracked successfully to their burrows or places of hiding. The flesh is not eaten during the summer and is best in the fall, shortly after the animals have become fat on the grain found in the fields. Rabbits were not imported into Australia and New Zealand until 1860, but they are now a common pest in many sections for the reason that the climate is exceedingly favorable to their multiplication, and because few enemies are found there to diminish their numbers. In many sections they have become harmful to vegetation, eating and destroying crops, pastures, and young trees. Domesticated rabbits have been greatly modified by the skill of breeders and now vary greatly in size and color. Albinos are very common and include a remarkable species with white hair and red eyes. Besides being valuable for food, rabbits yield skins of use in making glue and size, and the hair is well adapted for felting purposes. The fur is useful for articles of wearing apparel, or for imitating the rarer and more costly furs.

RACCOON (rāk-kōon'), an American quadruped mammal of the bear family, which is found from Canada to the tropics. The head is broad behind, the muzzle is narrow, the ears are short, and the tail is ringed and moderately

long. Raccoons are somewhat larger than a large cat, but they are built more heavily, have short legs, brown furry hair, and claws well adapted for climbing trees. The body is about 22 inches long and the tail measures 12 inches. They make their homes in hollow trees and burrows in the ground during the day, but at night come out in search of food and water. The food consists of vegetable and animal matters, particularly of crabs, oysters, crawfishes,



RACCOONS.

green corn, and tender shoots of plants. Their flesh is a favorite article of food, for which they are hunted in the fall and winter. The *crab-eating raccoon*, or *agouara*, is native to South America and ranges as far north as Panama. It differs from the common raccoon of North America in having a more slender shape and shorter fur. Both species are remarkable for displaying a fondness for glittering things, a trait likewise found in magpies and jackdaws.

RACE, a competitive contest of speed, including such as running, skating, riding, driving, rowing, and sailing. Racing may be a contest between individuals, as in walking and swimming; a test of machines, as in bicycle and automobile racing; or a test of speed in animals, as in driving and running horses. Sports and exhibitions of this class are very popular in Europe and America and are prominent as distinct competitive tests, or as features in fairs and exhibitions. Within recent years many of the contests assumed the distinctive feature of extending to great distances. Running foot races are usually confined to spaces ranging from fifty to eighty yards, but more recently they have been extended to include contests that cover distances of 25 miles or more. In 1908 the most extensive racing contest in the world was undertaken, in which automobiles

were registered to join in a race from New York City, to Paris, France, by way of Bering Strait and the line of the Trans-Siberian Railway. Yacht races and rowing contests have assumed international proportions, such as those held at various periods between representatives of Great Britain and the United States.

Horse racing is one of the most popular sports and has been greatly modified by careful breeding and training of several species of the horse. These contests are concerned in obtaining the highest possible speed for comparatively short distances. Horses are entered for racing contests according to the class in which their record as to speed entitles them to run, and the races are again divided into those provided for runners, trotters, or pacers. The running record takes precedence of all others, since horses excel in running rather than in pacing or trotting. A mile is usually taken as the standard and the contest is on a circle of that distance. Running records of a mile in one minute and fifty seconds are high and are considered equally good to a pacing record of 2:15 and a trotting record of 2:18. Laws against gambling at race tracks have been passed by a number of states and provinces, such as the Agnew-Hart bills that were enacted into law in New York, in 1908. These laws have had a tendency to lessen interest in horse racing somewhat in the larger cities, but they have directed attention more closely to the development of speed rather than to the former practice of bookmaking and gambling.

RACES OF THE WORLD. See **Ethnology.**

RACINE (rā-sēn'), a city of Wisconsin, county seat of Racine County, on Lake Michigan, at the mouth of the Root River, 62 miles north of Chicago, Ill. It is on the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul railroads. An excellent harbor is afforded on the lake, permitting the entrance of the largest vessels. The site is about forty feet above the lake and the city is regularly platted, having broad and well-improved thoroughfares. It has a large trade in lumber, grain, and merchandise. The manufactures include furniture, carriages and wagons, steam engines, lumber products, linseed oil, woolen goods, rubber clothing, machinery, malted milk, and farming implements.

Racine is well built of brick and stone. Among the noteworthy buildings are the county courthouse, the city hall, the high school, the Federal building, the public library, and many fine churches. It is the seat of the Racine Academy, the Racine College, the McMurphy

Home School, the Saint Catharine's Academy, the Saint Luke's Hospital, and the Taylor Orphan Asylum. Among the public utilities are street pavements, systems of waterworks and sanitary sewerage, and electric street railways. The first settlement on its site was made in 1834. It was incorporated as a village in 1843 and as a city in 1848. Population, 1910, 38,002.

RACK. See **Torture.**

RADCLIFFE COLLEGE, an institution of higher learning for women, established at Cambridge, Mass., in 1879, under the auspices of the Society for the Instruction of Women. Although it had no official connection with Harvard University, it was named Harvard Annex. In 1893 the name was changed to Radcliffe College in memory of Anne Radcliffe, who was the first woman to give a money endowment to Harvard. Only certificates were granted to students prior to 1893, but degrees are now signed by the president of Harvard University. The library has 10,500 volumes and the courses of instruction are similar to those of Harvard University. About 500 students attend the institution.

RADIATA (rā-dī-ā'tā), the name of the lowest of the four great divisions into which Cuvier classified the animal kingdom. It includes those forms in which the parts radiate from a central axis. These parts include both the organs of sense and those of motion. This classification went out of use in the latter part of the 19th century, when the animals included in it were divided into protozoa and coelenterata.

RADIATOR (rā'dī-ā-tēr), a hollow vessel or coil of pipe through which is passed steam, hot water, or air for warming a building or an apartment. Coils of pipe are used principally and the arrangement and appearance differ more or less. In heating by steam it is necessary to provide a boiler partially filled with water, which is connected with the radiators in the different apartments by pipes. Provisions are necessary by which all the condensed steam may return automatically to the boiler, as otherwise the radiator would soon fill with water and cease to radiate heat. Systems utilizing water are constructed in much the same way, differing only in that a continuous system of pipes articulates with a heater. These and the radiators are filled with water, which begins to circulate under the expanding influence of the heat applied in the heater, and a constant inflow of water is provided from a supply tank located in an upper story or from a city water system. The pipes which pass through basements or parts not intended to be warmed should be pro-



BOAT RACE BETWEEN HARVARD AND YALE UNIVERSITIES, IN 1910, WHICH WAS WATCHED BY 50,000 PEOPLE.



tected by asbestos wrapping, thus preventing the needless radiation of heat.

RADIOMETER (rā-dī-ōm'ē-tēr), an instrument for estimating the mechanical effect of radiant energy. It was invented by William Crookes and was first exhibited at the Royal Society, London, in 1875. The radiometer consists usually of a globe of glass from which the air has been exhausted, in which is a needle support carrying a rotating four-disk vane, colored white on one side and black on the other. When the instrument is exposed to light, revolution begins immediately, and the speed depends upon the intensity of the light. Twice the effect is produced when two candles are placed near it instead of one, and the vanes may be made to spin with great rapidity by exposure to an incandescent electric light.

RADISH (rād'ish), a fleshy plant grown extensively as a garden vegetable. It is thought to be native to India, where it was cultivated in



GERMAN DWARF RADISHES.

ancient times, and was brought from that country to Europe and America. The radish is planted for its root, which is eaten as a salad or relish when young. Gardeners usually sow the seed at various times in the same year, thus insuring young and tender plants at different periods, the older insipid and woody growths being inedible. Many species have been originated by cultivation, but all may be classed under two divisions, the *long-rooted* and the *turnip-rooted*. The root of the former resembles a carrot in form and the latter has the shape of a turnip, but the size and color vary greatly in the different species.

RADIUM (rā'dī-ūm), a radio-active metal discovered in 1898 by Professor Currie and his wife, Madame Currie, of France. It is obtained from pitchblende, a mineral consisting largely of oxides of uranium, but is difficult to procure in a pure state. It continually emits radiations of light and heat without combustion or an apparent loss of bulk or energy, but changes rapidly by oxidation. All of its prop-

erties are learned through its compounds, which are very similar to those of barium in color and solubility. By its radio-activity it affects photographic plates through various opaque substances, discharges electrified bodies, and causes remarkable changes in living matter. The activity of this metal is measured by delicate electrical devices, which are far more sensitive than the spectroscope. Radium salts emit both heat and light and this property increases with the purity. The rays of radium reduce silver salts, transform white into red phosphorus, color glass and paper, and cause a sensation of light when brought near the closed eyes. Substances placed near radium salts become radio-active. The rays of radium cause serious burns when placed near the skin, not at once, but after a considerable time, which are difficult to heal.

Radium is employed in medicine for therapeutic purposes and to some extent for diagnostic uses. The best results have been obtained up to the present time in applications to such diseases as tuberculosis and in treating epithelial cancer. Chloride of barium is used to dilute the sulphide of radium, and in this form it is placed in a small rubber bag or disc, which is fastened upon the affected part for whatever time the physician thinks it is necessary to produce the desired results. Another method is to place the salt of radium in a small cylinder, the open end of which is held near or directly against the affected part. Since radium is exceedingly expensive and no two samples are of the same strength, it is employed with difficulty in the medical practice.

RAFFIA (rāf'fī-ā), the name of a fiber obtained from the Jupati palm, used extensively in making matting and cordage. This tree is native to South America, where the natives gather the fiber and use it in making clothing. Large quantities of raffia are exported to the manufacturing centers of Europe and North America. Raffia weaving is a branch of kindergarten work in many schools of Canada and the United States.

RAFFLESIA (rāf-flē'shī-ā), a genus of plants native to the East Indies and the Philippines. Ten species have been described, all of which are parasitic. They are nearly rootless, stemless, and leafless, and consist almost entirely of flowers, which rise in the form of the heads of cabbage. One species bears a flower three feet in diameter, weighing about fifteen pounds, and this is the largest bloom in the world. It was discovered in 1815 by Sir Thomas Sandford Raffles, a British officer in Sumatra, from whom the genus was named.

RAGNARÖK (răg'nă-rĕk), the name applied in Scandinavian mythology to the time when the world is to be dissolved, when the gods will come into mortal conflict with the spirits of evil. They thought that depravity and strife will herald the approach of this great event, when piercing winds will prevent the coming of summer. Then the ferocious wolf will be freed from its chains and the Midgard serpent will gain land, while the heavens will be rent in twain and the earth will become denuded of its vegetation. Odin, Vidar, and Thor are to be destroyed, and the earth is to be wrapped in fire and sunk beneath the sea. After Ragnarök has passed away, a new earth and a new heaven are to take the place of the old. It is to be the golden age of good and happiness, when the triumphant gods shall establish peace and good will among men forever.

RAGSTONE, a rough, impure limestone rock, which breaks into raglike fragments. It is well adapted for whetstones used in sharpening steel instruments. The name is generally applied to hard, irregular rock overlying better grades of building materials, but which is used for building purposes.

RAG TRADE, the traffic in fragments of textile materials. Formerly these commodities were regarded valueless, but now they form important materials in manufacturing enterprises. Rags are collected at present with considerable care in all countries, but for centuries they were allowed to waste or were used to a very limited extent in stuffing saddlery. They are gathered in large quantities in Canada and the United States by persons traveling from house to house, but the demand for them is greater than the supply, hence considerable quantities are imported. Linen and cotton rags are consumed almost exclusively in the manufacture of paper. Bank notes, ledgers, and papers of light quality are made mostly of rags, but printing paper is made largely by mixing wood pulp with rags. Rags of woolen or worsted goods are not used in paper making, but are carefully sorted, the inferior portion being used for manure, while all the available loose texture is unraveled by machinery and, after mixing with good wool, is made into goods generally known as *shoddy*. The refuse matter remaining after carefully selecting the different grades is pulverized and used in making flock papers. In London and many other European cities companies are maintained to collect rags by utilizing the labor of children. This plan is employed in the larger cities of America, while in the country districts vendors of trinkets and merchandise collect rags and fragments of metals, usually paying for

them with tinware or small articles, such as handkerchiefs.

RAGUSA (rà-gōō'zà), a maritime town of Austria, in the southern part of Dalmatia, about forty miles northwest of Cattaro. It was formerly an independent republic, but now possesses little of its former prosperity. The place is surrounded by a wall and has a number of machine shops and mills. Among the manufactures are clothing, oil, silk, leather, tobacco, soap, and utensils. It has a considerable export trade. Ragusa was founded about 656 by refugees from a city of the same name in Sicily, and in the time of the Byzantine Empire had a flourishing trade and important educational and manufacturing institutions. It became subject to Venice in the 12th century, but formed an independent republic at the beginning of the 15th century, which was finally overthrown by Napoleon in 1808. Both the town and the province became a part of Austria in 1814. Population, 1906, 13,447.

RAGUSA, an ancient city of Sicily, thirty miles southwest of Syracuse, fifteen miles from the Mediterranean. It is situated on the Ragusa River and occupies a site in the midst of a productive agricultural and stock-raising region. Among the manufactures are cotton textiles, woolen and silk goods, oil, wine, and utensils. In its vicinity are a number of ancient tombs and the city is surrounded by a substantial wall. Population, 1906, 32,422.

RAGWEED, the name of an annual plant found in the Temperate Zone of Europe and North America. It is so named from the ragged appearance of its leaves. Some species are locally called *hogweed*, since they are eaten by swine. The flowers appear in clusters, usually golden-yellow in color. This plant thrives in rich, damp soil, and is usually found in pastures and along the highways.

RAHWAY (rà'wă), a city of New Jersey, in Union County, on the Rahway River, sixteen miles southwest of New York City. It is on the Pennsylvania Railroad and is the home of many New York business men. Among the features are the public library, the high school, the Y. M. C. A. building, and several parks. The manufactures include carriages, clothing, woolen goods, utensils, and machinery. Gas and electric lighting, sanitary sewerage, waterworks, and rapid transit are among the improvements. Population, 1905, 8,649; in 1910, 9,337.

RAIL, the name applied to many birds of the subfamily *Rallinae*, most of which are related to the coots and gallinules. These birds are widely distributed and include upward of 150 species. Among the familiar birds of this class

are the rails proper, the water hens, the coots, and the crakes. The *water rail* of Europe and the *Virginia rail* of North America are quite similar and form representative types. They have a long bill, long and powerful legs, an olive-brown or a bluish-ash color, and are about eleven inches in length. These species are highly esteemed for their flesh. The Virginia rail is a bird of passage. It feeds on worms, mollusks, and soft vegetable substances, and is abundant in many parts of North America.



CAROLINA RAIL.

VIRGINIA RAIL.

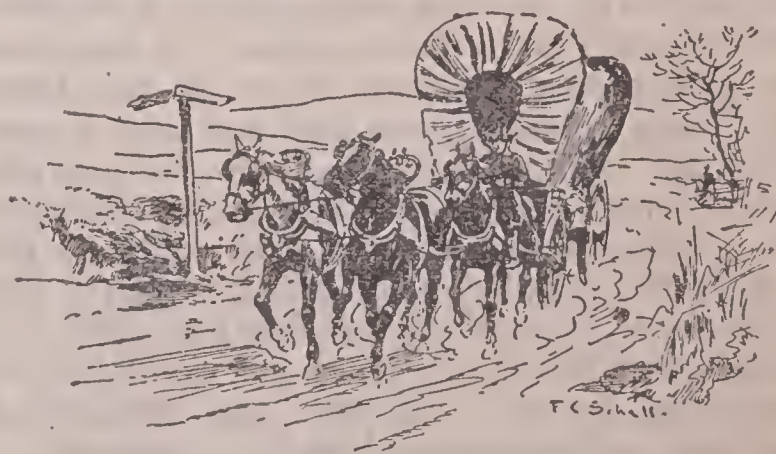
It is very shy in its habits and, when detecting danger, escapes by passing swiftly through the reeds rather than by flight. The *fresh-water marsh hen* is about twenty inches in length and is abundant in the marshes of the Southern States. Its body is eighteen inches long, the bill has a length of three inches, and the weight is nearly two pounds. The *mangrove hen* is native to the West Indies, where it is found along the muddy shores and in marshes. The *land rail* is commonly known as *corn crake* and is about half the size of a partridge, but appears quite as large as that bird.

RAILROADS, or Railways, the graded roads having one or more tracks of metal rails supported by ties or sleepers, designed for the passage of rolling stock. It may be said that railroads are exclusively modern institutions, though similar improvements were utilized in a primitive way by the ancients. The Romans constructed grades and built tracks of two lines of dressed stones, connected end to end, so as to form hard, continuous surfaces for the passage of vehicles drawn by horses. Similar tracks constructed of two parallel lines of wooden beams, having flanges to prevent the wheels of the cars from leaving the track, were built

in many parts of Europe early in the historic period. However, these were built principally within mines for transporting material to the place of exit, or for the purpose of conveying the mineral products to the places of use or shipment. Tramways were in general use in connection with the mines of Europe in 1662, and about that time they began to be used for conveying freight. The rails consisted of timber and in 1676 additional wearing rails were provided to replace those worn out, and later flat strips of iron were nailed on the surface to add greater durability.

HISTORY OF RAILROADS. Cast-iron rails were first used in 1767. They were made in lengths of five feet and a cast-iron flange was soon after added to serve in keeping the wheels on the track. Nicholas Cugnot, a Frenchman, was the first to invent a steam engine of practical service in moving cars on a railway track. His engine was completed in 1769 and is preserved as a remarkable curiosity in Paris, and a full-sized model of it may be seen at the Chicago Field Columbian Museum. It has a pair of single-acting thirteen-inch steam cylinders, by which power is communicated to a single drive wheel, and was designed for transporting artillery. Though important as leading to the perfection of the steam engine, it is a mere toy when compared to the vast machines of modern structure.

The invention made by Cugnot, stimulated many mechanical engineers and scientists of Europe to devote marked attention to the construction of a machine that would combine the



PRIMITIVE MODE OF TRAVELING.

qualities necessary to move cars safely and rapidly over rails. This ambition to add materially to practical engineering soon spread to America, and Oliver Evans, of Philadelphia, obtained a patent on steam carriages in 1787. Railroad building was delayed to a large extent by the construction of canals in many sections of Europe and America, and it was argued that no

form of transportation could surpass water navigation from the standpoint of safety and low freight or passenger rates. Although this view was proved to be entirely correct, railroad building still remained a favorite theme of study, since it was desired to secure greater rapidity and to establish highways of travel and commerce where water navigation could not be utilized. It may be said that Oliver Evans is the inventor of the high-pressure double-acting steam engine, since his first product of this class was completed in 1800. However, England claims that honor for Richard Trevithick, who, about the same time, constructed an engine to draw wagons on rails. Oliver Evans (q. v.) built a steam dredge in 1804, which was the first steam-propelled vehicle made in America that moved successfully. For many years engineers entertained the mistaken notion that locomotives cannot do their work successfully without having spur wheels, and mechanical engineers conformed their engines and tracks along that view, but a coal operator of England, in 1812, successfully demonstrated that smooth wheels run more easily and successfully on smooth rails. This having been satisfactorily established, nothing more was needed than to provide a machine that would possess the desired amount of speed. In 1814 George Stephenson made a practical success in building a locomotive for railroad use. It was built with money advanced by Lord Ravensworth and ran 35 miles an hour. The first railway opened in England was that from Stockton to Darlington, in 1825, and the second was built from Liverpool to Manchester in 1830.

NORTH AMERICA. The first railroad constructed in North America was projected in 1825 and extended from Quincy, Mass., to the nearest tidewater, about four miles. It was completed the following year and was used principally for carrying granite from the quarries near Quincy. The second railroad extended from mines near Mauch Chunk, Pa., to the Lehigh River and was completed in 1827. The New York Central was projected in 1825; the Boston and Albany, in 1827; and the Baltimore and Ohio, in 1828. In 1830 only 23 miles of railroads were completed and in operation in the United States. The engines used were of the Stephenson make and were imported from England. Since then many vast improvements have been made in building railroad tracks and rolling stock, and lines are now operated in nearly all sections of the United States and in the southern part of Canada.

The United States has a larger railroad mileage than any other country in the world. It

has witnessed a marvelous extension of railroad mileage since 1830, not a single year having passed without material additions being made to the value and utility of these neces-



MODERN MODE OF TRAVELING.

sary highways of modern commerce. At the beginning of the Civil War, in 1861, that country had 29,739 miles of railroads, and in 1873 it had 70,268 miles. The following table contains an exhibit of interesting matters in railroad development during the decade ending with the last census of the United States:

YEAR.	TOTAL MILE-AGE.	TOTAL CAPITAL.	TOTAL DEBTS.	NET EARNINGS.
1891.....	164,686	\$4,809,176,751	\$5,233,295,074	\$356,209,880
1892.....	170,499	4,920,555,225	5,463,611,204	358,638,520
1893.....	173,012	5,080,032,904	5,570,293,613	364,591,109
1894.....	176,919	5,075,629,070	5,665,734,249	322,539,276
1895.....	179,198	5,231,373,852	5,712,052,517	327,505,716
1896.....	180,891	5,200,600,725	5,690,970,314	332,333,756
1897.....	184,603	5,230,924,860	5,720,828,215	338,170,195
1898.....	187,340	5,240,728,254	5,727,364,201	341,244,580
1899.....	190,833	5,262,286,561	5,753,123,790	356,280,760
1900.....	195,133	5,276,524,380	5,800,542,870	361,080,203
1909.....	230,404	5,694,425,841	6,098,452,908	385,808,645

CONSTRUCTION. The first work in railroad building is to make a survey of the projected route between two places for the purpose of ascertaining the most practicable line, and for setting grade stakes to indicate the amount of cuts and elevations to be made. It is aimed to make the line as nearly level and straight as possible, since both are important factors in facilitating speed and promoting traffic without needless expense. To do this it is generally made an object to follow the valleys of streams wherever practicable, though in many sections it is necessary to penetrate hilly and mountainous regions. In an undulating country railroad builders aim to have the cuts supply the necessary amount of earth to build the embankments required in carrying the grade over depressions. Tunnels are cut only through the higher hills and mountains. In many regions where snow-storms, or snowslides, prevail it is necessary to protect the portions of railroad tracks passing through cuts by snow fences.

After the grading is completed, the *ties*, or *sleepers*, are placed across the grade at a distance of about twelve inches from each other, the wood commonly used for that purpose including white oak, yellow pine, chestnut, and hemlock. Afterward the roadbed is treated with a process called *ballasting*, which consists of imbedding the ties in a layer of sand, gravel, earth, or crushed stone. At present the rails are made almost exclusively of steel. They are spiked at a certain distance or width from each other, called the *gauge*. Three different gauges, known as *narrow*, *standard*, and *broad*, are in general use throughout the world. However, the railroads are chiefly of the standard gauge, which is four feet eight and a half inches (1.435 meters) wide, and the rails are made

early as 1837, dining cars came into use in 1867, and George M. Pullman patented the vestibule car in 1887. Passenger trains of the first class are made up of cars fitted with two six-wheel trucks. They have electric or gas lights, hot water or steam heating, automatic air brakes, and automatic couplers, and include vestibule cars for dining and sleeping. In some of the finer cars are apartments containing a barber shop, a smoking room, a bath room, a library, etc. The block signaling system is used on all first-class lines, thus providing practical safeguards against danger.

ELECTRIC AND OTHER RAILWAYS. Much activity has been displayed in building *electric railways*, which are so named because the cars, or trains of cars, are propelled by electric power.

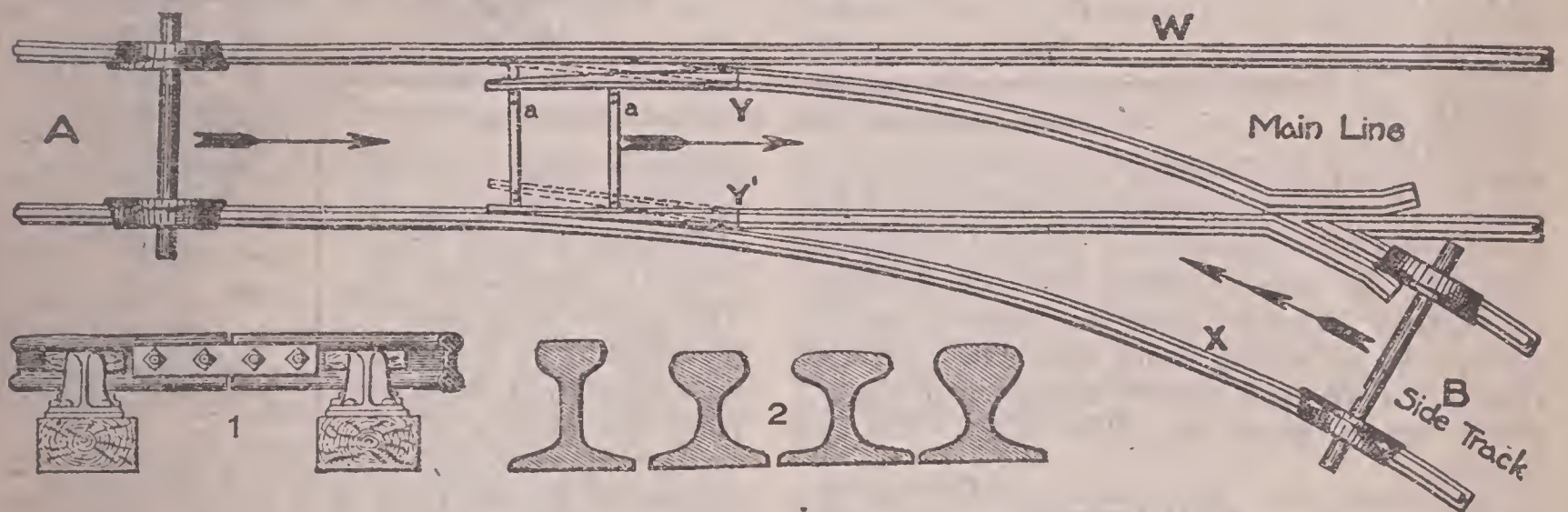


DIAGRAM TO SHOW RAILROAD AND SWITCH.

A, Wheels passing the Y of the switch on the main line; B, wheels passing from the side track to the main line; 1, connection of rails at the ends and plan of mounting upon the ties; 2, cross sections of T rails.

principally of the *T steel*, so called from its resembling the form of the T turned upside down. One pair of parallel rails constitutes a single track of railway, two pairs, a double track; and with each system are a number of *side tracks* connected with the main line by *switches*.

EQUIPMENT. The cost of building the railroad lines is only a portion of the general expense to be considered in construction and operation, since depots, freight offices, telegraph lines, and rolling stock are all important items to be added in estimating the general cost. Cars for the transportation of freight are variously constructed and include those designed particularly for way freight, grain, coal, oil, fruit, and other perishable commodities. The express and postal business is largely in connection with passenger trains, though on some lines the express and postal service is carried on trains designed especially for those purposes. The Baltimore and Ohio Railroad issued the first time-table for passenger trains in the United States in 1830. Sleeping cars were made as

They are now utilized not only for urban and suburban passenger traffic, but have come into a wide use in the interurban districts for the conveyance of passengers, express, mail, and freight. In many cities railway lines are built above the streets, known as *elevated railways*, partly to overcome the dangers attending crowded streets, and to make it possible to provide greater rapidity in the transit. Systems of elevated street railways are operated in New York, Chicago, Berlin, London, Paris, Vienna, and other great cities of the world. *Underground railways*, or *subways*, are operated in New York, Paris, London, and elsewhere. *Cable railways*, which employ underground cables to propel the cars, are in use in some cities and in mountainous districts, being most serviceable in making steep ascents and descents.

RAILROADS OF THE WORLD. The total railroad mileage of the world is placed at 583,622 miles, of which 272,300 miles are in North America. The following is the mileage of railroads in the grand divisions according to the latest accounts:

North America, 272,300; Europe, 196,620; Asia, 46,890; South America, 35,360; Africa, 16,240; and Australasia, 16,212.

In some countries of Europe and Asia transportation is facilitated by canals, and the location of many commercial centers is such that they can be reached easily by navigation on streams and the ocean. This accounts in part for a smaller mileage than would seem adequate to transport interior trade when the population

and industries are taken into account, but there are many regions where railroad construction would seem highly advantageous

and no doubt will receive greater attention in the future. Railroad building is a material factor in the development of natural resources, especially in regions remote from the seaboard and where highways have not been improved. The countries having more than 5,000 miles of railroads at the end of 1908 are given in the list below, taken from the *New York Railroad Gazette*:

Sweden.....	7,242	Australia.....	9,825
Spain.....	8,447	Italy.....	9,881
Mexico.....	9,660	Argentine.....	10,479
Brazil.....	9,248	British America.....	20,379
Great Britain.....	23,164	Russia.....	36,130
Austria-Hungary.....	23,432	Germany.....	38,943
British India.....	25,515	United States.....	230,404
France.....	27,285		

Great Britain stands at the head of the list in the number of passengers carried in one year, namely 1,062,911,000. In the United States the number of passengers carried in a year is 965,300,000; in Germany, 925,600,000; and in France, 410,240,000. The Trans-Siberian Railway from Moscow to Dalny, a distance of 5,403 miles, is the longest line in the world, and from it are branches to Saint Petersburg, Port Arthur, and Vladivostok. Work on double-tracking the main line is progressing rapidly. The branch passing round the southern extremity of Lake Baikal was opened for traffic in 1904. In 1905 the Grand Trunk Railway Company secured the assent of the Canadian Parliament for a new Trans-Canadian Railway, from New Brunswick in the east to the Pacific in the west, which was projected to Dawson, Yukon, in 1909. The government of France has projected a Trans-African line across the Sahara, which will likely be completed within the next decade.

It is to extend from Algiers to the west shore of Lake Tchad.

RAIN, the condensed vapor of the atmosphere falling to the earth in drops large enough to obtain sensible velocity. It differs from *mist* in that the latter falls in very small drops or particles, and from fog, which is composed of particles so fine as to be not only individually indistinguishable, but to float or be suspended in the air. A large amount of watery vapor is



MAP SHOWING THE TRANS-SIBERIAN RAILWAY.

always present in the air, but warm air is capable of holding a much larger quantity than cold air. The vapor suspended in the atmosphere is derived by evaporation of water from the surface of the earth, by far the larger part being taken up from the ocean, though there is a considerable evaporation from the land and interior bodies of water. The quantity of moisture that the atmosphere may hold depends upon the temperature, and, when it contains all that it is capable of holding, it is said to be *saturated*, or at its *dew point*.

To produce rain, it is necessary that the temperature of a large mass of air be reduced considerably below its dew point. This condition may be brought about by a change of latitude, that is, a warm moisture-laden wind may blow into a cold region; or by a change of altitude resulting from an ascending current of air carrying the moisture of the lower strata into the upper regions. It is mainly in the latter manner that the rains of the tropical regions are caused, but the effect is similar in mountainous districts when a moist wind reaches a mountain range and is forced to ascend the slopes. Rain is also caused by the mingling of masses of cold and warm clouds, though the precipitation from this cause is never considerable, since the colder air becomes warmed by the mixing, and thus acquires greater capacity for holding moisture.

As raindrops fall through the cloud they be-

come larger by other drops uniting with them, hence their size depends upon the density of the cloud. Generally they are larger in the daytime than at night and are larger in the tropics than in the polar regions. The air is purified by rain falling through it, and by the mixture of the upper and lower strata of air resulting from its passage through the strata. Rain has a wholesome effect upon the earth, since offensive gases are washed from the surface by water flowing over it or passing into the soil. Fresh rain water contains a small quantity of ammonia and carbonic acid, on account of which it has a more wholesome effect upon plants than that derived from wells and springs. A great variety of circumstances affect the quantity of rainfall in different localities, such as nearness to the sea, exposure to prevailing winds, latitude, altitude, and the presence of mountain ranges. Rainfall is affected by the presence of vegetation, since an abundance of vegetable forms tends to aid condensation by keeping the soil cool, while a desert region becomes highly heated and directly counteracts condensation. More rain falls in the tropics than in the temperate regions, and more descends in the temperate than in the polar regions. This is due to a decrease in the quantity of heat and evaporation with moderate regularity from the Equator toward the poles.

The distribution of rain determines in a large measure the material industries of the people, since without moisture any region is a mere desert and the subsistence of animal and vegetable life is either entirely impossible or greatly limited. The supply of rain in the vast interior of North America depends upon the winds blowing from the Gulf of Mexico. These winds are influenced in a measure by the elevated ranges of the Sierra Madre Mountains, in Central America and Mexico, and thus are directed to spread themselves over the great basin of the Mississippi River. The movement of these winds may be traced from the equatorial regions to the vicinity of the peninsula of Yucatan, and as they proceed toward the north and west they appear to be elevated by a countercurrent of colder winds near the surface. In moving from the lower to the higher latitudes they gradually give off their store of moisture. The quantity required in the upper part of the valley is perceptibly less than in the southern part, since the temperature is noticeably lower; thus the valley is adequately watered from the Gulf of Mexico to the regions extending far into Canada.

The Atlantic coast plain and the western slope of the Pacific derive an abundance of moisture

from the respective oceans, but there is a considerable shortage of rainfall in the Pacific highlands and the slopes of the Rocky Mountains. Among the vast arid regions are the Sahara and Kalahari deserts of Africa; the Arabian, Tarim, and Gobi deserts of Asia; the coast of Peru; and the great interior of Australia. On the other hand, there are regions where rain falls almost daily or periodically with great excess, such as Patagonia, the lake regions of Africa, parts of India, and the northern part of Brazil. The quantity of rain which falls in a given time on any area is determined by means of an instrument called the *rain gauge*. The following statistics show the average rainfall of various places of interest: Cherapungee, India, 610 inches; San Luis de Maranhao, Brazil, 280 inches; Paramaribo, Guiana, 229 inches; Havana, Cuba, 91 inches; Sitka, Alaska, 90 inches; western Sweden, 82 inches; southern Germany, 27 inches; the British Islands, 40 inches; Washington, D. C., 38 inches; and San Francisco, Cal., 23 inches. The average rainfall in the United States in the semi-tropical zone is 39 inches and in the temperate zone, 34 inches. In Canada the rainfall is greatest on the eastern and the western coasts, with a semi-arid region on the eastern slope of the western highlands, where the precipitation ranges from 10 to 21 inches.

RAINBOW, a luminous arch appearing in the clouds opposite the sun, due to the refraction, reflection, and dispersion of light in drops of water falling through the air. The light is thus decomposed into its simple colors, which always appear in the same order; namely, violet, indigo, blue, green, yellow, orange, and red. A perfect rainbow consists of two concentric arches, the inner or brighter being called the *primary* bow, while the outer or fainter arch is called the *secondary* bow. In the primary bow red is the outer color and violet the inner, while in the secondary bow the colors are dimmer and arranged in a reverse order, this being due to a double reflection within the drops. Rainbows are seen only when the sun is 40 degrees or less above the horizon, hence they occur both in the morning and in the evening. Only a part of the rainbow is seen, since a portion of it is below the horizon, but an observer standing on the top of a high mountain can see a greater part of it than an observer occupying a lower altitude. The bow is circular in form because the red ray of the primary bow forms an angle of about 42 degrees when it leaves the drop, and the violet forms one of 40 degrees. The occurrence of a broken rainbow is due to only parts of the field being filled with falling rain, or to

the sun being obstructed from parts of it. Rainbows forming a complete circle are caused by the rays of the sun falling on the spray rising from a waterfall or cataract, but this phenomenon is of rare occurrence. They are formed occasionally by the light of the moon, called *lunar rainbows*, but these are not so bright as those seen in daytime.

RAIN GAUGE, or **Pluviometer**, an instrument for measuring the amount of rain which falls on any given surface. The measurement of rainfall has long been regarded important, and various contrivances to secure fairly accurate tests have been devised. The form generally used consists of a cylindrical vessel with a horizontal base, surmounted by a funnel-shaped top into which the rain enters. A glass tube with an attached scale is connected with the lower part of the cylinder. As the water enters the cylinder it rises in the glass tube and it becomes an easy matter to read the quantity of rain fallen in inches by observing the scale. It is necessary to place the rain gauge in a position free from eddies and whirls. The rain-water accumulated may be emptied by means of a stopcock at the bottom. It is quite important to locate the instrument as near the general level of the region to be tested as possible, since rainfall is more abundant near the ground than at some distance in the air. This was verified in a practical test made at Des Moines, Iowa, where it was found that the rainfall near the general level of the region for one year reached 30.2 inches, while at a height of 150 feet above the general level it was only 24.8 inches. Automatic rain gauges now made have a graduated scale for estimating the rainfall collected by the funnel. They indicate the duration of each shower as well as the rate at which the water falls. The fall of snow, in a melted condition, is always included when speaking of the rainfall of a country.

RAINY LAKE, an inland lake of North America, which forms part of the boundary between Minnesota and Ontario. It is situated 160 miles west of Lake Superior. Rainy Lake is about 40 miles long, has an average width of five miles, and is 1,160 feet above sea level. It has numerous small islands and valuable fisheries. Rainy Lake River, a stream about 100 miles in length, carries its surplus water into the Lake of the Woods.

RAISIN (rā'zīn), the dried fruit prepared from the grape and used for dessert or in cookery. The species of grapes containing a large quantity of sugar are of greatest value in making raisins. Several methods of producing raisins are in use, those of inferior quality being

dried in an oven. The best grades are made from choice grapes by cutting half through the fruit stalk without detaching it from the tree, thus leaving the cluster to shrink and dry by the heat of the sun while on the vine. Another method is to dip each bunch of grapes into a solution of lye made of the ashes of the burned tendrils, after which the fruit is dried by exposure to the sun. Large quantities of raisins are produced in California, but the principal producing countries are Spain, Asia Minor, Egypt, and other regions adjacent to the Mediterranean Sea.

RAISIN RIVER, **Battle of the**, an engagement at Frenchtown (now Monroe), Mich., in the French and Indian War. General Harrison had sent a detachment of Americans under General Winchester to take possession of Frenchtown, where he was surprised on Jan. 22, 1813, by a force of British and English under General Proctor. The Americans were defeated, but received assurances from the British that those left in the village would be protected from the Indians. After the British departed with their prisoners for Malden, the Indians massacred nearly 400 and took the balance away into captivity. After that event the Americans frequently used the cry, "Remember the Raisin River."

RAJAH (rā'jā), or **Raja**, a title borne originally only by the princess of the Hindu race, but now conferred by the British government upon Hindus of rank. Anciently the title was borne only by the military caste and powerful princes, but it is now assumed by landholders and members of inferior castes.

RAJPUTANA (rāj-pōō-tā'nū), an extensive division of British India. It is bounded on the north by the Punjab, east by Agra and Oudh, southeast by the Central India Agency, and west by Bombay. The area is 127,541 square miles. A large majority of the inhabitants are Hindus, but they are divided considerably in religious affiliations, including Brahmins, Mohammedans, Jains, and a small number of Christians. Population, 1906, 9,828,103.

RAKE, an implement with teeth or tines, which is used for collecting loose material or smoothing and evening a surface. The hand implements with parallel teeth fixed at right angles to a long handle are the simplest form of rakes. The horse rakes now used by farmers are two-wheeled implements. They are drawn by one or two horses and are provided with curved tines between the wheels for gathering hay into windrows and cocks.

RALEIGH (rā'li), the capital of North Carolina, county seat of Wake County, near the

Neuse River, 147 miles northwest of Wilmington. Communication is furnished by the Southern and the Seaboard Air Line railroads. It occupies an elevated site in the upper valley of the Neuse, about 320 feet above sea level, and is surrounded by a fertile region. Near the center of the city, in a small but well-kept square, is the State Capitol. Other noteworthy buildings include the county courthouse, the Federal post office, the State penitentiary, the State Geological Museum, the State Insane Asylum, the State College of Agriculture and Mechanic Arts, and the Governor's mansion. It has many fine libraries, including the State Library of 40,000 volumes. Pullen Park and the Confederate and National cemeteries are fine public grounds. Among the institutions of higher learning are the Saint Mary's School, the Peace Institute, the Raleigh Male Academy, the Shaw University, the Saint Augustine Collegiate Institute, and the Latta University. Raleigh is important as a market in cotton, tobacco, and general merchandise. It has manufactures of cigars and pipe tobacco, cotton-seed oil, clothing, machinery, marblware, carriages, wagons, furniture, flour, railroad cars, and hosiery. The streets are well graded and improved with drainage and pavements. Raleigh was chosen as a site for the State Capitol in 1792 and was incorporated two years later. In 1865 the city was occupied by General Sherman. Population, 1910, 19,218.

RAM, an ironclad ship of war having its bow especially designed and constructed for ramming. Such a vessel has a heavily armored stem at the bow below the line of water and is intended to destroy the enemy's ships by driving against them with great force, the collision being designed to crush the side of the attacked vessel without injuring the ironclad. Vessels of this class were first employed in the Civil War, when the Confederate ram *Virginia* sunk the Federal frigate *Cumberland* at Hampton Roads in 1862. The ram is now regarded one of the most efficient vessels for coast defense.

RĀMA (rā'mā), in Hindu legends, the hero of the Rāmāyana, who made his appearance in the world at the end of the Treta Yuga or second age, and is called the seventh incarnation of Vishnu. He is generally spoken of as Ramachandra. Two other incarnations of Vishnu bear the name of Rāma, known as Balārāma and Parasa-rāma.

RAMADAN (rām-ā-dān'), the ninth month of the Mohammedan year, the one in which Mohammed received his first revelation. It is for this reason the great annual fast month and festivities are kept up throughout the entire period, from sunrise to sunset. All believers

are enjoined to abstain from eating, drinking, and sensual pleasures during the entire day, but food may be taken at night to supply the necessary wants of the body. The obligations enjoined upon believers during Ramadan are treated in the second book of the Koran called *The Cow*. Since the Mohammedan months are reckoned by lunar time, each month begins in each successive year eleven days earlier than in the preceding, hence it occurs successively in all the seasons in a period of 33 years.

RĀMĀYANA (rā-mā'yā-nā), one of the two great epic poems of India, the other being known as Mahābhārata. This poem is the accredited work of Valmiki and recounts the famous exploits of Rama, King of Oude, who was one of the conquerors of Ceylon. It consists of 2,400 stanzas, arranged in seven books, and is thought to have been composed in the 5th century A. D. Many translations and criticisms on this work are extant, since it may be classed as the most celebrated poem in India. The translations of Schlegel are especially noteworthy.

RAMESSEUM, the name of a temple built at Thebes, Egypt, by Rameses II. It was located on the west bank of the Nile, where its ruins attract many tourists. This temple was dedicated to the god Ammon and contained a colossal statue of Rameses II.

RAMIE. See *Boehmeria*.

RAMILLIES (rā-mē-yē'), or *Ramilies*, a town of Belgium in Brabant, 28 miles southeast of Brussels. It is noted as the seat of an important battle in the War of the Spanish Succession, which occurred on May 23, 1706. The French forces were commanded by Marshal Villeroy and the elector of Bavaria, while the allied troops were under the command of Marlborough. The former were defeated with a loss of 13,000 men and France was compelled to abandon its claim to the Spanish Netherlands.

RAMPART (rām'pärt), the embankment surrounding a fort, on which the parapet is raised, and which is designed with the view of resisting cannon shot. It is constructed immediately within a ditch, the lower part of the outer slope being usually made of solid masonry and the remainder being formed by the earth taken from the ditch. The height of the rampart is determined largely by the height of the buildings to be defended and by the character of the region surrounding the fort.

RANCH, a term applied in the western part of North America to an establishment for rearing and grazing cattle and other stock in large numbers. The name was derived from the Spanish word *rancho*, meaning a hut or collec-

tion of huts in which ranchmen mess and lodge. Ranching has long been an important business and involves the rearing of large herds of cattle, horses, ponies, and sheep. For nearly half a century the ranchmen and cowboys had almost uninterrupted possession of many sections of the great plains, but the region is now penetrated more or less by railroads and limited by agriculturists.

RANGOON (rān-gōon'), the capital and chief seaport of British Burmah, on the Rangoon River, twenty miles from the sea. The Rangoon River is the eastern branch of the Irrawaddy, and the city is situated along the left bank, its dock being on the opposite side of the river, at the suburb of Da-la. Rangoon is an important railroad and trade center. It is fortified and garrisoned and contains many valuable public buildings. The most noteworthy structures include the government buildings, the Saint John's College, a number of hospitals and schools, and numerous churches, mosques, and temples. A large majority of the people are Burmese, but it has a considerable number of Hindu inhabitants. A city has existed here since many centuries before the Christian era, but its prosperity dates from the 18th century, when it was captured and rebuilt by the Burmese. The British came in possession of it in 1852. It is the seat of rice mills and has manufactures of clothing, lumber products, pottery, and utensils. The trade in timber, ivory, rice, hides, cotton, precious stones, and gums is important. Population, 1906, 236,818.

RANK. See *Relative Rank*.

RANUNCULUS (rā-nūn'kū-lūs), a genus of herbaceous plants of the buttercup family, several common species of which are known as *buttercup*, or *crowfoot*. The flowers have five or more petals and numerous stamens, and the seeds are grouped into a head or cluster. The leaves of most species are much divided, the roots are bulbous, and some species have acrid and caustic properties. *Buttercups* are among the more common species and are found largely in meadows, while *crowfoots* and *spearworts* are equally well known, the former growing mostly in pastures and the latter in marshes and wet places. More than a hundred species have been described. A double-flowered variety, known as *bachelor's button*, is cultivated in some regions as a flowering plant. It has a tall stem and white or yellow flowers.

RAPE, a biennial plant which is cultivated extensively in Europe, principally for the leaves and the seed. It is closely related to the cabbage family, but it has a root like that of the turnip, this portion being esculent and useful

as an article of food. A species known as *summer rape* is well known in England and France, being cultivated largely for *colza oil* obtained from the seed. This oil is used for machinery and lamps in lighthouses. The seed is fed to cage birds. Rape is not only valuable as a forage crop and for the root and seed, but is useful to plow under as a fertilizer.

RAPIER (rā'pī-ēr), a straight sword used only for thrusting. The blade is highly tempered and finely pointed and was formerly used very extensively in duels among military men. At present it is employed in state ceremonials.

RAPPAHANNOCK (rāp-pā-hān'nūk), a river in Virginia, which has its source in the Blue Ridge Mountains, and, after a course of 225 miles toward the southeast, flows into Chesapeake Bay by an estuary about 70 miles long. It is navigable to Fredericksburg, 110 miles. The principal tributary is the Rapidan. On these two rivers occurred the important battles of Fredericksburg, Chancellorsville, and the Wilderness, in the Civil War.

RARITAN (rā'rī-tān), a river of New Jersey, which rises in Morris County and flows southeast into Raritan Bay. It is 70 miles long and is navigable to New Brunswick. The Delaware and Raritan Canal joins it at that city, connecting it with the Delaware River and forming a short route between New York and Philadelphia.

RASPBERRY (rāz'bēr-rŷ), a shrubby plant belonging to the same genus as the blackberry.



RASPBERRY.

It is cultivated extensively as a garden fruit. The old plants have many suckers, the stem is

characterized by slender prickles, and the leaves are pinnate. It is native to America and the northern part of Europe and Asia. The cultivated species have been greatly improved and about 500 different kinds have been described. They include red, yellow, and black species and the fruit resembles the strawberry in not becoming acid in the stomach. The ripened fruit is used in making jam, jelly, and various liquors and is eaten as a dessert. Different kinds of medical preparations are made of it, including compounds of use in fevers and for expectorants. Wild species are found in many sections of the United States. The raspberry is cultivated throughout the southern part of Canada.

RAT, a class of rodent mammals belonging to the mouse family, but including only the larger species. A number of species have been described. They infest houses, barns, and ships. Most rats have a slender head and a long, scaly tail. The *Norway* or *brown rat* is about nine inches in length, and is the largest and most powerful. The *black rat* has a somewhat shorter body, a longer tail, and larger ears. These two kinds are native to Central Asia, where other allied species also prevail. Rats were unknown in Europe until the 16th century, when the black rat made its appearance, and about two centuries later the brown rat became common to the western part of that grand division. Both are now distributed in America and are hostile to each other. The brown rat being stronger, it either kills or drives the black rat from a locality when it once gets a permanent foothold. Rats feed on many kinds of animal and vegetable food, and to obtain it they burrow in the ground or gnaw through wooden structures. They devour eggs, small poultry, birds, grain, and vegetables and make their way into warehouses and dairies. The rat multiplies very rapidly. Its flesh is eaten only by rude tribes and animals, though its skin is used to a considerable extent in making gloves. The *white rat* belongs to this class of animals and is frequently seen as a household pet. A species known as the *cotton rat* is common to the southern part of the United States.

RATCHET (răch'ět), a mechanism for holding or propelling a ratchet wheel. It consists of a pawl or click, which fits into the teeth of a circular wheel, as in the carriage of a typewriter, where it turns a wheel by degrees. The windlass and derrick furnish an example of a ratchet that prevents the backward movement of a wheel.

RATEL (ră'těl), a mammal of the badger family, sometimes called *honey badger* from its fondness for honey. The size is that of the bad-

ger, but it is somewhat heavier and has a less projecting nose. The ratel native to South Africa burrows in the ground for its dwelling and searches for the nests of wild bees, against whose sting it is protected by its loose and leathery hide. The ratel of Asia has a shorter tail, is about three feet in length, and is nocturnal in its habits. It feeds on small animals and insects and is said to prey upon imperfectly buried human bodies.

RATIO (ră'shĭ-ō). See **Proportion**.

RATIONALISM (răsh'ün-ăl-ĭz'm), a term employed to denote a system of theology in which reason is the supreme guide. It stands in opposition to *supernaturalism*, which is the doctrine of a supernatural agency in the matters of faith and morals. While rationalism is founded upon physical or natural causes, supernaturalism assigns revelations to a divine agency. As a doctrine rationalism had its rise in Germany at the time of the Reformation, when the Roman Catholic Church held to the doctrine of infallibility as a central dogma. In 1521 Martin Luther declared at the diet of Worms: "Unless I am refuted and convinced by proofs from the Holy Scriptures, I yield my faith neither to the Pope nor to the council alone." In this doctrine Luther was joined by Zwingli and Calvin, and in 1530 was published the Confession of Augsburg. Kant used the term rationalism in considering the tendency which claims for the unaided human reason the right of deciding in matters of faith. In this sense it departs from the teachings of Luther, since it considers all sources of information and leaves to the human reason the important decision of matters of faith, without regard to the authority of councils or the Scriptures.

RATISBON (răt'is-bŏn). See **Regensburg**.

RATON (ră-tŏn'), a city in New Mexico, county seat of Colfax County, twenty miles south of Trinidad, Colo. It is on the Atchison, Topeka and Santa Fé Railroad, and is surrounded by a farming and stock-raising country. In its vicinity are productive deposits of coal. The principal buildings include the county courthouse, the high school, and a number of churches. It has grain elevators, stock yards, and extensive railway shops. Population, 1900, 3,540; in 1910, 4,539.

RAT PORTAGE, or **Kenora**, a city of Canada, in the western part of Ontario, 130 miles east of Winnipeg, Manitoba. It is a port of entry on the northern shore of the Lake of the Woods, has communication by the Canadian Pacific Railway, and is surrounded by a lumbering and gold-mining district. The chief buildings include the high school, the armory, and the

Commercial and King Edward hotels. It is noted as a summer resort. Fine water power is furnished by the Winnipeg River, which has a fall of twenty feet. The manufactures include flour, machinery, clothing, and lumber products. It has an extensive trade in merchandise and lumber. Population, 1901, 5,202.

RATTAN (răt-tăn'), the name applied commercially to the long and flexible stems of several species of climbing palms and to the more rigid stem of certain erect palms. The former are very tough and strong and are used for many purposes, such as making ropes, seats of chairs, cables, baskets, mats, hats, and various kinds of wickerwork. The stems of the erect palms are used mostly for walking sticks. Rattan is produced largely in Sumatra, Java, and other islands southeast of Asia. It is sold in the export market in bundles of 100 canes, each measuring from fifteen to twenty feet in length.

RATTLESNAKE (răt't'l-snāk), the general name of several species of venomous snakes, so named because of having a series of horny



PRAIRIE RATTLESNAKE.

scales at the end of the tail, which clash together with a rattling sound when the tail is vibrated. The rattle is a complicated organ and appears in very young rattlesnakes, before they have shed their skin for the first time. When the skin is renewed a new joint appears next to the body of the snake, while the old one is not cast off with the remainder of the epidermis. Thus, there are as many loose joints in the rattle as there have been renewals of the skin of the snake, though the number does not indicate the age of the snake, since the skin is changed oftener than once a year, but it does indicate the number of changes of skin that the animal has undergone. The rattles are dry, horny, and cup-shaped, each fit-

ting over a portion of the preceding and tapering toward the farther end. They give off a peculiar sound when shaken, unless wet by rain or dew, when no sound can be produced.

Rattlesnakes are natives to America, and include about fifteen-species. They are sluggish in habit, but pursue squirrels, rabbits, mice, and other animals upon which they prey with considerable skill. The poison is one of the most deadly found in serpents and penetrates rapidly and with deadly effect the nerve centers. The *prairie rattlesnake* attains a length of about three feet and is found in many sections of the western states, where it shares burrows in common with prairie dogs and owls. The *banded rattlesnake* occurs east of the Mississippi and reaches a length of from four to six feet. Other and larger species are found in Mexico, Central America, and South America.

RAUHES HAUS (rou'es hous), meaning rough house, an institution founded near Hamburg, Germany, by Johann Heinrich Wichern. It is located at a suburb named Horn and is managed as an adjunct to the German Home Mission. This institution was opened in 1831, and has since grown into an important institution for the culture of children—physically, intellectually, and morally. An artisan is appointed for the supervision of families of children, usually about twelve, and they are instructed in different elementary branches of study and are trained to do all classes of useful household and outdoor labor. The institution somewhat resembles an industrial school, with the addition of special efforts to inculcate moral tendencies and ability for various occupations, such as teaching, superintendence, clerking, etc.

RAVEN (rā'v'n), a species of crow, widely distributed and remarkable for its large size. It is about two feet from the bill to the tail, and its extended wings measure nearly three feet. The plumage is glossy black. Its bill is thick and short, the tail is rounded, and its flight extends high into the air. Ravens are able to scent carrion a distance of several miles, which causes them to congregate in the vicinity of dead animals, their favorite food, but they also feed on fruits and tender shoots of plants. They are noted for being long-lived and may be taught to imitate human speech. The ravens are noted in literature, being the first birds to be mentioned in the Old Testament, and they are alluded to in classic mythology as an ill omen. Shakespeare mentions the appearance of the raven as foreboding misfortune, while

Poe makes it a prominent figure in "The Raven."

RAVENNA (rà-vĕn'nà), a city of Italy, capital of a province of the same name, four miles west of the Adriatic Sea and 42 miles southeast of Bologna. It is located in a fertile region, has wide streets, and is surrounded by walls. In former times the sea extended to the city, but now its harbor is silted up, and the connection with the Adriatic is by a canal. A railroad line connects it with the great railroad system of northern Italy, giving it convenient trade facilities. Among the manufactures are silk textiles, pottery, utensils, clothing, musical instruments, and machinery. Its streets are adorned with a number of statues of the popes and the city is generally rich in monuments of art. The principal buildings include a cathedral dating from the 4th century, numerous other churches, and a library containing 100,000 volumes. It has numerous educational institutions, museums, gardens, and parks. Among the municipal facilities are electric lights, waterworks, pavements, and telephones. Ravenna is a very ancient city, and is thought to have been founded by the Umbrians. Emperor Honorius made it the capital of the Roman Empire, but its greatest prosperity was attained under Theodoric the Ostrogoth, who was buried here. It became the metropolis of the Lombardic kingdom in 1752, but the Lombards were expelled by Pepin and Charlemagne, who presented it to the Pope. It continued as an exarchate to the Pope until 1860. Population, 1906, 64,031.

RAWLINS (rà'lĭnz), a city of Wyoming, county seat of Carbon County, 135 miles west by north of Laramie. It is on the Union Pa-



RAY.

1, Florida Sting Ray; 2, Common Skate.

cific Railroad and is surrounded by a mining and sheep-raising country. The features include railroad machine shops, the county courthouse, the high school and the State prison. It has electric lighting, public waterworks, and a large commercial trade. Limestone and building stone are quarried in the vicinity. Population, 1905, 3,617; in 1910, 4,256.

RAY, a genus of cartilaginous fishes. They are generally divided into numerous families, including the sawfishes, electric rays, skates, sting rays, and the eagle rays. The *sawfishes* have an elongated body and a peculiar prolongation of the snout, armed with from three to five cartilaginous tubes. This snout prolongation is called the *saw*, and is a formidable weapon of defense, with which it is able to tear open the body of its prey to feed on the vitals. The *electric ray* has peculiar organs by which it is capable of generating electricity as a means of defense, or to kill the smaller animals on which it feeds. Its body is smooth and naked. The *skate*, or *thorn-back ray*, is so named from the peculiar curved spines, while the *sting rays* are peculiar for their vertical fins and barbed spine, with which they are able to inflict painful wounds. In the *eagle rays* the pectoral fins are highly developed, the body is dilated, and the tail is very thin. More than a hundred species of rays have been described. Some weigh only a few ounces, while others attain a weight of 1,500 pounds. Many species of the genus are distributed more or less widely in all the seas.

RAZOR (rà'zēr), a knife of a peculiar shape and with a keen edge, used to shave the hair from the face or the head. The best quality of steel is used in making razors and the sides of the blades are usually drawn or ground concave. The blade is held to the handle by a rivet, which facilitates turning it in a position most convenient for shaving. Razors of this kind are used exclusively by barbers, while safety razors, which are fitted with a guard to prevent cutting the face or head, are employed in personal shaving.

RE (rà), the name of the ancient sun god of the Egyptians. He is credited with overcoming the powers of darkness and is said to have turned chaos into order and system. In old age he was overcome by the goddess Isis. He was supposed to be the ancestor of the Pharaohs, who assumed the title of *Son of Re*.

RÉ (rà), an island of France, in the Bay of Biscay, belonging to the department of Charente Inférieure. It is seventeen miles long and four miles wide.

Oysters, wine, and salt are the principal products. The island is located opposite La Rochelle and is strongly fortified. Population, 1906, 14,534.

READING, the art of perusing written or printed matter to ascertain and consider its contents or meaning. The subject as a whole is divided into oral and silent reading. *Oral*

reading is closely associated with elocution, as it involves giving proper oral expression to thought and sentiment, though the latter term has particular reference to the higher department of reading. *Silent reading* is the art of practice of reading to one's self, or the art of perusing written or printed matter without uttering aloud the words. It is merely seeing the thoughts through the words. Skill in both oral and silent reading is made an objective point in studying the subject, but it may be said that silent reading is the more important of the two, since the larger part of our study is from printed pages with the view of getting thought and meaning. However, oral reading is a fine art, and skill in it should be regarded a valuable accomplishment. Many of the noted actors and public readers have been as highly honored as the eminent musicians; it is difficult to say whether the higher praise is due to Charlotte Saunders Cushman (q. v.) or Jenny Lind.

While the subject of reading is of interest to all, it has special elements of importance to teachers of children and youth. A comparatively small proportion of teachers in the common schools have been as well equipped to teach reading as its importance demands, but there is a notable improvement in ability to instruct as well as in the methods employed, especially in the states where an adequate number of normal schools and institutes have been provided for the equipment of teachers. The lack of thoroughness in reading may be attributed at least partially to the circumstance that many educators have looked upon it as secondary to grammar, mathematics, and other sciences. However, it is to be noted that many academies and schools of higher learning are employing special teachers of reading and elocution. On the other hand, public schools are becoming equipped with professionally trained teachers in the primary branches, who are cultivating a taste for reading and laying a foundation for wholesome advancement in both thought gathering and expression.

Much has been said and written on the art of teaching reading. Many plans of instruction have been proposed, among them the so-called alphabet, word, object, phonetic, synthetic, and sentence methods. The *alphabet method* was formerly in general use. By it the pupil is taught the letters of the alphabet before an effort is made to teach reading. It differs from the *word method*, in that by the latter the children are taught to recognize words as wholes rather than to learn them by noticing the individual letters of which they are composed. The *object method* is quite similar in many respects

to the word method, but differs from it in that the attention of the learner is directed to objects instead of names. Usually pictures as well as objects are used in conversational lessons. Both the *phonetic* and *synthetic* methods consist chiefly in teaching the elementary sounds of the language, but in the latter greater stress is laid upon the importance of articulating the particular sounds and using them in building words. This is done by the learner uttering them as distinct sounds, by repeating in concert, and by singing them according to a scale or in verse. In the *sentence method* the beginner is taught sentences rather than letters or words. It is based upon the theory that the sentence is the unit of language and that we think in sentences.

While all the methods of teaching reading possess merit, it may be said that there is no arbitrary plan by which reading can be taught successfully to all students. The most feasible way is to become acquainted with all the methods and use them in combination as the particular needs of the pupil or classes may require. Much depends upon the ability and tact of the teacher. However, it should be aimed to lay a basis for advanced reading, whereby the mind may be trained to become active and scrutinizing. In all grades of teaching the instructor needs to keep in mind the mental, vocal, and physical elements. The *mental element* is that by which we understand and feel what we read, and embraces the intellectual and emotional powers. The *vocal element* pertains to the voice, and is concerned with pronunciation and modulation. *Pronunciation* is the art of uttering words correctly. It includes articulation and accent. *Modulation* is the variation of voice in speaking and reading. The *physical element* in reading is concerned with the body and embraces breathing, facial expression, posture, and gesture. In reading much depends upon example and imitation. Hence, the teacher should be a good reader in order to obtain the most satisfactory results. He needs to inculcate the power of thought getting and the ability to convey meaning when reading. The habit of accurate reading, once acquired, is a source of much profit. It makes a good book a useful companion. See **American Literature; Literature.**

READING (rĕd'ing), a town of Massachusetts, in Middlesex County, ten miles north of Boston. It is on the Boston and Maine Railway and is noted as a favorite residential center. A public library, waterworks, and electric lighting are among the municipal improvements. It has manufactures of rubber goods, musical instruments, clothing, machinery, and boots and



POSITIONS IN PUBLIC READING.

- 1. DESIGNATION.
- 3. FEAR.

- 2. DISDAIN.
- 4. MEDITATION.



shoes. It was settled in 1638 and incorporated in 1664. Population, 1905, 5,682; in 1910, 5,818.

READING, a city of Pennsylvania, county seat of Berks County, 58 miles northwest of Philadelphia. It is on the Schuylkill River, the Schuylkill Canal, and the Pennsylvania, the Philadelphia and Reading, and the Wilmington and Northern railroads. The site is regularly platted and includes about eight square miles, and the locality is more or less rolling or hilly. East of it is Mount Penn and south is Never-sink Mountain, both of which are reached by electric railways. These eminences have a height of about 995 feet, hence afford a fine outlook over the surrounding country and have provisions for entertaining tourists and visitors. Many of the streets are paved with stone and macadam and traversed by a system of electric railways, which furnish communication with many points and cities in the eastern part of the State.

The city has a fine system of public schools with courses ranging from the kindergarten to the high school. It is the seat of the Inter-State Commercial College, the Schuylkill Seminary, and a number of charitable institutions and hospitals. Near the city, at Kutztown, is the Keystone State Normal School. In the northern part of the city are the grounds of the county fair. The Lutheran Trinity Church, the county courthouse, the Federal building, the city hall, and many fine churches are among the noteworthy public buildings. Much of the architecture in the city is modern and substantial, especially the business blocks and office buildings, such as the Baer building and the Colonial Trust building.

Reading is situated in a region of anthracite coal mining, but the agricultural resources are well developed. Here are located the extensive shops of the Philadelphia and Reading Railway. The manufactures include paper, hosiery, pipe tobacco and cigars, machinery, malt liquors, pottery, and iron and steel products. Extensive interests are vested in the manufacture of letter boxes and steel projectiles. It has a large wholesale and jobbing trade and is a market for cereals, live stock, and fruit. The region was settled by Germans in 1748 and a large per cent. of the people are of German descent. It was incorporated as a borough in 1783, but was chartered as a city in 1847, when it had a population of 12,000. Population, 1910, 96,071.

READING, a city of England, in Berkshire, 35 miles west of London. It is at the junction of several railways and has additional trade advantages because of being near the junction of the Kennet and Thames rivers. Among the

notable buildings are the Benedictine Abbey, founded in 1120, and the Church of Saint Lawrence, a structure of the Norman type. It is the seat of several hospitals and educational institutions. The surrounding country is fertile. Among the manufactures are silk goods, machinery, spirituous liquors, flour, and earthenware. Reading was important as early as 871, when it was occupied by the Danes. Population, 1907, 83,311.

REAL ESTATE, the property which consists of lands, tenements, and hereditaments. In law real property does not only consist of land itself, but includes all immovable effects upon it, such as timber, minerals, and buildings. This class of property is distinguished from *personal property*, which consists of movable effects, such as money, furniture, and live stock.

REALISM (rē'al-iz'm). See **Idealism**.

REAL SCHOOLS, in German *Realschulen*, a class of educational institutions maintained in Germany. They take a place immediately between the elementary school and the university. There are two classes of real schools, the higher preparing for certain courses in a university and the lower fitting for professions that require no university education. The higher grade is the real gymnasium, as opposed to the gymnasium proper, or classical school.

REAPING, the act of cutting down and gathering grain, as in harvesting wheat, oats, or corn. Reaping is as old as human history, though the instruments used in early times were greatly different from those now employed. The



ANCIENT REAPING MACHINE.

oldest known device for cutting the grain is a *reaping hook*, or *sickle*. It was employed by the ancient Jews and Egyptians, and continued in use by the civilized nations down to the latter part of the 19th century. The sickle consists of a curved instrument about two feet in length, having a wooden handle, and tapering from a width of about two inches near the handle to a point at the opposite end. The edge is sometimes serrated, but generally is plain and sharp like a knife. It is held in the right hand by the harvester, who cuts the standing grain near the surface, holding a handful of it by the left hand. The first few handfuls of grain are made into

a band, which is laid on the ground, and when a sufficient amount of grain has been cut and laid on the band, it is bound around it to form the *sheaf*. After a number of sheaves, usually twelve, have been bound in this way, they are set up to form the *shock*, in which position the grain is left on the field, until sufficiently cured, when it is placed in the stack or barn mow to be threshed.

The process of reaping described here is one that the writer personally witnessed in the harvest fields both of Australia and America, but it has now given way to harvesting by machinery, in which the same work is done by mechanical devices that quite successfully take the place of the human hand. However, improvement in this line was brought about by a long



MODERN REAPING MACHINE.

period of evolution, the ordinary *scythe* following the sickle, that in turn giving way to the *cradle*, until finally the machines were produced that are drawn by animals or steam power. The ancient methods of reaping are still used by primitive peoples and to a limited extent in Asia and Spanish America. In some countries, as in ancient times, the harvester cuts the grain by hand and places it in a wooden cart moved by an ox or some other animal. This method is advantageous where the grain is quite ripe and dry, thus insuring it against molding or decay, and it is usually customary in such cases to cut little more than the heads, the remaining portions of the standing grain being either plowed under or used for pasture. See **Harvesting Machinery; Mowing Machine.**

REASON (rē'z'n), the mental faculty by which man is able to distinguish truth from error, and which places him in the scale of life far above the lower animals. It comprises conception, judgment, reasoning, and the intuitional faculty, and in the philosophy of some writers there is a shade of identity between reason and understanding. Reason can exercise itself on the most abstract and spiritual theories, as well as on those of a simpler character. It was formerly believed that of all visible creatures

man alone possesses reason, but most writers within the last century expressed views favorable to the theory that animals possess some power of reason, a position now generally accepted. It may be that their actions are due to the association of ideas or to instinct, but the former principle is associated with reason.

REBELLION OF 1838, a revolt against the government of Upper and Lower Canada, brought about largely through the unpopularity of the manner in which the public affairs were organized. A small class of descendants from the Loyalists largely dominated the political forces for several decades. They became known as the *Family Compact*, which, it was alleged, was maintained to monopolize the public offices. The popular dissatisfaction was enhanced by the apparent frauds in disposing of certain public lands in Lower Canada, where the discontents were under the leadership of William L. Mackenzie (q. v.). At the same time a large faction rose against the government in Upper Canada, under the leadership of Louis J. Papineau (q. v.). In the latter section the contest was largely between the French constituents and the Popular Assembly on the one hand and the English, representing the Governor and the Legislative Council, on the other. In both instances the disturbances were subdued by force of arms. Soon after, in 1841, the two provinces were united by an act of the British Parliament.

RECEIPT (rê-sēt'), a written document which acknowledges the delivery of money or goods. One who makes tender of money or property under contract may demand a receipt therefor in writing as a condition precedent to the delivery thereof. Such a receipt may be given in part or in full payment of a debt. It is evidence of the discharge of a debt or part of the debt which it includes, but may be set aside by evidence that shows beyond a reasonable doubt that it was obtained fraudulently. Those sending goods or money by a common carrier, such as an express or a railway company, receive a receipt when the goods or money are delivered to the carrier or warehouseman. Freight shipments are covered by bills of lading, and the contract of the company under which the shipment is made is usually printed on the same.

RECEIVER (rê-sēv'ēr), a disinterested person appointed by a court to receive and disburse the issues or profits arising from property which is in question between the parties through litigation, or which belongs to an infant, or some other person who is not legally competent. The purposes of appointing a receiver are to collect rent or profits, to take charge of and preserve

the property from waste or deterioration, and to make final disposition of the goods or property as the court may direct. In some cases such an appointment is made so the business may be conducted, or to prevent the removal of the property beyond the jurisdiction of the court. Since the receiver is an officer of the court and is required to give a bond for the faithful discharge of his duties, he is subject to the law and the judicial decree of the tribunal appointing him.

RECHABITE (rē'kăb-īt), the descendants of Rechab, the ancestor of Jehonadab. These people came to Palestine with the Israelites. They resided in Judah in the time of Jeremiah and, when Nebuchadnezzar invaded Palestine, they took refuge in Jerusalem (Jer. xxxv.). The Rechabites dwelt in tents and abstained totally from the use of intoxicating drinks. A large secret society of total-abstinence men and women, with numerous branches in Great Britain and United States, is known as the Independent Order of Rechabites.

RECIFE (râ-sē'fâ). See Pernambuco.

RECIPROCITY (rēs-ī-prōs'ī-tỹ), the exchange of commodities between two subjects of different governments without levying import or export duties on the same. It implies trade relations between two or more nations mutually advantageous to the same extent, and is brought about by means of treaties. Reciprocity first began to be advocated as a definite tariff policy in the United States in the period from 1880 to 1890 as a result of a tariff revision in 1883, which proved unsatisfactory to a class of manufacturers who wanted larger foreign markets for their products. President Arthur sent a commission to visit the countries of South America, in 1884, with the view that the question of reciprocity with their governments might be discussed and more favorable trade relations established. This commission reported in favor of tariff reduction on sugar and wool, but as it had not been authorized to promise concessions the effort resulted practically in a failure to secure any revision.

In 1889 the Pan-American congress met at Washington, and, although it favored reciprocity, the result of the conference was not promising, since the delegates differed more or less regarding the extent of reductions that should be made on the more important articles. Besides, a feeling sprung up that reciprocity does not differ materially from tariff revision on the one hand and from that of tariff reduction on the other. However, sentiment in favor of closer trade relations with South American countries has grown steadily, and no doubt a

plan will be carried into practice in the near future under which American products will find a larger market in the republics of South America, and on the other hand more will be bought of the commodities which are not produced to a sufficient extent in the United States.

Although England has been a free trade country for many years, a considerable number of its statesmen under the leadership of Chamberlain favor an imperial custom tariff or reciprocity. This idea was proposed early in 1903 and discussion conducted through 1904 and 1905. The movement is calculated to bring about closer trade relations between the colonies and the mother country, through the medium of lowering colonial tariffs to English ports in exchange for retaliatory tariffs against foreign products competing with those of the colonies. Reciprocity is represented in Europe at present by a large number of commercial treaties, affecting particularly other nations, and as a general rule the trade between colonies and mother countries is free or less restricted than trade generally. The movement in England is calculated to bring about larger trade relations as well as to confine the trade to channels which will contribute to the permanent welfare of England and its colonial possessions.

RECITATIVE (rēs-ī-tā-tēv'), the name of a kind of vocal composition adapted to musical notes, forming a medium between ordinary recitation or speaking, which it nearly resembles, and measured air or song. It was introduced at Rome in 1600 by Emilio del Cavaliere, who employed it to express action or passion in operas and oratorios. This style is now used in cantatas and oratorios. It may be delivered by the singer according to his fancy, subject of course to the laws of prosody. The chords are struck by the pianoforte to indicate the harmony, but sometimes the organ and other instruments are used. When the recitation is interrupted by interjected passages performed by the orchestra, it is said to be *obbligato*.

RECONSTRUCTION (rē-kōn-strūk'shūn), the term applied to the process of bringing back to the Union the states that seceded previous to or at the beginning of the Civil War in America. The Confederate States passed under the military control of the United States when the Confederate army surrendered in 1865, but the states of this federation were regarded as conquered territories and not as members of the Union. President Johnson held the view that these states maintained the same constitutional relation to the United States government as before their secession, and accordingly appointed provisional governors. These governors in-

vited the people to send delegates to conventions with a view of forming constitutions for the respective states. However, Congress upheld the view that these states could be readmitted only on such terms as that body would impose. This view was maintained principally because it was thought that the freedmen would not secure proper recognition of their civil and political rights, if the matter of reconstruction were left entirely to the southern people, many of whom expressed views in opposition to general enfranchisement.

President Johnson had recognized provisional governments in all the southern states before Congress met in December, 1865, on their accepting the Thirteenth Amendment to the Constitution. Congress proposed the Fourteenth Amendment to the Constitution and in 1867 passed the Reconstruction Act, by which five military districts were established in the South. It was the purpose to effect a registration of voters, including Negroes, and these voters were to elect representatives to a convention, which should make a constitution and submit it to be ratified by the people. It was next to be submitted to Congress for approval, and, whenever the Fourteenth Amendment was ratified by the Legislature, the states ratifying should be reinstated.

From this act resulted the *carpetbag government*, so called because many designing individuals from the North went to the South to fill offices at favorable remuneration. Under this unsatisfactory condition the leading white men of the South were excluded from participation in the active affairs of the government, the debts of the states affected were increased without receiving value, and the local offices were mismanaged. Many white men, as a means of having satisfactory local government, now organized secret societies, such as the Ku Klux Klan, to prevent the Negroes from voting or holding public offices. Tennessee ratified the Fourteenth Amendment and was readmitted in 1866, hence was not materially affected, but Alabama, Arkansas, Florida, Louisiana, North Carolina, and South Carolina were readmitted under this special act in 1868. It was also required that the amendment be ratified by Georgia, Mississippi, Tennessee, and Virginia, which states were readmitted in 1870. Two years later, in 1872, Congress passed the amnesty act, which removed the disqualification of the ex-Confederates. The reconstruction period ended in the administration of President Hayes, who withdrew from the South the army of Federal troops.

RECORD (rĕk'ĕrd), a written memorial or

account of a fact or event of public interest, made by a public official and preserved as a matter for future reference. Records may be public or private, but the latter do not come within the provisions of the law. Public records may be classed as *judicial*, *legislative*, or *miscellaneous*, the latter term embracing all official records that are neither judicial nor legislative. Both the books and the original papers pertaining to a cause at law are judicial records. Any one desiring a certified copy of a public record may obtain it on demand by paying the legal fee therefor.

RED, one of the three primary colors, seen at the end of the spectrum, owing to the fact that its rays are at least broken or refrangible. Red pigments or coloring matters are obtained from the mineral, animal, and vegetable kingdoms. Vermilion and the red ochers are obtained from the mineral, carmine and scarlet from the animal, and madder pigments from the vegetable world. Red is one of the colors adopted by many nations and is the color of the flag used by the anarchists.

RED BANK, a town of New Jersey, in Monmouth County, 25 miles south of New York City. It is on the Shrewsbury River, which furnishes transportation facilities, and on the Pennsylvania and the Central of New Jersey railways. Many business men of Jersey City and New York reside here. It is visited during the summer by tourists, having many fine hotels and other attractions. Among the features are the high school, the public library, and the Red Bank Shrewsbury Academy. Clothing, carriages, steam boilers, and machinery are among the manufactures. It was settled in 1650 and incorporated in 1872. Population, 1910, 7,398.

REDBREAST. See **Robin**.

RED CROSS SOCIETY, an international society for the relief of the sick and wounded in the time of war, now recognized as an important factor in military sanitation. It may be said to have originated from the recommendations made by Henri Dunant, a Swiss gentleman, who, in 1859, served on the medical force in the Italian wars. At the close of the war he published a work calling attention to the needless hardships endured by the sick and wounded. He recommended that a universal society for the care of disabled soldiers be organized, and that the sick and wounded be regarded as neutrals in the time of war. Soon after he secured aid and coöperation from the Swiss federal council in calling an international conference, which met in Geneva on Oct. 26, 1863, in which sixteen of the leading nations were represented, but since then the number of

powers signing the conditions required has increased very materially.

The principal conditions to be complied with by each nation joining the association is the provision that a society is to be maintained by each power, which is to care for the sick and wounded in the time of war, and to devote attention to the training of nurses and preparation of hospital stores in the intervening time of peace. Provisions were made whereby the general society is bound to cooperate by sending representatives and nurses to any country where war, famine, pestilence, floods, or any other great calamity may exist, though the Geneva treaty extends protection only in the time of war. The first provisions for supplying aid in naval warfare were adopted at Paris in 1868, and later other features were added at an international conference held at Berlin. The badge of the society is a red cross on a white background, and it must be accompanied in time of service by the banner of the country in which the society operates. Queen Victoria issued an order to institute the Royal Red Cross in 1883, which adopted a red Maltese cross as the decoration, bearing the words, *Faith, Hope and Charity*. The American society was formed under the direction of Clara Barton, who is the originator of the plans for extending relief on a broader basis than only in the time of war. Among the notable instances of recent times in which the Red Cross Society has extended valuable relief are the period of Turkish atrocities in Armenia, the Spanish-American War, the Anglo-Boer War, the Filipino insurrections, and the Russo-Japanese War.

REDFISH, the name of several fishes, found chiefly off the southern coast of the United States and in the waters off the coast of California and Lower California. One of the species is the familiar *red drum*, or *channel bass*, which has a grayish red color and is from three to five feet long. It is caught in the Gulf of Mexico as a food fish. A species frequently called *fathhead* is prized for its flesh in California, especially by the Chinese, who preserve it by salting and drying. The name redfish is applied in Alaska to a species of salmon that has a reddish tint.

RED MEN, Improved Order of, a fraternal and beneficial society which succeeded from the Sons of Liberty, one of the organizations to promote the Revolution in America. It was reorganized at Baltimore, Md., in 1835, since which time it has increased greatly in membership. Three degrees are conferred, those of Adoption, Warrior, and Chief. The officers are named in reference to certain officials among

the Indians, such as prophet, sachem, senior sagamore, junior sagamore, chief of records, and keeper of wampum. In 1908 the order had a membership of about 350,000. In addition it maintains the Degree of Pocahontas, which has a membership of 52,500. The motto is Freedom, Friendship and Charity.

RED RIVER, an important western tributary of the Mississippi, the most southerly affluent of that river. It rises in the Staked Plain in Texas, near the boundary of New Mexico. Near its headwater it passes through a magnificent cañon 100 miles long, which in some places is fully 1,000 feet deep. Its general course is toward the southeast, forming the boundary between Oklahoma and Texas, and, after passing through Arkansas and Louisiana, it enters the Mississippi about 300 miles from the Gulf. In its lower course are numerous lakes and bayous, all of which abound in fish. It receives the water from the Negro, Washita, and Little Washita rivers. Owing to its winding course, the Red River has a length of 1,550 miles, of which about 1,200 miles are navigable. It was so named from the color of the sediments carried by it in a period of high water.

RED RIVER, or **Song-Koi**, a river of French Indo-China, in Tongking, rising in the highlands of southern China. After a course of 650 miles toward the southeast, it discharges through a delta into the Gulf of Tongking. In its course are several rapids which are avoided by canals. On its banks is the city of Hanoi, the capital of Tongking.

RED RIVER OF THE NORTH, a river of the United States and Canada, forming the principal part of the boundary between Minnesota and North Dakota. The Otter Tail rises in the lake region of western Minnesota, near the source of the Mississippi, and has a general course toward the southwest until it makes a bold curve near the border of the State and then joins the Bois de Sioux to form the Red River of the North, which flows nearly due north into Lake Winnipeg. Among its numerous tributaries in the United States are the Goose, Sheyenne, Wild Rice, Marsh, and Red Lake rivers. Its total length is 660 miles, of which 520 miles are in the United States. The Assiniboin joins it in Manitoba, at the city of Winnipeg. The Earl of Selkirk made the famous Red River settlement, on the banks of the Red River of the North, in 1812. It was founded on a tract of land obtained from the Hudson Bay Company, which was afterward conveyed back to that company, and in 1870 was transferred to Canada. It is now a part of the Province of Manitoba.

RED SEA, or **Arabian Gulf**, an inlet from the Indian Ocean, lying between Africa and Arabia. It communicates with the Gulf of Aden by the Strait of Bab-el-Mandeb, and stretches in a narrow expanse of water toward the northwest to the Isthmus of Suez, which separates it from the Mediterranean. Its length is 1,450 miles and its width in the central part is about 200 miles, whence it gradually diminishes toward the extremities, being about 20 miles wide near the Strait of Bab-el-Mandeb. It is divided in the upper part by the Sinai peninsula, thus forming the two gulfs of Suez and Akabah. The former is the larger of the two, being 180 miles long and 25 miles wide, while the latter is 100 miles long and about 12 miles wide. The Red Sea has been an important seat of commerce from remote antiquity and was navigated by the ancient Egyptians, Phoenicians, Arabs, Hebrews, and Persians.

Navigation of the Red Sea is more or less dangerous, owing to the prevalence of violent winds and the numerous shoals, islands, and coral reefs that abound along the shores. Coral reefs are particularly abundant near the Arabian coast, where they are remarkable for their scarlet tints mingled with white. A strong current of wind blows from the south from October to May, and from the north from May to October. This results in a current of water passing through the Strait of Bab-el-Mandeb in the former season, which raises the sea level several feet, but it is correspondingly lowered in the period in which the wind blows from the north. Much of the trade from Southern Asia passed up the Red Sea and was conveyed by caravans to the Mediterranean until the route around the Cape of Good Hope was discovered, when it was turned largely in that direction, but in 1870 the Suez Canal was opened to trade, which immediately reestablished the Red Sea as an important highway between the Orient and the Occident. Considerable trade is carried across the sea, but this consists chiefly of local products and the traffic in connection with pilgrims to Mecca. Jedda, Hodeida, and Mocha are the principal seaports on the Arabian coast and Kosseir, Massowa, Suez, and Suakim on the African coast.

REDSTART, a genus of American birds, which are native to a region extending from Canada to Bolivia. About a dozen species have been described. They are very active, being skilled in catching flies and other insects while on the wing. The male of most species has a glossy black color, with spots of white and orange red on the wings and tail, and the female is brownish. The *common redstart* of

the Old World is somewhat larger and resembles the redbreast. It has a melodious song and may be domesticated. Redstarts are migratory.

REDTOP, the name of several species of grass grown extensively for hay and pasturage. It is sown in most localities with timothy and clover and thrives best in soils that are too moist for the growth of other cultivated grasses. All the species are valuable because they maintain themselves against the growth of weeds and other grasses of less value. Some species are small and are sown to decorate lawns and parks.

RED WING, a city in Minnesota, county seat of Goodhue County, on the Mississippi River, forty miles southeast of Saint Paul. It is on the Chicago Great Western, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads. The noteworthy buildings include the county courthouse, the high school, the public library, the Lutheran Ladies' Seminary, and the Lutheran Theological Seminary. It has well-graded streets, systems of sewerage and waterworks, and a well-graded system of public schools. Among the manufactures are boots and shoes, furniture, lumber products, machinery, stoneware, flour, and earthenware. The surrounding country is agricultural and dairying. It was settled in 1853 and incorporated as a city in 1864. Population, 1905, 8,149; in 1910, 9,048.

REDWOOD, a species of sequoia, native to the Pacific coast of North America, but found chiefly in Oregon and California. It is one of the largest trees in existence, attaining a diameter of 12 to 15 feet and a height of 225 to 300 feet. The name redwood is applied because the newly cut wood has a reddish color, but it soon fades on exposure to light and the air. The grain of the wood is straight, is well fitted for inside finishing of buildings, and takes a good polish. The forests are maintained by seeds and suckers sent up from the stumps. See **Sequoia**.

REED, in music, the mouthpiece of the bassoon, hautboy, clarinet, and several other instruments. Reeds were first made of cane, whence the name has been extended to the reeds of the organ and the harmonium. They are now made of a thin strip of metal. The reed itself does not produce the sound, but is only the means of obtaining the sound from the current of air directed against it. Two classes of reeds are in general use, the striking and the free. The *striking reed* is commonly used in the pipes of an organ and requires to be placed in a tube as a means to produce a musi-

cal sound. The *free reed*, such as is used in the harmonium, has a smoother and more mellow sound than the striking reed and does not require a pipe, as does the latter.

REFERENDUM (rĕf-ĕr-ĕn'dŭm), the name used to designate the practice of submitting to a vote of the people for approval or rejection the laws passed by their representatives in a legislative capacity. Such laws are first passed by the legislature and properly certified, and they are then submitted at the next regular election for consideration by the electorate. In some countries the referendum is *optional*, while in others it is *obligatory*, that is, the laws must be submitted without petition. The *initiative* is the logical complement of the referendum, since it enables the people to draw up their own laws, which are then submitted to the legislature, or they may be proposed by petition and submitted without any action on the part of the legislative branch. Both the initiative and the referendum are in use in some form in all the cantons of Switzerland, except Freiburg. Both are in vogue as a feature of the government of the Swiss Confederation, and under a provision of the constitution it is obligatory to submit any law on demand of eight cantons, or a petition signed by 30,000 citizens. The referendum was adopted in Switzerland in 1874 and the initiative was made a feature of the government in 1891. In Canada and the United States the referendum is employed to a considerable extent, especially in matters of municipal government, such as permitting the sale of intoxicating liquors, granting franchises to electric railway and other corporations, and issuing or refunding town and city bonds.

REFLECTION (rĕ-flĕk'shŭn), the power that the mind has to consider and compare sensations and ideas by the aid of the principles of association. It is one of the primary sources of all ideas, the other source being *sensation*. Some writers, as Herbart, discuss analysis and synthesis as integral parts of reflection. See **Psychology**.

REFLEX ACTION, the name applied to any action performed involuntarily in consequence of an impulse transmitted along certain nerves to a nerve center, whence it is reflected to an efferent nerve, hence inducing action in certain muscles, organs, or cells. Reflex action has its seat chiefly in the brain and spinal cord. The majority of these phenomena are very complicated, varying greatly in the intensity and rapidity, as in a series of coughs to remove dust from the air passages. Extensive research has shown that the impulses from the receiving surface toward the interior and from the

central cells outward are transmitted with equal facility, that the rate of motion is much slower than that of electricity, and that only a small amount of energy is extended in the transit. Natural electric currents pass over the fiber, but no chemical or physical changes in the fibers resulting from the passage from impulses have been detected. Waste of tissue and weariness accompany the expenditure of energy, but the exact volume of waste cannot be determined.

REFORMATION (rĕf-ŏr-mā'shŭn), the great religious revolution of the 16th century, which may be said to mark the end of the Middle Ages and the establishment of Protestantism. Western Europe was under the absolute authority of the Roman popes from the year 800, when Pope Leo III. crowned Charlemagne emperor of the Romans, until restricted by the results following the Reformation. In this period of about 800 years papal authority was supreme over all the Christian Church, except only the countries where the Greek Church had secured a foothold, and this authority was exercised both in spiritual and temporal affairs. Various abuses arose from this widespread power, against which many devoted members of the Roman Church protested and from which both laymen and clergymen sought to secure relief.

Many causes may be assigned as the incentives that induced the people to rise in this mighty religious revolution, some of which extended back to the early introduction of the Papacy. Although many efforts had been made to revise the doctrines and ceremonies of the church, such as confession to a priest, the invocation of the saints, and the devotion to the Virgin Mary, the first organized movement did not occur until the early part of the 15th century. It was led by John Huss and Jerome of Prague, in Bohemia, but they and their followers were not able to wield a widespread influence, since conditions had not formed that contained the necessary elements to crown such a movement with success. Among the events that formed and molded public opinion favorable to a great reformation were the invention and general use of printing, the diffusion of knowledge through universities teaching the Greek and Hebrew languages, and advancement in industrial arts and commerce, all tending to lead the people to assert their independence of thought and energy. Besides, the rise of modern literature occasioned by the Renaissance brought forward such writers as Erasmus, who held the abuses of power up before thoughtful men. The last spark needed to kindle a widespread revolution of thought was furnished in the pontificate of Leo X., when Johann Tetzel, a Domini-

can monk of Leipsic, published indulgences in Germany, to procure means for the building of Saint Peter's at Rome.

The appearance of Tetzl in Saxony was followed immediately by the pronounced opposition of Martin Luther, an Augustine monk and professor of theology in the University of Wittenberg, who, on Oct. 31, 1517, posted 95 theses or questions on the door of the church. His able sermons won many adherents among the influential nobles and princes, who united with him in urging the Pope to suppress the traffic in indulgences and otherwise reform various practices. This brought him into conflict with Pope Leo X., who excommunicated him in 1520, but Luther appealed to a general council. However, his works were burned at Cologne, Mentz, and Louvain, and he retaliated by publicly burning the papal canons and decrees. When Luther formally separated from the Roman Church, he was followed by many German nobles, while most of the eminent scholars, and particularly the University of Wittenberg, declared in favor of the reformed faith. In 1521 he was summoned before the Diet of Worms by Emperor Charles V. of Germany, and his bold refusal to recant not only increased the reform movement, but made it a political matter in the North German States. Soon after the Bible was translated and published in the German language, Luther's "Liturgy" appeared in 1522 and was immediately adopted by Magdeburg and other cities, and translations of the Bible into the Dutch and French languages soon followed. The reformed faith received legal recognition for the first time by the Peace of Augsburg in 1555, which gave each prince liberty to adopt either the Protestant or Roman Catholic faith.

Protestantism was carried to Sweden under Gustavus Vasa, who became king in 1523, and it was formally adopted in the Danish dominions at a diet held in 1536. Lutheranism found many adherents in Hungary and Poland, but it was kept out of Italy and Spain by the vigorous application of the Inquisition. Zwingli and Calvin carried Protestantism into Switzerland and various parts of France, while John Knox embraced that faith in 1543 and gave it a firm foothold in Scotland. The first separation from the Roman Church occurred in England under Henry VIII., in 1527-47, but the movement was made more spiritual by improvement in the translations of the Bible and the adoption of the articles or confessions in the period between 1547 and 1573, and Protestantism became finally established under Queen Elizabeth. It may be said that the view taken

by Lord Macaulay in regard to the Reformation is the correct one, since he looked upon the movement as consisting of two distinct phases, one applying to a reformation of the doctrine in the northern part of Europe, and the other in reforming the doctrine and discipline of the church in the Latin and Spanish countries. The intellectual impulse communicated by the Reformation is still in force and will never cease to exist. See **Thirty Years' War**.

REFORMED CHURCH, the name given first to the Helvetic Church, which rejected certain doctrines of Luther concerning the sacrament of communion, regarding it simply a commemorative ordinance. The term is used in history to comprehend all those churches that were organized as a result of the Reformation, but it is applied specially to several branches resulting from dissensions arising at conferences, such as the Reformed Presbyterians and the Reformed Episcopalians. The Reformed Church of the United States is a German body organized in Pennsylvania by settlers from Germany, about 1684. It now has 1,685 churches and 250,000 communicants, and maintains a number of missions and institutions of higher learning. The most important institutions include Franklin and Marshall College, Lancaster, Pa.; Heidelberg University, Tiffin, Ohio; Palatinate College, Myerstown, Pa.; and Catawba College, Newton, N. C. The Reformed Church of America is a Dutch organization and was established in the United States in 1628 by members of the Reformed Church of Holland, who settled at New Amsterdam, now New York. It has 625 churches, 125,000 communicants, eight institutions of higher learning, and a number of missions. The principal colleges are at Holland, Mich.; New Brunswick, N. J.; and German Valley, Ill.

REFORM SCHOOL, an institution maintained to train juveniles who have been convicted of crime. Schools of this kind are now more generally termed *industrial schools*, since they teach various industries in connection with the common branches of study, and this name has been adopted at least in part because it is less objectionable to those who are completely reformed after systematic training. Usually these institutions are located on a large tract of land, frequently from 100 to 300 acres, and the industries include gardening, fruit growing, stock raising and general farming. Those confined usually receive instruction half of the time, and the remainder of the day is devoted to work in the yards or fields. These schools generally have laundries, bakeries, and various shops, the purpose being that all of the repairing as well as

the domestic service is to be done by the inmates. Juveniles are thus separated from the older and hardened criminals, and are educated in the fundamentals as well as the domestic and industrial arts. The first institution of this kind in America was established by an act of the Legislature of New York, in 1824, under the name of the New York House of Refuge. They are very numerous at present. Practical experience has demonstrated their utility in training and reforming.

REFRACTION (rê-frāk'shŭn), the change in the direction of all kinds of wave motion, as in light and heat, when the waves enter obliquely a medium of a different density from that through which it previously moved. In astronomy the term is applied to the change in the direction of a ray of light resulting from its passage through the atmosphere of the earth, and, consequently, to the change in the apparent position of a heavenly body from which the light emanates. Refraction has the effect of causing the heavenly bodies to appear higher in the sky than their real position, but it is greatest at the horizon, where it is about 38'. It decreases uniformly toward the zenith. Refraction has the effect of causing the heavenly bodies to appear to rise earlier and set later than they actually do, hence we see the sun in the morning while the entire disc is yet below the horizon. For the same reason, we see it in the evening a short time after it has passed the horizon. A familiar illustration of the refraction of light may be seen by immersing a stick partly in a glass of water, when the refraction of light will cause it to appear bent where it enters the water. It is due to refraction that the visible part of the sun during a partial eclipse appears relatively larger than the portion covered by the disc of the moon. Twilight, the gradual change from daylight to darkness, is the effect of the successive refractions of the light by the successive layers of the atmosphere.

REFRIGERATION (rê-frīj-ēr-ā'shŭn), the art of employing artificial means to reduce the temperature. It was practiced in very ancient times, but improved apparatus and systems to promote commercial refrigeration on a commercial scale are comparatively recent. The process depends upon the law of physics that any substance passing from a liquid to a gaseous state absorbs a certain amount of heat and, on the other hand, it gives off the same amount of heat when returning from a gaseous to a liquid state. As a means of promoting refrigeration a number of agencies may be employed, such as compression, condensation, absorption, liquefaction, and the vacuum process.

In ordinary household economy it is customary to use a common ice *refrigerator*, which consists of a chamber or box holding a supply of ice to cool provisions and keep them from spoiling in warm weather. Most refrigerators have two compartments, in the upper of which ice is stored to supply cooled air to come in contact with the provisions in the lower compartment, whereby they may be kept near the freezing point. Refrigerators used for household purposes are on this plan and have a device to carry off the water that results from the ice melting. Those used in meat markets are much larger than the devices employed for household purposes, but the same principles are utilized in them and in refrigerator railroad cars. The latter are employed in transporting meat, fruit, and other perishable commodities. See **Ice**.

REGELATION (rê-jê-lā'shŭn), the name applied to the freezing together of contiguous surfaces without the application of outward cold, as in the case of two large blocks of ice. This phenomenon is common to all substances which increase in volume upon freezing. When two pieces of ice are brought in close contact and submitted to pressure, the surfaces melt, and the two pieces are united by freezing when the pressure is relieved. Faraday discovered this phenomenon in 1850, and Lord Kelvin demonstrated that snow in the tracks of wheels is covered with a thin film of ice, owing to the fact that pressure of the vehicles causes it to melt and that it freezes as soon as the pressure is removed. According to this theory, a snowball is solidified not by compressing a given quantity of snow into a smaller body, but by small particles melting under pressure and then solidifying by regelation. The movement of glaciers is greatly modified by this phenomenon.

REGENERATION (rê-jĕn-ēr-ā'shŭn), the Christian doctrine formally expounded by Jesus in his interview with Nicodemus, which is generally held to be a radical and permanent change wrought in the spiritual nature of man by the Holy Spirit through faith in Christ. Regeneration is regarded by some churches as the beginning of the new life conferred in baptism, which is called the *sacrament of regeneration*, while others look upon it as a change in the governing purpose, or as the creation and continuation by the Holy Spirit of a new series of holy acts.

REGENSBURG (rā'gĕns-bōōrg), or **Ratisbon**, a city of Germany, capital of the Bavarian province of Upper Palatinate, on the Danube, 65 miles northeast of Munich. It is important

as a commercial and railroad center, is strongly fortified, and has many interesting monuments dating from the Middle Ages. The streets are broad and well improved, having pavements of stone and asphalt, electric and gas lights, rapid transit, and numerous squares and parks. Among the noteworthy buildings are the Church of Saint James, a Byzantine structure of the 12th century, the townhall, and the Royal Library, containing 75,000 volumes. It has a splendid monument in honor of Kepler, the astronomer, who resided and died in Regensburg. The manufactures include beet-root sugar, jewelry, paper, metalware, pottery, soap, scientific instruments, and machinery. The city is one of the most ancient of Germany, having been founded by the Celts under the name of *Radasbona*. In the time of the Romans it was fortified and named *Castra Regina*. Since 1810 it has belonged to Bavaria. Population, 1905, 48,801.

REGENT (rē'jĕnt), the name applied to a ruler who governs a monarchy during the minority, absence or disability of the sovereign. The duties of this office usually devolve upon the nearest relative of the sovereign who is capable of undertaking them, especially in hereditary monarchies. The term is applied in the State of New York to a body of commissioners in whom is vested the superintendence of public instruction, and in many states to the presiding officer of the university. The term is used similarly in various countries in Europe, particularly to designate a member of one of the universities of England.

REGILLUS (rê-jĭl'lūs), a lake mentioned in the history of ancient Rome, situated southeast of the capital, in the crater of the extinct volcano Cornufelle. It is celebrated in legendry as the scene of an important battle in 496 B. C., between the Romans and Latins, in which the former attained a signal victory. The lake was drained in the 17th century.

REGIMENT (rĕj'ĭ-mĕnt), a body of regular troops, whether infantry, cavalry, or artillery. This division of a military organization consists of from two to four battalions, differing somewhat in various countries, and numbers about 1,000 men. It is the largest permanent association of soldiers, the third subdivision of an army, several regiments constituting a *brigade* and several brigades a *division*. The regiment is commanded by a colonel, one or more lieutenant colonels, and several majors, according to the battalions into which it is divided. Subdivisions of the battalions are known as companies, each of which is commanded by a captain and one or more lieutenants. The regi-

ment originated in France about 1560 and is now a subdivision of the troops in nearly all civilized countries.

REGINA (rê-jĭ'nà), the capital of Saskatchewan, in a flourishing agricultural and stock-raising section, on the Canadian Pacific and the Canadian Northern railways. It is the headquarters for the Northwest Mounted Police. The principal buildings include those of the government, the high school, the public library, the King's and the Wascana hotels, and several fine churches and business houses. It has large grain elevators, flouring mills, machine shops, pressed brick factories, iron foundries, and a growing commercial trade. Large quantities of wheat and live stock are shipped to points both east and west. The waterworks and electric power plant are owned by the municipality. Population, 1906, 6,169.

REIKIAVIK (rā'kyà-vĕk), or **Reykjavik**, a city in Iceland, capital of Danish America. It is situated in the southwestern part of the island, on a large bay, and has a considerable trade in merchandise. The capitol building has a fine library and a museum of Icelandic antiquities. Besides common schools, it has several institutions of higher learning, at which about 150 students attend. Telephones, electric lighting and waterworks are among the facilities. Population, 1908, 6,982.

REINDEER (rān'dēr), a species of mammals of the deer family, native to the northern regions of Europe and Asia. It has long been domesticated in Scandinavia, especially among the Laplanders, and in the northern parts of Asia, but is still found in the wild state in Spitzbergen and other sections of the far north. The reindeer differs from the common deer in being less gracefully formed, in having stouter limbs, and in carrying its head less elevated. The antlers of the male are much larger than those of the female and the upper parts are palmated or branched. A marked difference is noticeable in the size of reindeer, this depending largely upon latitude, the larger species occurring in the regions farthest north. The usual height when full grown is about four and a half feet, the color is brownish-yellow in winter and grayish-white in summer, and the horns are shed every year. The reindeer is valuable because of its flesh, hide, and milk. Large herds are reared in many sections of Northern Eurasia, in Greenland and Iceland, and in several localities of North America. They are used as saddle and pack animals in Kamchatka, but serve chiefly for draught purposes. A single reindeer is capable of moving 200 pounds at the rate of from eight to ten miles

per hour and can endure work for a considerable time. The reindeer native to North America is the caribou, which includes several species differing but slightly from those of Europe. *Reindeer moss* is a form of lichen of much importance because of its value as food for the reindeer, but these animals also feed on other forms of vegetation.

RELATIONSHIP (rĕ-lā'shŭn-shĭp), the relation that exists between two persons on account of marriage or ancestry. The relation-



REINDEER.

ship between husband and wife, as well as that of others through marriage, is known as *affinity*, while that due to the descent from the same ancestors is called *consanguinity*. The latter may be either *lineal* or *collateral*. By *lineal consanguinity* is meant the direct descent from one to another, as from father to son or grandson, while *collateral consanguinity* refers to those who descended from common ancestors, as the children of two brothers, who are *cousins* in relation to each other. In law, the kindred of the wife by blood are related to the husband by affinity, her brothers and sisters being respectively the *brothers-in-law* and the *sisters-in-law* to the husband. The relationship

of children of cousins, popularly called *second cousins*, is not recognized in the law of most countries. Relationship by affinity and consanguinity bars service as judges or jurors in the trial of causes, and in some countries the marriage of cousins is not permitted.

RELATIVE RANK (rĕl'ā-tĭv), a term used in the army and navy to signify the precedence of officers. The following list indicates the relative rank of combatant army officers and their equivalent in the navy:

ARMY.	NAVY.
General.....	Admiral
Lieutenant General.....	Vice Admiral
Major General.....	Rear Admiral
Brigadier General.....	Commodore
Colonel.....	Captain
Lieutenant Colonel.....	Commander
Major.....	Lieutenant Commander
Captain.....	Lieutenant
First Lieutenant.....	Lieutenant (junior grade)
Second Lieutenant.....	Ensign

RELIGION (rĕ-lĭg'ŭn), the reverent feeling by which men indicate their recognition of the existence of a Supreme Being, to whom they attribute power over their destiny and render obedience, service, and honor. The religious feelings are experienced only in beings that possess advancement in intellectual and moral faculties to a moderately high degree. Religion differs from morality in that it denotes the influence and motives of human duty found in the character and will of God, while morality is concerned with the duties that one individual owes to another, but in their fulfillment true religion is a potent influence. As distinguished from theology, religion is subjective, in that it designates the feelings and acts of men relating to God, while theology is objective, denoting the beliefs and ideas that man entertains in respect to the God whom he worships according to the nature of his views. Darwin considers the feeling of religious devotion to be highly complex, since it includes love, complete submission, dependence, reverence, gratitude, fear, and hope for the future. On the other hand, Max Müller regards religion a mental faculty that enables man to apprehend the Infinite under different names, even without the exercise of reason, and regards it as a mark of broad distinction between man and the lower animals.

The term religion is likewise employed to imply forms of doctrines that have come down to the present time by tradition or in canonical books. When used in this sense, it extends to the different religious forms supported by people in all states of society, from the savage to the highly civilized, though the many different

forms may be quite accurately divided into two general classes, the *polytheistic* and *monotheistic*. Those grouped under the former are systems that recognize a plurality of deities, while those belonging to the latter class recognize but one, an ever-existing, unchangeable, almighty God (q. v.). It may be said that all forms of religion are historically connected and related to each other, and have influenced one another in various ways that can be discovered quite easily by the study of history. Like the history of art, industry, science, and society in general, religion has been a process of development in which each stage has proceeded gradually from antecedent factors and conditions. However, it is not studied entirely from a historical standpoint, but in its unity and entirety, with a view to learn of its essence and all its essential relations. In this aspect it comprehends the philosophy of religion, and in an independent form it could not have been studied appropriately until both philosophy and theology were highly developed.

Writers have made various estimates of the different religious creeds supported in the world, but all of them are only approximately correct. The following table is taken from the most recently published reports, which place the entire number of religious worshipers at 1,490,464,202, as follows:

CHRISTIANS.	NON-CHRISTIANS.
Roman Catholics.. 228,666,533	Confucians..... 200,000,000
Protestants. 163,300,000	Hindus..... 210,000,000
Orthodox Greek Church 98,016,000	Mohammedans.... 250,000,000
Church of Abyssinia.. 3,000,000	Buddhists 147,900,000
Armenians..... 2,690,000	Polytheists..... 117,681,669
Coptics..... 260,000	Taoists..... 43,000,000
Nestorians..... 80,000	Shintoists 14,000,000
Jacobites..... 70,000	Jews..... 11,800,000
Total..... 496,082,539	Total..... 994,381,660

RELIGIOUS LIBERTY, the freedom of religious opinion, the equality of all churches, or the right of every individual to worship according to the dictates of his own conscience. It is the purpose of civil government to neither support nor hinder any form of religion, but it is charged with the duty of preventing excesses and encroachments upon private rights. While injuries are not to be inflicted on account of religious belief, special privileges are not to be granted to any class of individuals or religious associations. The state is limited to the overt act, while religion takes an account of the attitude of the mind or soul.

Ancient nations had no conception of religious liberty, but instead treated as disloyal those who preferred not to worship at the shrine of the altars set up by a system of state religion.

Gradually the public mind became more tolerant, but it again relaxed in the early centuries of the Christian era, when the spread of the religion of Christ was looked upon as an interference with existing governments. Emperor Constantine, after his conversion, established Christianity by law, in 313. This may be looked upon as an unfortunate event in the history of religion, since it was the forerunner of allying religion with civil authorities in many nations, which has not been entirely overcome up to the present time. In the early history of the Roman Catholic Church it subjected governments under its authority, or formed alliances with civil powers. Although the Reformation was not entirely tolerant, it may be said to constitute the forerunner of religious liberty in the world. Freedom of worship is now generally permitted in the nations of the world, but some give aid and support to certain denominations. However, the tendency is toward absolute liberty in regard to freedom of conscience and worship.

RENAISSANCE (re-nâ-sâns'), or **Revival of Learning**, the name used to designate an indefinite space of time in the development of culture and learning in Europe. In this sense it denotes the transition from the period of history known as the Middle Ages to that of modern civilization. Sometimes the term, which signifies literally a revival or new birth, is applied to the period commencing with the 14th and ending with the first half of the 16th century, which witnessed the revival of classical literature and the fine arts of the Western nations. It is true that the Middle Ages had a culture and civilization peculiar to that period, but the public mind was more or less stagnant and learning was confined almost entirely to the clergy. While the defects of former periods were remedied, the best of the preceding civilization was made a part of the Renaissance. It signifies the entrance upon a fresh stage of vital energy in general, implying a fuller consciousness and a freer exercise of faculties that had belonged to the mediaeval period. Though in large parts contemporary with the Reformation, it is not to be confounded with the latter movement, which was concerned more specifically with a series of events and group of facts.

RENNES (rĕn), a city of France, formerly the capital of Brittany, at the confluence of the Ille and Vilaine rivers, 190 miles southwest of Paris. It is on both sides of the Vilaine River, which is crossed by a number of stone and steel bridges. Among the noteworthy buildings are a cathedral of modern Grecian construction, the palace of justice, a number of fine schools, sev-

eral hospitals, and a university. The manufactures include shoes, sailcloth, cotton and woolen goods, yarn, lace, paper, and earthenware. The city is surrounded by a fertile country producing wheat, rye, and fruit. It has important railroad facilities and river and canal navigation. It is well fortified and has a large arsenal. Population, 1906, 75,640.

RENO (rē'nō), a city in Nevada, county seat of Washoe County, on the Truckee River, in the western part of the State, 31 miles north of Carson City. It is on the Virginia and Truckee, the Southern Pacific, and the Nevada, California and Oregon railroads. Among the principal buildings are the county courthouse, the Carnegie public library, the Nevada State Hospital for Mental Diseases, the Nevada State University, the Bishop Whitaker School for Girls, and several public schools. Reno has a considerable trade in merchandise. The surrounding country is devoted to farming, mining, and stock raising. It was settled in 1868 and the present charter as a city dates from 1903. Population, 1900, 4,500; in 1910, 10,867.

RENSSELAER (rēn'sē-lēr), a city of New York, in Rensselaer County, on the New York Central and the Boston and Albany railways. It is situated on the Hudson River, opposite Albany, with which it is connected by several bridges. The surrounding country is agricultural and dairying. It has several fine school buildings and churches, and carries considerable trade in produce and manufactures. Electric lighting, pavements, and electric railways are among the public utilities. It has extensive railroad machine shops, lumber yards, roundhouses, and freight yards. It was incorporated as the village of Greenbush in 1815 and was chartered under its present name as a city in 1897. Population, 1905, 10,715; in 1910, 10,711.

RENT, the compensation paid for the possession and use of land, houses, or property of any kind. The term is applied in an economic sense only to the annual payment made for the use of lands employed in producing such wealth as it yields by tilling. In this sense it attaches to and proceeds from things fixed or immovable. It is paid either in money at a fixed amount annually, or by giving a share of the crops produced. The rate of rent accruing to a landlord may be said to be fixed by free competition, since the character of the work done by the tenant and the rate offered for possession determine largely what particular person may occupy the land. Rents depend chiefly upon fertility of the soil, facility or difficulty of cultivation, and situation as to an available market.

That the highest rent may be secured for

lands of fertile soil is quite apparent, but it is likewise important that it be of such a character as to render cultivation reasonably easy, otherwise the extra expense for machinery and labor renders production more costly and the profits correspondingly less. Proximity to market is a very important factor, since thereby the capabilities of the soil can be more easily utilized. Besides, the cost of transportation to a distant market materially reduces the profit and renders it less easy to place the products for sale at the most opportune time. The factor of maintaining virgin fertility of the soil is also taken into account and even enhancing its productiveness, which is always facilitated by nearness to a large city, through enlarged consumption on the farm, or by returning to the land an equivalent for what is produced. In many cases the productive quality of the soil has been increased two, five, or even tenfold by tilling, careful cultivation, and the addition of manures hauled from the cities.

REPRIEVE (rē-prēv'), the postponement of the execution of a sentence imposed by a court of record. A suspension of this kind may be granted by the executive of a state or nation, or by the judge of such a court. However, in some instances the right to grant a reprieve or a pardon is vested in the board of pardons, subject to the approval of the chief executive. Reprieves are granted for various causes, including an opportunity to investigate the legality of the conviction, the sudden insanity of the prisoner, and favorable indications in the prisoner that may appear to justify a postponement of the execution or the commutation of the sentence.

REPTILES (rēp'tīlz), a class of cold-blooded air-breathing vertebrates. They are classed as occupying a place in the animal kingdom between birds and amphibians. The body is generally elongated, terminating in a long tail, and the skin in most species is covered with scales or scutes. They are distinguished from the amphibians in that they breathe air through lungs during the whole period of their lives, and from birds in having scales, instead of feathers, and cold blood. Like birds, many species of reptiles are oviparous, that is, their young are produced from eggs incubated outside the body; while some are ovoviviparous, producing eggs that are incubated or hatched within the parent's body. Most species have four limbs, which are barely long enough to keep the body from the ground, but many are without limbs, as the serpents and some of the lizards. When present, the limbs have many carpal and metacarpal bones.

Reptiles are now classed in ten orders, six of which are extinct. The four represented by living forms include the Lacertilia, Crocodilia, Ophidia, and Chelonia. The order of *Lacertilia* includes the lizards, chameleons, and blind-worms; the *Crocodilia* embraces crocodiles, alligators, and gavials; the *Ophidia* includes the snakes; and the *Chelonia* comprises the turtles and tortoises. All the turtles and tortoises have a round body, which is covered by a hard shell, and they are characterized by a long tail. The senses are more highly developed than those of fishes, but duller than in birds and mammals. Nearly all are slow in their movements, but, as they bear more bruising than other animals, their life is less easily destroyed. Most species of reptiles are flesh eating. Snakes swallow their food whole, the stomach and gullet being capable of great distension, while crocodiles and tortoises masticate quite carefully.

In some cases, as in the python, the eggs are hatched by the warmth of the body, but they are mostly laid in the warm sand to be hatched by the sun, or by the warmth of decaying vegetable matter. Reptiles are most numerous in warm climates, where they attain their greatest size. Some are aquatic, as certain snakes, crocodiles, and tortoises, and others live in trees or

About 2,000 species of reptiles have been enumerated.

The reptiles antedate the Permian period. This is evidenced by the remains of these animals found in the Permian rocks of North America and Europe. Indeed, the living representatives are insignificant as compared with the vast multitude of large reptiles which are known to have lived in the ages of the remote past. They included both marine and land forms of large size, including vegetable feeding as well as carnivorous animals, some of which suggest the present snakes, porpoises, whales, and sloths. The *plesiosaurus*, an extinct marine reptile with a long neck, a small head, and paddles for swimming, is a type of the Mesozoic age. Others include the *ichthyosaurs*, the *pterodactyls*, and the *dinosaurs*.

REPUBLIC (rê-püb'lik), the form of government in which the sovereignty is vested in the people, the administration being lodged in officers who are elected by, and directly represent, the people. The element of democracy is necessarily included in the management of a republic, since the extension of suffrage to the people is *democratic*, while the representative feature in law-making and law-executing is the *republican* element. The government of the

United States is democratic-republican, but it is generally known as a republic. In reality there are two distinct classes of governments in most republics, known as State and Federal. Before the thirteen original states ratified the Constitution each possessed an independent national sovereignty. When it entered the Federal Union it became subject to the general Constitution, but it retained a dependent republican government. The nation is bound to preserve the right of republican government in each of the states, an obligation laid upon it by the national Constitution. Thus, each State has a constitution more or less similar to that of the other states, and is dependent upon and limited by the Constitution of the

Federal government.

Republics had their origin in the opposition that prevailed against hereditary monarchies, as was the case in Greece, Rome, and most countries of North and South America. The essential features have continued to be principally the



PLESIOSAURUS.

burrow in the ground, as the lizards. They generally hibernate in winter, or the cold season. The crocodiles and alligators are the largest living reptiles, and the structure of the vital organs most nearly resembles those of the birds. Snakes are peculiar for shedding the skin periodically.

control of the chief executive by elections and in laws emanating from assemblies chosen by an enfranchised class. In ancient Greece the government of the small states partook of the nature of a democracy, where the whole body of citizens met to enact their laws, while the republics of Genoa, Venice, and others of mediæval Italy partook of the nature of an oligarchy, since the right of suffrage was vested almost entirely in the nobles and a few privileged individuals. The representative form prevails in all modern republics. Nearly all have a written constitution. They vest the right of suffrage in the male citizens. In most cases they choose the chief executive indirectly, some through an electoral college, as in the United States, or by the legislature, as in France and Switzerland. The legislative authority is generally vested in an assembly of two chambers or houses, and the judiciary has power to pass upon the constitutionality of the laws and executive acts.

Switzerland and France are the only powerful republics of Europe, but there are three others—Andorra, Monaco, and San Marino. The last named is the oldest republic in the world. It is situated on the Italian coast of the Adriatic Sea and dates from the 4th century. France was a republic at three different periods, in 1793-1804, in 1848-1852, and from 1870 to the present time. The seven provinces of Holland organized a republic at the time of their separation from Spain and maintained it until 1815. The government of England was a nominal republic from 1649 to 1660, and Spain was so governed at two periods—in 1808-09 and in 1873-74. In 1776 the American colonies declared their independence, but the United States was not organized as a constitutional republic until 1789. Mexico obtained its republican government in 1824, which it has ever since possessed, except in the brief period of Maximilian's reign, from 1863 to 1867. All the independent countries of America are now republics, Brazil obtaining that form of government in 1889. At present there is a marked tendency toward the establishment of republics, or toward limiting the power of monarchies by constitutions. It is not at all improbable that the present century will witness the establishment of republics in many regions governed at present by powerful monarchies.

REPUBLIC, Grand Army of The. See **Grand Army of the Republic.**

REPUBLICAN PARTY, the name first applied to the party formed by Jefferson in opposition to the Federalists, which assumed the name as an advocate of a republic, while its oppo-

ents were classed as Monarchists. However, the name soon gave way to that of Democrat, chiefly because the party advocated vesting large powers in the people. The present Republican party was not organized until in 1854. It was formed by a union of smaller parties and factions that left the Whigs and Democrats on account of various phases of the slavery question. It may be said that the Whig party was disrupted by the compromise of 1850. In 1854 the Democrats passed the Kansas-Nebraska Act, which was immediately followed by a union of various elements that united in opposition to that measure, among them the Know Nothings, Abolitionists, Free Soilers, Whigs, and numerous Democrats. The party was first known as anti-Nebraska men, but soon assumed the name of Republican and won a plurality in Congress. In 1856 the first national convention was held in Philadelphia, which nominated Fremont and Dayton for President and Vice President. The platform adopted by this convention declared against the repeal of the Missouri Compromise, opposed the extension of slavery to the territories, and advocated the admission of Kansas as a free State and the construction of a railroad to the Pacific. In the campaign "Free soil, free speech, free men, Frémont" became the rallying cry, and, though overwhelmingly defeated, the party elected 92 out of 237 Congressmen.

Thousands of voters broke away from the Democratic party on account of the Dred Scott Decision and the Lecompton Bill, and the division of that party in 1860 brought about the election of Abraham Lincoln. The first election of a President by the Republicans hastened on the Civil War, but before 1864 a split occurred in the party, the dissenting faction nominating John C. Frémont for President at a convention in Cleveland. However, the Republicans temporarily assumed the name of the National Union party, renominated Lincoln, and placed Andrew Johnson, a Democrat, on the ticket for Vice President. The latter succeeded to the Presidency in 1865, owing to the death of Lincoln, and immediately the question of reconstruction began to agitate the nation. The Fourteenth Amendment, the civil rights bill, the reconstruction bill, the Freedmen's Bureau Bill, and the tenure of office act were passed. President Johnson's opposition to a number of these measures caused his impeachment, but he was not convicted.

A new class of leaders arose with the election of General Grant, in 1868, among them Sherman, Blaine, Conkling, Edmunds, and Allison. President Grant was reelected for a sec-

ond term and was followed successively by Hayes and Garfield. The latter dying in office, he was succeeded by Chester A. Arthur. In 1884 the nomination of Blaine caused a division of the party in New York and other eastern states, thus assuring the election of Grover Cleveland, the Democratic candidate. However, Benjamin Harrison was elected in 1888. He was defeated when a candidate for reëlection, in 1892, by his Democratic opponent, Grover Cleveland. The party elected William McKinley in 1896 and reëlected him in 1900. After his assassination in 1901, he was succeeded by Theodore Roosevelt, who was elected President in 1904. Four years later, in 1908, William H. Taft was elected President, defeating William J. Bryan, his Democratic opponent.

The Republican party has always depended for its strength upon the North and West, though in 1896 it lost practically every State west of the Missouri. Like all other parties, its positions have been modified by the character of national events, but it has been constant as an advocate of national banks, a high protective tariff, and internal improvements during its entire existence. Among the positions taken on questions already settled or now in a state of discussion are those including opposition to the extension of slavery, in favor of a vigorous prosecution of the Civil War, the Emancipation Proclamation, the demonetization of silver in 1873, the resumption of specie payment in 1879, a general increase in pensions, the acquisition of territorial possessions in regions remote from the United States, and an increase in the standing army. The period of American history during which the Republican party controlled the executive branch of the government is forty years. See **Political Parties in the United States**.

REPUDIATION (rê-pû-dî-â'shûn), the rejection of the whole or part of a contract, debt, or obligation. The several states are limited by the Constitution in that they may not pass laws to impair the obligations of contracts, but the Eleventh Amendment provides that the Federal Supreme Court has no jurisdiction of suits brought against a State by a citizen of another State. Hence, states have been at liberty to either repudiate or acknowledge debts, but acts of repudiation have occurred generally only on grounds of unlawful or fraudulent transfer coupled with failure of consideration. This was the case in 1841, when Mississippi repudiated bonds issued to railroad companies, which failed to comply with the conditions on which they received them. Among the other states repudiating at various times are Georgia,

Alabama, Louisiana, Minnesota, Florida, Michigan, Tennessee, Arkansas, Virginia, and the Carolinas, though in some states bills were passed to refund the debts.

RESACA DE LA PALMA (râ-sä'ká dâ lä pä'l'mâ), **Battle of**, an engagement of the Mexican War, fought on the plains at Resaca de la Palma, in Cameron County, Texas, on May 9, 1846. The Americans under General Taylor had an army of 2,300 men, while the Mexicans under General Arista numbered about 5,000. The center of the battle was in a ravine covered by a thick growth of timber, and the day was won for the Americans by a charge of dragoons. Both sides lost heavily.

RESERVATION (rêz-êr-vâ'shûn), a tract of land set apart by the government for public uses or for special purposes. A large number of reservations have been made in different parts of the country for divers purposes, such as providing sites for forts and government buildings, preserving tracts for the forests, and retaining scopes of country for the special use of the Indians. The most extensive reservations in the United States are the Yellowstone National Park and the tracts set apart for occupation by the Indians. Canada has many forest preserves and Indian reservations.

RESERVOIR (rêz'êr-vwôr), the term applied to any receptacle for storing up a fluid, but employed most extensively in describing an artificial basin to retain water until it can be used in economic and industrial enterprises. Reservoirs are divided into several classes, of which the more important are for storage, impounding, settling, and distributing purposes. In many cases great engineering skill is required to plan the constructions of basins of this kind, since the pressure is an item to be considered, as well as freezing, flooding, and influences exercised by overflows.

Storage reservoirs are frequently formed by constructing a dam across some stream, but in many instances they are made either in part or wholly by excavations and embankments. To this class belong the great reservoirs connected with the Croton dam of New York City, which serves in supplying the city with water. It has a capacity of about 35,500,000,000 gallons. The Wachusett dam of Boston retains about 63,000,000,000 gallons; the Periyar dam of India, 100,000,000,000 gallons; and the Assuan dam of the Nile, about 280,000,000,000 gallons. These dams provide storage reservoirs of greater capacity than any others in the world. *Impounding reservoirs* are constructed by building a dam across some stream, the purpose being to flood the country above. *Settling reservoirs* are

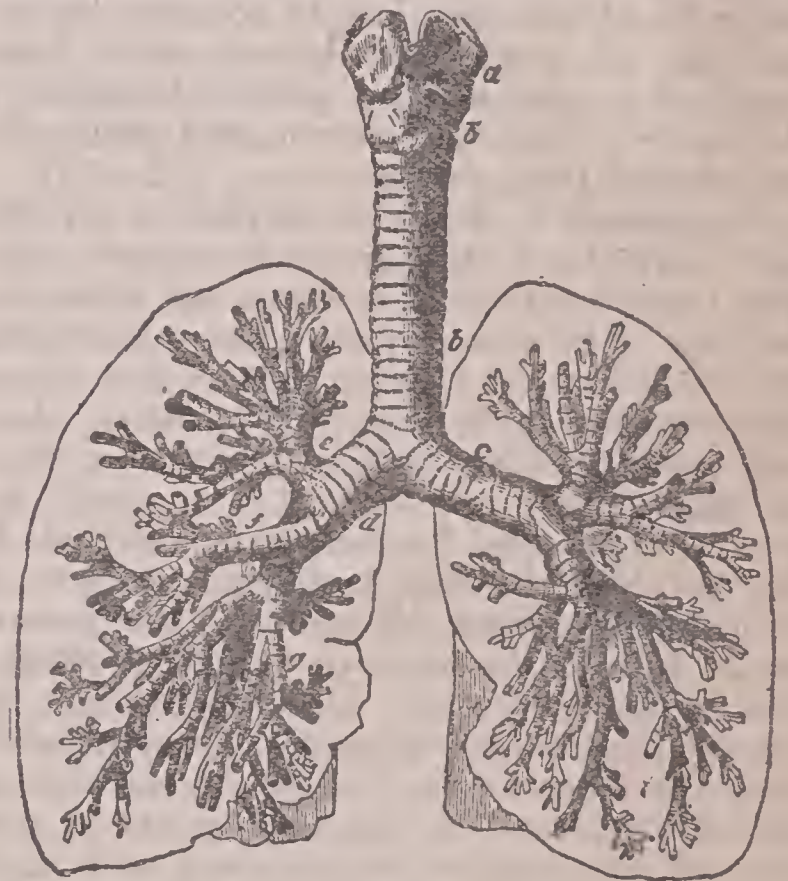
maintained to purify the water by aërating and permitting the mud to settle. *Distributing reservoirs* are comparatively small and serve to retain a supply of water in different parts of the city. Formerly the construction was largely of stone, but cement and concrete are the principal materials used in building reservoirs at present.

RESINS (rĕz'inz), a class of vegetable substances, being the product of oxidation of volatile oils secreted by certain plants. They are hard or soft according to the amount of oil they contain and the length of time they have been exposed to the air. Resins are either transparent or translucent, are somewhat elastic, and generally are soluble in alcohol, but insoluble in water. The resins are divided into three general classes, including those obtained from fossils, those extracted from plants by alcohol, and those exuding from plants spontaneously. Those obtained from fossils are derived from amber, coal, asphalt, and lignite; those extracted from plants by alcohol embrace such as the resins of angelica root, which generally contain definite carbon compounds; and those that exude from living plants include benzoin, Peru balsam, turpentine, lac, myrrh, copal, jalap, and storax. The last mentioned resins are obtained by making incisions in the stems and branches of plants, but in some plants they form drops of tears naturally. Many of the resins are used in medicine and mechanic arts, and are sold extensively as commodities in the trade.

RESPIRATION (rĕs-pĭ-rā'shŭn), the process of breathing, which consists of two acts: taking in the air, or *inspiration*, and expelling the air, or *expiration*. It is partly nutritive and partly excretory in its character, since it revives the blood by taking in oxygen and casts out waste products in the form of carbonic acid. Besides carbonic acid, there is a quantity of water and organic matter given out by the breath, which may be seen more or less clearly by breathing on a glass or windowpane at low temperature. Respiration is carried on in man and the higher animals mainly by the lungs. The air enters into the mouth or nose, passes through the larynx, a kind of hollow chamber extending from near the root of the tongue to the trachea, or windpipe, whence it passes into the lungs through two bronchial tubes. On entering the lungs the bronchial tubes divide and subdivide, usually by twos, into smaller tubes called *bronchi*, and the whole appears like a tree with many branches. The larynx is a framework made up of cartilages held together by small ligaments, and forms the projection called *Adam's apple*. An elastic plate called

the *epiglottis* is at the upper opening of the larynx, which closes down over its entrance while swallowing, thus preventing the admission of food substances into the bronchial tubes.

The tubes in the lungs terminate in minute air cells, which are inclosed by transparent and very thin walls, and through them ramify minute blood vessels, lymphatics, and nerves. As the air enters the lungs, the diaphragm, a thin partition between the chest and the abdomen, is lowered, while the ribs are raised, thus increasing the size of the chest. Thereupon, the elastic lungs expand to occupy the extra space, while the air rushes in through the windpipe and pours along the bronchial tubes, crowding into every cell. The operation is reversed when the air is expelled. The walls of the abdomen are drawn in, the diaphragm is pressed upward, and the ribs are pulled downward, thus diminishing the size of the chest and forcing



LUNGS.

Distribution of Air tubes in Mammalian Lungs. *a*, larynx; *b, b*, trachea; *c, d*, left and right bronchial tubes; *e, f, g*, the ramifications.

the air outward. Ordinarily breathing is done mainly by moving the diaphragm. It takes place about eighteen times per minute during the waking hours, or at the rate of one breath to every four beats of the heart. The lungs of a healthy adult have a capacity for about 330 cubic inches of air, and in ordinary breathing about thirty cubic inches pass in and out, though it is possible to take in fully 100 cubic inches in a deep inspiration. A quantity of air is always in the lungs. The constant supply is equal to about 100 cubic inches, this being important for

the reason that the action of the air goes on continuously.

In the process of breathing the blood comes in contact with the air as it is pressed into the air cells of the lungs, where it takes up the oxygen and in turn gives up carbonic acid gas and other impurities taken up in its circulation through the body. By this process it is changed from dark blue to a bright red color. Thus purified and laden with the inspiring oxygen, it goes bounding through the system, while the air we exhale carries off the impurities. If respiration is interfered with, the arterial blood becomes dark like that of the veins, and, when death takes place by asphyxia, as it does when respiration is impeded, the body assumes a very dark color. Foul matter passed off from the lungs diffuses itself through the surrounding atmosphere, and, if good ventilation is not provided in rooms occupied by a number of persons, the air becomes largely poisoned by impurities. As a result the system suffers from a lack of oxygen, which is speedily followed by drowsiness, headache, catarrh, and finally by serious and fatal diseases.

Respiration in fishes is carried on by the gills, the water inhaled giving up oxygen, while that exhaled carries off nitrogen and other impurities. The reason that fishes cannot long endure in stagnant water is that oxygen is rapidly consumed in the process of breathing; thus, it becomes necessary to frequently replace water in vessels where fish are kept. No special apparatus is provided for the aëration of fluids in the body of the lowest and simplest forms of animals, this being effected by the general movements of the body, or by cilia producing the necessary currents. Some animals are incapable of breathing either air or water, and in such the process is carried on by the skin or through small sacs at regular intervals on each side of the body, as in the leech and earth worm. Respiration is carried on in insects by spiracles opening into tubes, which communicate with each other through the body. Plants have a respiratory process somewhat similar to that of animals, but they take in carbonic acid as the vital element and exhale oxygen, thus reversing the action of the animal. However, the normal respiration in plants takes place only in the presence of light. Thus, it will be seen that nature has provided elements alike essential to both forms of life, and that each is dependent at least to some extent upon the other.

RESTIGOUCHE (rēs-tī-gōōsh'), a river of Canada, in the northwestern part of New Brunswick, forming a part of the boundary between

that Province and Quebec. It rises in Madawaska County, whence it flows toward the northeast, discharging into Chaleurs Bay. The Patapedia, the Matapedia, and the Upsalquitch are its principal tributaries. It has a total length of 200 miles, of which about half is navigable for small boats, while the largest vessels ascend a distance of twenty miles.

RESURRECTION (rēz-ūr-rēk'shūn), the awakening or raising of mankind immediately preceding the last judgment. The doctrine of the resurrection is maintained by all Christians and in some form it is supported by the Jews and Mohammedans. The Zoroasterians taught it definitely and it was suggested by the teachings of Plato and in the mysteries of the Egyptians. This doctrine was a fundamental belief of the Pharisees, but was disputed by the Sadducees. Christ and the apostles revealed it in the New Testament.

The Christian churches base their belief in this doctrine upon the resurrection of Christ. It is recorded that he rose on the third day after death, when his body was identical to it at the time of the crucifixion, except that it was changed as to its mode of being. Accordingly, it is held that all the dead are to rise on the last day to be judged according to the deeds done in this life, after which the good are to enjoy bliss and the bad are to undergo punishment. Most of the fathers of the church believed in the resurrection of the flesh, but later a distinction was made between the flesh and the body. Origen reaffirmed a distinction between the resurrection of the body and the flesh, referring to the former as the *essence* and to the latter as the *phenomenal form*. This view was generally held by the reformers, who looked upon the body as the creature of God, the redeemed by Christ, and the temple of the Holy Ghost.

RETAINER (rē-tān'ēr), a fee paid to an attorney or counselor at law, or the employment of an attorney to prosecute or defend a cause. A retainer may be either in writing or in the form of a verbal request. One employed in this manner is authorized to represent a client in a suit, under such rules and regulations as may be in use in the court. A *retainer*, or a *retaining fee*, is sometimes paid to an attorney with the understanding that he will hold himself in readiness to represent the applicant in the court, although the arrangements to do so are to be made at some future time.

RETIREMENT (rē-tīr'mēt), the act of retiring a military or naval officer from active duty, especially where such an officer has reached the age at which active service is lim-

ited. Such limits are recognized in all the leading nations and the officers who thus retire in most cases receive a regular salary and an increase in rank. Great Britain permits voluntary retirement with gratuities or pensions, but requires such retirement when the age limit is reached. In the United States the navy officers retire at 62 and the army officers at 64 years, but the President may retire an army officer at 62. Officers who are on the retired list in the United States receive 75 per cent. of the pay of their rank.

RETORT (rê-tôrt'), a vessel used for the decomposition of compound bodies by heat, or for distillation. The retort of the chemical laboratory is of glass, platinum, porcelain, or other material. It consists essentially of a bulb with a long neck attached, in which the products of distillation are condensed, and from it they pass into the receiver. Retorts are of various shapes and the materials from which they are made differ somewhat with the uses they are to serve. Where a high degree of heat is necessary, iron or metal retorts are used, since glass and many other substances are not proof against a high temperature.

RÉUNION (rê-ün'yün), or **Bourbon**, an island in the Indian Ocean, situated between Madagascar and Mauritius. It is about 35 miles long and 22 miles wide. The area is 780 square miles. The island is of volcanic origin, but the summits are now extinct, except Pition de la Fournaise, which is active. The surface is mountainous, ranging from 2,000 to 10,065 feet, which is the height of Pition des Neiges, the culminating peak. Much of the surface is fertile, especially along the coast and in the valleys. Sugar, coffee, vanilla, timber, and tropical fruits are the principal products. The inhabitants consist chiefly of Africans, Chinese, and natives. Portuguese navigators discovered the island in the 16th century, but it became a possession of France in 1649. It is governed under the municipal code of France. The executive power is vested in a governor, who is assisted by a privy council. Population, 1908, 175,240.

REVAL (rêv'el), or **Revel**, seaport of Russia, capital of Esthonia, on the Gulf of Finland. It is 200 miles southwest of Saint Petersburg, with which it is connected by railroads. Among the noteworthy buildings are the townhall, the central railway station, the capitol building, the merchants' exchange, and three gymnasiums. It is popular as a summer resort for boating and bathing. The city has a system of waterworks, the supply being carried from Lake Jarvakyla by an aqueduct. It has manufactures

of machinery, clothing, cotton and woolen goods, utensils, and cordage. The harbor of Reval, which remains open throughout the year, has a large commerce. A large proportion of the inhabitants are Germans. Population, 1908, 68,246.

REVELATION (rêv-ê-lâ'shün), **Book of**, the name of the last book of the New Testament, which is sometimes called the *Apocalypse of Saint John*. It has been the subject of more or less discussion, since both the authorship and the date of its composition are uncertain. Issued at a time when religious persecutions were practiced, it was probably written in opposition to the practices of the Roman Empire, but at the same time to encourage the faithful to persevere until the coming of judgment and the deliverance. In the first part are letters written to seven Christian churches in Asia Minor, which are followed by visions and prophecies relating to the fall of Jerusalem, the power of the world that opposes Christ, and the glory of the heavenly and eternal Jerusalem. See **Apocalyptic Number**.

REVERE (rê-vêr'), a town of Massachusetts, in Suffolk County, a short distance northeast of Boston, on the Boston, Revere Beach and Lynn and the Boston and Maine railroads. It is improved by street pavements, waterworks, and sanitary sewerage. Many Boston business men make it their place of residence. The principal buildings include the Carnegie library, the high school, the townhall, and the public bathhouse. Revere was settled in 1626, when it was known as Rumney Marsh, and received its present name in 1871. Population, 1910, 18,219.

REVIVAL (rê-vîv'äl), the name used among Protestants to denote a time of active work in the church, usually a period of two to six weeks. In this sense it applies only to certain Evangelical churches, such as the Methodist, Baptist, United Brethren, and Presbyterian. These denominations and a number of others set apart a brief period for specially active work among the members and in the community to strengthen their faith and extend the Christian belief and practice. It is a time for local missionary work, when new members are to be brought in and when the spiritual welfare is to be emphasized with special fervor. Formerly these revivals were conducted by the local ministers with the aid of the elders and the other officials, but later aid came to be extended by other ministers of the same denomination, and finally Evangelists were appointed or chosen to carry on the work at certain periods of the year. For this purpose camp meetings were organized, since the buildings rarely furnished ample ac-

commodations for the large numbers in attendance, or tents were erected to supplement the seating capacity of the church edifices.

Church revivals may be said to have reached their height in the time of the Crusades, when a general movement was inaugurated in Europe to establish a permanent foothold for Christianity in Asia. The Crusades cover the period from 1096, the beginning of the first Crusade, until 1291, when Acre was captured by the Sultan of Egypt. Another great period of revivals spread over Europe at the time of Reformation, which may be said to have been inaugurated by John Huss in Bohemia, by Luther and Zwingli in Germany, and by Bruce and Livingston in England and Ireland. John Wesley and George Whitefield, in the 18th century, conducted a revival in England that gave rise to the Methodist and other evangelical churches. New England witnessed a revival under the preaching of Jonathan Edwards. The camp meeting was the forerunner of the Chautauqua assembly, which may be said to have brought about in the educational and literary fields what has been done by the revivals in a spiritual way. Moody and Sankey, who united preaching with singing, induced an extensive revival movement in the United States during the 19th century. Work of a similar character is carried on by the Roman Catholics through organization work known as *missions*, which are designed to renew spiritual activity and perpetuate religious fervor.

REVOLUTION (rĕv-ō-lū'shŭn), any fundamental change in government, or a revolt against an existing government and the establishment of a new one in its stead. Revolutions are mainly brought about by internal causes. However, the change must be accomplished completely to constitute a revolution, otherwise it is generally termed a *rebellion*, or an *insurrection*. Among the notable revolutions of modern times is that of England in the 17th century, which began in 1642 with a quarrel between Charles I. and his Parliament and ended in 1649, when the king was brought to the block. A republic was organized with Oliver Cromwell as protector, but the monarchy was restored in 1660 by the return of Charles II. The great Revolution in America began in 1776, when the colonies declared their independence of Great Britain. It ended with the surrender of Cornwallis at Yorktown in 1781. The great Revolution of France began at Paris in 1789 and ended with the beheading of Louis XVI. on Jan. 21, 1793, though some writers place the end in 1794, when Robespierre was guillotined. Two other revolutions occurred in France. The one of 1830 de-

posed Charles X. and placed Louis Philippe on the throne and the Revolution of 1848 established the second republic. Some writers regard the establishment of the third French republic, in 1871, as a revolution. The republics of South America were practically all established by revolution, though the one of 1889, when Brazil became a republic, was without bloodshed.

REVOLUTIONARY WAR IN AMERICA. See **United States**, page 2979.

REVOLVER (rĕ-vōlv'ēr), a firearm which resembles the pistol, but differs from it in having a breech-loading cylinder so arranged that the cocking of the hammer revolves it and brings the next cartridge in line for firing. Many kinds of revolvers are in use. They have from three to six chambers in the cylinder and differ widely in size and mechanical construction. The cheaper kinds are cocked by means of pulling the hammer back with the finger, while the more expensive are self-cocking; that is, they may be cocked and discharged by simply pulling the trigger. Others are made with a concealed hammer, thus guarding against the danger of being discharged by accident. In some revolvers is a safety latch to prevent them from being fired without first releasing the internal hammer by pressure. In 1818 Elisha H. Collier patented the first weapon of this kind in the United States, and in 1835 Samuel Colt invented the famous revolver that bears his name. The principle employed in a revolver is used also in rifles and guns designed to throw small projectiles, as in machine guns of the Gatling kind.

REYNARD THE FOX (rā'nĕrd), an epic fable of the Middle Ages, written at some time between the 10th and 12th centuries. However, the first printed edition did not appear until 1517, when it was published at Rostock, Germany. It was written in the low German dialect by one signing himself Hinreck van Alekmer, but the real name of the author is believed to be Hermann Barkhausen, a book printer in Rostock, who wrote under a pseudonym. The characters in the story are animals, which are represented as speakers and actors. They are treated with such a degree of interest that many translations have been made into different languages, and few fables are at present better known or more popular.

The writer of Reynard the Fox represents that on one eastertide Nobel the Lion, king of beasts, held court, to which he summoned all the animals, both great and small, to do him homage. All gave willing obedience to the summons except Reynard the Fox, who was prompt-

ly summoned for this and other misdeeds to appear before the king of beasts, Bruin the Bear being sent to command his attendance. However, Reynard employed his well-known tactics to escape punishment by informing Bruin that a rich fund of honey could be found in a split tree, to which the bear at once hastened, but got fastened in his attempt to secure the honey and was almost beaten to death by angered peasants before he was able to escape. The Lion next sent Tibert the Cat as a messenger, but Reynard persuaded him to go on a chase by relating that a nest of mice could be found in a certain place, and in attempting to secure the prize he was caught in a noose and barely escaped with his life. Grimbart the Badger next went as a messenger, and, being less vain than those who had gone before, he succeeded in persuading Reynard to appear at court, where he was at once tried and it was decided that he should die. His death was to be by hanging.

When Reynard the Fox had ascended the gallows, he was asked if he had something further to say before suffering death. Instead of making a confession of his guilt, he turned to the Lion and informed him that Bruin the Bear and Isengrim the Wolf had planned to kill the Lion; but, since he and his old father Reynard were not friends of the wicked bear, he had stolen and hidden their treasure, for which reason he wanted to inform the Lion of his danger. The king of beasts at once pardoned Reynard and imprisoned both Bruin and Isengrim. Trouble again arose when the Lion wanted Reynard to show him the treasures, but he soon excused himself by saying that it was secure at some distance and that he did not have time to look it up immediately, as he had taken an oath to go to Rome on a pilgrimage.

The skillfully devised story was cause enough for the Lion to let Reynard go at once to redeem his vow. However, he took Belim the Ram and Cuwaert the Hare with him. Soon after starting the three came to the home of Reynard, which he induced the Hare to enter by promising him rest and a good meal, but at once fell upon him and ate all but his head. This he put into a sealed satchel, which he sent back to the Lion by the Ram, telling the latter that it contained letters of great value. When the Ram reached the court of the Lion, the king of beasts was greatly angered, and not only declared the Fox an outlaw, but gave freedom to the Wolf and Bear. It happened soon after that the Wolf and Fox met in the forest, when the former undertook to punish Reynard for causing him to be imprisoned, but the latter

won a victory by his cunning and was thereby restored to the protection of the Lion.

RHEA (rē'ā), the name of a large bird native to South America, found chiefly in the valleys of the Amazon and the La Plata. It is allied to the ostrich, but is distinguished from it by having no tail, three-toed feet, and a covering of feathers on the neck and head. Although the wings are unfit for flight, they are more highly developed than those of the ostrich and the emu of Australia. The body stands about three feet high, but the male is somewhat larger than the female. The color of the plumage is a brown tint. While the plumes of the wings are marketed for dust brooms, they are inferior to those of the ostrich and are little used for ornamentation. One male is usually associated with two or more females, who build a common nest and lay from twenty to thirty eggs, which are incubated by the male. These birds feed on grass, berries, worms and insects. In case of danger they run swiftly, when they use the wings as an aid to make good their escape. See **Ostrich**.

RHEIMS (rēmz), or **Reims**, a city of France, in the department of Marne, on the Vesle River, eighty miles northeast of Paris. It is located in a fertile region, has extensive railroad facilities, and is one of the important commercial and manufacturing cities of France. A large cathedral in the Gothic style of architecture was built at Rheims in the 13th century. It has many other churches, several institutions of higher learning, and a fine public school system. The manufactures include cotton and woolen goods, blankets, champagne, machinery, earthenware, toys and scientific instruments. It has been the seat of an archbishopric since the 8th century and was made the place of coronation in 1179, when Philip Augustus was crowned here. Rheims is famous as the place where Clovis was baptized in 496, for the crowning of the dauphin in the presence of Joan of Arc, and for the fact that all the French kings were crowned here down to 1825, except Henry IV., Napoleon I., and Louis XVIII. The city was occupied by the Germans in 1870-71. Extensive railroad building in France has caused the city to grow with remarkable rapidity. Population, 1906, 109,859.

RHETORIC (rēt'ō-rīk), the art that treats of discourse, or the expression of thought by means of language, either oral or written. Aristotle wrote the first treatise on rhetoric, a work that is still considered valuable as a text of reference. He treated the subject as a branch of logic and applied its rules largely to oratory. Aristophanes of Byzantium was the first to in-

roduce rhetorical points and accents and Quintilian carried on teaching in rhetoric in the Roman capital for more than twenty years, publishing his famous work on the subject, entitled "Education of an Orator." It may be said that Quackenbos (q. v.) is among the best known American writers on the subject.

Rhetoric is divided into two parts, style and invention. *Style* treats of the manner of expression and, as a word, was derived from the Latin *stylus*, a small steel instrument used by the Romans for writing on waxen tablets. *Invention* in rhetoric is the art of putting together what one has to say on a subject. It does not include finding out what to say, but rather consists in putting statements of facts, our observations upon men and things, our feelings, and our conclusions, into readable shape. The subject of invention is so extensive and complicated that no two authorities exactly agree upon every detail. As a whole, it may be said that rhetoric is the art by which the discourse is adapted to its end. This includes at least four important purposes in speaking or writing: namely, to enlighten the understanding, to please the imagination, to move the passions, and to influence the will.

RHEUMATISM (ru'má-tiz'm), an inflammation or malady with aching pain, usually of a variable or acute nature. It affects equally the muscles, the joints, and other structures. Exposure to cold and damp are among the ordinary causes of rheumatism, but it likewise results from severe labor, insufficient nutrition and the reduction of vitality by an over-consumption of stimulative food without sufficient exercise to eliminate the waste from the system. No specific time in life can be assigned in which it may attack the body, but rheumatic affections are most frequent between the ages of 15 and 35 years. Acute cases are generally attended by affections of the heart, particularly of the pericardium. Young persons are frequently attacked by a form known as *Saint Vitus' dance*. Swollen joints attended by severe pain often accompany rheumatism. Complicated cases usually become chronic, often ending in severe deformity and twisting of the joints. A common form of muscular rheumatism is known as *lumbago*: Rheumatism is more or less hereditary.

RHINE (rīn), or **Rhein**, an important river of Europe, one of the finest and most historical streams in the world. It rises in Switzerland, has a general course of about 765 miles toward the north and west, and flows into the North Sea. Two streams form the Rhine in the Swiss canton of Grisons, which are known as the

Vorder Rhein and the Hinter Rhein. A short distance below the junction it passes through Lake Constance and at the town of Basel turns toward the north and enters Germany, in which country most of the river is located. The part from the vicinity of Saint Gothard's Tunnel to Basel is generally known as the Upper Rhein; the part from Basel to Cologne, as the Middle Rhein; and from Cologne to the North Sea, as the Lower Rhein. It enters Holland after turning toward the west, but soon divides into numerous branches, entering the sea by a delta.

The Rhine is an important commercial highway, being navigable a distance of nearly 600 miles. It is connected by numerous canals with other river systems, including those of the Danube and the Rhone. On its banks are many thriving cities, including Arnheim, Leyden and Utrecht, in Holland; Bonn, Coblenz, Cologne, Düsseldorf, Mentz, Mannheim, Strassburg, Spire, and Worms, in Germany; and Constance and Basel, in Switzerland. The principal tributaries are the Aar, Moselle, Main, Neckar, and Lippe rivers. The scenery of the Rhine is noted for its great beauty, both in Switzerland and Germany; but particularly in the latter country. In Holland it is less beautiful, owing to the generally level character of the region through which it passes. Much of the land of the Rhine delta has been redeemed by dykes. In some places the embankments are nearly thirty feet above sea level. More than a million tourists visit the Rhine every year.

RHINELANDER (rīn'lān-dēr), a city of Wisconsin, county seat of Oneida County, 102 miles northwest of Green Bay. It is on the Wisconsin River, at the Pelican Rapids, and has communication by the Chicago and Northwestern and the Minneapolis, Saint Paul and Sault Sainte Marie railroads. The surrounding country produces lumber, cereals, and live stock. Extensive water power is furnished by the Pelican Rapids. The chief buildings include the county courthouse, the high school, and several fine churches. Electric lighting, waterworks, and drainage are among the public utilities. It has manufactures of furniture, ironware, malt liquor, and machinery. Population, 1905, 5,435; in 1910, 5,637.

RHINE PROVINCE, or **Rhenish Prussia**, a part of the German Empire, a province of Prussia. It is bounded on the north by the Netherlands, east by Westphalia and Hesse-Nassau, south by Lorraine, and west by Luxemburg, Belgium, and the Netherlands. The area is 10,423 square miles, nearly half of which is in a state of cultivation. A large part in the north is low and level, while the south is hilly

and undulating. Drainage is principally by the Rhine and the Moselle. Agriculture is the principal occupation, but extensive interests are vested in manufacturing and commerce. Wheat, rye, barley, oats, hops, tobacco, and grapes are the leading products. The extensive vineyards are located along the Rhine and the Moselle, where wine is manufactured extensively for exportation. Coal is mined in large quantities and there is a considerable output of lead, iron, zinc, salt, and copper.

The manufacture of textiles has attained a high state of development, especially in Krefeld and Aix-la-Chapelle. Needles, locomotives, glass, chemicals, leather, paper, sugar, and machinery are produced in large quantities. A network of railways and electric lines furnish transportation to all parts of the province. It has an extensive trade in cereals, wine, textiles, and other manufactures. For the purpose of local government it is divided into the five districts of Coblenz, Cologne, Düsseldorf, Treves, and Aix-la-Chapelle. Coblenz is the capital of the province. Within the last two decades it has increased rapidly in population and is now the most densely inhabited province in Prussia. Population, 1905, 6,436,337.

RHINOCEROS (rī-nōs'ē-rōs), an ungulate mammal, allied to the elephant, tapir, and hippopotamus. Next to the elephant it is the most powerful animal now living. A number of species have been described, all of which are native to the warmer parts of Asia and Africa. They are usually harmless and of low intelligence, but display considerable ferocity when provoked, and can run with great speed. The

marshes and on the banks of streams, where they wallow in the mud, while some frequent open country. Their flesh is eaten by natives and their skin, which is thick enough to be proof against the claws of lions and even bullets, except at the neck and head, is used for whips and shields. One young is brought forth at a time. Little more than mere traces of hair appear on the skin. The hoof terminates in three toes, and one or two horns are attached to the nasal or frontal bone.

The *one-horned*, or Indian, rhinoceros is the largest of the genus. It has a very thick, black horn, which sometimes is two feet long and eighteen inches in circumference at the base, and the skin is peculiar for having definite folds. The *black rhinoceros* is native to South Africa. This species has two horns, the smaller of which grows behind the other, and is dreaded more for its ferocity and strength than the lion. Several species are found in the islands of Java, Sumatra, and Borneo, including the well-known Javanese rhinoceros, all of which are one-horned. The rhinoceroses of Asia are more docile than the African and have been trained as beasts of draft and burden. Traces of many extinct species are found as early as the Miocene tertiary period.

RHODE ISLAND (rōd ī'land), one of the original thirteen states of the United States, belonging to the North Atlantic group, popularly called *Little Rhody*. It is bounded on the north and east by Massachusetts, south by the Atlantic, and west by Connecticut. The extreme length from north to south is 49 miles and the greatest breadth from east to west is about 40 miles.

It has an area of 1,250 square miles, of which 97 square miles are water surface. In area it is the smallest State in the Union.

DESCRIPTION. Rhode Island is located entirely in the Atlantic coast plain, but its surface is somewhat diversified, being hilly in the northern part. It slopes toward the south and along the Atlantic coast is a level tract. Durfee Hill, in the northwestern part, has an altitude of 805 feet and is the highest point. The general elevation is less than 600 feet. Narragansett Bay, a large and branching inlet, extends northward from the Atlantic

about 40 miles. Within it are inclosed several islands, including Aquidneck, or Rhode Island, which is three miles wide and fifteen miles long and contains the town of Newport.



BLACK RHINOCEROS.

INDIAN RHINOCEROS.

largest are about six feet in height at the shoulders, with short legs and a very heavy and solid body. They feed on grass and other vegetable forms. Most species prefer to loiter in

The northern part is drained largely into Narragansett Bay by the Blackstone and the Pawtucket rivers. The Ten Mile River forms a part of the eastern border. A small section in the northwestern part is drained by head streams that cross into Connecticut. The Pawcatuck River drains a large section in the southwestern part, flowing into the Atlantic on the border of Connecticut. Many of the streams are rapid and supply considerable water power. Numerous small lakes are found in many places.

The climate is similar to that of southern Massachusetts and like it is influenced favorably by winds from the Gulf Stream. At Newport, on Aquidneck Island, the mean temperature is 46°. This locality is often referred to as the *Eden of America*, owing to its fine climate, delightful beaches, and bold cliffs. Farther north the extremes of temperature are greater, ranging from about zero in the colder part of winter to 95° in July. All parts of the State have an abundance of rainfall, which averages about 40 inches in the north and 48 inches in the south. All seasons and localities are healthful.

MINING. The minerals are numerous, but the output is not extensive. Deposits of anthracite coal occur in several sections, but some of the beds are not workable, owing to the fact that they are located near the bay. Extensive beds of granite and limestone abound, the former being quarried largely for monuments and paving blocks, while the larger part of the output of the latter is used in making lime.



RHODE ISLAND.

1, Providence; 2, Pawtucket; 3, Woonsocket; 4, Newport; 5, Westerly. Chief railroads indicated by dotted lines.

Other minerals include clays, serpentine, graphite, and talc.

AGRICULTURE. About 67 per cent. of the land surface is included in farms, which average 83 acres. However, only about half of the land is improved. In some sections the soil is of a sandy character, but most of the surface is quite fertile. Hay and forage are the principal crops, but corn, oats, rye, and barley are grown successfully. Considerable gardening is carried on to supply the local market with potatoes, beans, celery, strawberries, and sweet corn. Dairy farming is an important enterprise, yielding large returns from the sale of milk and butter. The cattle grown are of a fine grade

and fully two-thirds are milch cows. Other live stock includes horses, sheep, swine and poultry.

MANUFACTURES. A larger number of people are engaged in manufacturing than any other industry and the returns show a steady growth in this enterprise since 1850. Pawtucket and Providence are centers of the cotton-spinning industry, where about two million spindles are employed. The textile products have an annual value of about \$110,500,000 and represent the most important manufactures. They include worsted goods, silk textiles, hosiery, and cotton and woolen goods. In the output of dyed and finished textiles the State has the third rank in the Union. It holds first rank in the manufacture of jewelry. Other manufactures include firearms, machinery, locomotives, pipe tobacco and cigars, and rubber and leather goods. The fisheries furnish a large output for canning and curing. Large quantities of fruit and vegetables are preserved and canned.

TRANSPORTATION AND COMMERCE. The railroads have a total length of 225 miles and are largely under the control of the New York, New Haven and Hartford Railway Company. Electric lines are operated in the cities and many rural districts, furnishing communications between numerous points within the State. The highways are in a good state of construction and repair. Providence is the most important commercial center and has considerable foreign trade. The principal exports include jewelry and textiles, while the imports embrace lumber, raw cotton and silk, and foodstuffs.

GOVERNMENT. The present constitution was adopted in 1842. It vests the executive authority in the governor, lieutenant governor, secretary, treasurer, and attorney-general, all elected annually on the Tuesday after the first Monday in November. Legislative authority is exercised by the General Assembly, which consists of a senate and a house of representatives. One senator and one or more representatives are elected in each town or city, but no legislative subdivision can have more than one-sixth of the 72 members who constitute the lower branch. The senate has 38 members besides the Governor, who is ex-officio president of that body. A supreme court has ultimate judicial authority, and subject to it are such inferior courts as the Legislature may establish. Local government is administered in the towns and counties.

EDUCATION. The State has a well-organized system of common schools, which are graded from the kindergarten to the public high school. At present illiteracy is placed at 8.4 per cent., but among the native population it is much less.

Brown University, one of the oldest institutions of higher learning in the United States, is located at Providence, which is also the seat of the State normal school and the Rhode Island School of Design. Many private and secondary schools are maintained. Kingston is the seat of the Rhode Island College of Agriculture and Mechanic Arts and Bristol has a soldiers' home. Ample provisions have been made for training in the industries and for the care of the unfortunate and incorrigible. Cranston has the State farm, which contains an insane asylum, the reformatory, the workhouse, and the penitentiary.

INHABITANTS. The State has a density of 407 inhabitants to the square mile, which is the largest population per square mile in any of the states. The foreign-born population is 134,519, including principally Irish, English, and Canadians. Providence, on the Providence River, is the capital and largest city. Other cities and towns include Pawtucket, Woonsocket, Newport, Central Falls, Warwick, Lincoln, Cranston, Cumberland, and Westerly. In 1900 the State had a population of 428,556. This included a colored population of 9,506, of which 366 were Chinese and 9,092 Negroes. Population, 1910, 542,610.

HISTORY. It is thought that the Norsemen were the first Europeans to visit Rhode Island. They cruised on its shores in the 10th century. Roger Williams was banished from the Massachusetts Bay colony for attacking its theocratic government and in 1636 made the first settlement at Providence, where he advocated complete separation of church and state. The followers of Anne Hutchinson founded Portsmouth in 1638 and Newport was settled in 1639. These settlements were organized as one colony under a charter in 1644, but a new charter was granted in 1663, which remained the fundamental law until 1842. The peculiarity of apportionment of representation and a property qualification for voting caused Dorr's Rebellion in 1842, when a new constitution was adopted, which extended the right of suffrage to all male citizens. The State did not ratify the national Constitution until 1790, this delay being occasioned by a desire of the agricultural classes to reserve the power to levy import taxes and to retain paper money as legal tender. Its citizens were active supporters of the Revolution and all other national contests in favor of maintaining the nation. The property qualification for voting was abolished in 1888 and since 1893 elections to office are by a plurality vote. Formerly Newport and Providence were the joint

capitals, but the latter has been the sole capital since 1900.

RHODES (rôdz), an island situated southwest of Asia Minor, in the Mediterranean Sea, belonging to Turkey. The length is about 40 miles; greatest width, 20 miles; and area, 425 square miles. Anciently it was an independent state of Greece, when it was known as Rhodos, and its capital, Rhodes, dates from 404 B. C. It is famous as a maritime city and its neglected harbors were once the seat of vast commercial activity. The city was surrounded by strong walls and at the entrance of one of its ports stood a great statue of Helios, called the *Colossus of Rhodes*. This work of art was so remarkable that it became known as one of the seven wonders of the ancient world. Its height was 70 cubits and it was only one of about 3,000 statues in that city, which was then a noted center of intellectual and political power. Alexander the Great captured Rhodes and established a powerful garrison there, but at his death, in 323 B. C., the Macedonians were expelled from the island. The Rhodians sided with Caesar against Pompey, and in 42 B. C. Cassius entered the city and carried off many of its treasures. However, it continued to be a center of learning for many centuries under the emperors of Byzantium. The Knights of Saint John of Jerusalem settled on the island in 1310 and until 1565 defended themselves against the Turks, but in the latter year they were compelled to yield. Since then it has been a Turkish possession. The island has a population of about 32,016, of whom fully 25,000 are Greeks.

RHODESIA (rô-dē'zī-à), a possession of Great Britain in South Africa, divided by the Zambezi River into Northern and Southern Rhodesia. It is bounded on the north by the Congo Free State and British Central Africa, east by British Central Africa and Portuguese East Africa, south by the Transvaal Colony, and west by German Southwest Africa and Angola. The southern part includes Mashonaland and Matabeleland, two regions lying between the Zambezi and the Limpopo rivers.

Northern Rhodesia has an area of about 288,500 square miles and a population of 846,000. It has fine forests of valuable timber, which yield India rubber and large quantities of lumber. Coal, gold, and copper are mined. Cattle and horses are grown in large numbers by the natives, whose chiefs retain their authority. For the purpose of government it is divided into Northeastern Rhodesia and Northwestern Rhodesia. Administrative headquarters for the for-

mer are maintained at Jameson and for the latter at Livingstone.

Southern Rhodesia has an area of 143,830 square miles and a population of 619,000. It embraces the two provinces of Matabeleland and Mashonaland, the former having a population of 208,700 and the latter 410,000. The soil is generally fertile and the climate is favorable to Europeans. Cereals, tobacco, rubber, cotton, vegetables, and fruits are produced in large quantities. The minerals include gold, silver, copper, iron, lead, coal, and diamonds. About 2,750 miles of railways are in operation, the main line of which forms a part of the Cape-to-Cairo Railway. This line is carried over the Zambezi River at Victoria Falls by one of the highest bridges in the world. Bulawayo is the chief town of Matabeleland and Salisbury of Mashonaland. The inhabitants consist almost exclusively of natives, including about 5,150 whites.

The entire possession of Rhodesia was governed by the British South Africa Company until 1907, when steps were taken to reorganize the government on the principle of federation. Salisbury is the seat of government and the residence of a commissioner and commandant-general. Each division is administered by an administrator, who is assisted by an executive council. Formerly the region was held by the Matabeles, a native race, who concluded an alliance with Great Britain. A royal charter was granted to the British South Africa Company in 1889. Lobengula, the chief of the Matabeles, headed an uprising in 1893, after which the entire region was annexed as a British possession.

RHODES SCHOLARSHIPS, the stipends established by the will of Cecil John Rhodes (q. v.) for the purpose of maintaining a certain number of students at Oxford University, England. It is stated in the will that "a good understanding between England, Germany, and the United States will secure the peace of the world, and that educational relations form the strongest tie." The scholarships were distributed as follows: Australia, 18; Bermuda, 3; Canada, 6; Cape Colony, 12; Germany, 15; Jamaica, 3; Natal, 3; Newfoundland, 3; New Zealand, 3; Rhodesia, 9; and two to each State and Territory of the United States. The beneficiaries are chosen under methods adopted in the several countries, those of Germany being by appointment of the emperor and those of the United States being named by committees in each State and Territory. The age of eligibility is fixed between 19 and 25, and candidates must be unmarried and citizens of the states

or countries by which they are appointed. In most cases the committees are presided over by presidents of universities and candidates are chosen on the basis of scholarship. The scholarships have a value of \$1,500 per year and are tenable for three years.

RHODODENDRON (rō-dō-dēn'drōn), an extensive genus of shrubs of the heath family. The leaves are usually alternate and are evergreen in some species, and the flowers are in clusters and often variously colored. Many species are cultivated for ornament in Canada and the United States, where they are found in abundance in the native state along the Pacific coast and in the Allegheny Mountains. Several species are native of Japan, China, Australia and South America. Various American species have been naturalized in Europe, where they are cultivated extensively in gardens and parks as flowering plants. Some species abound in the Alps, where they are known among the Germans as *Alpine roses*. The *great rhododendron* is found in abundance in some of the Southern States. It is from ten to twenty feet high.



RHODODENDRON.

RHONE (rōn), a river of France, which rises in Switzerland, twenty miles southwest of the source of the Vorder Rhein. The beginning is in the Rhone glacier, about 7,548 feet above sea level. From Lake Geneva, through which it passes, it has a general southwesterly course to Lyons, where it makes a bold turn toward the south and enters the Gulf of Lyons by an extensive delta. The length is 500 miles, the basin has an area of 37,500 square miles, and 350 miles of its course are navigable. The Saône, Ain, Isère and Durance are its principal tributaries. It is connected by canal with the Rhine, Loire, Seine, and Meuse rivers.

RHUBARB (rū'bärb), or **Pie Plant**, a genus of plants cultivated for medicinal use and as a food. About twenty species have been described. The stems are erect and thick, often from five to seven feet high, and bear a cluster of seeds at the upper end. The roots are fleshy and the leafstalks, when young and ten-

der, are used for pies, tarts, preserves, and a kind of wine. In many countries the rhubarb is cultivated chiefly for its roots, owing to their medicinal properties. Rhubarb as a medicine is slightly astringent, when given in small doses, and in large doses acts as a purgative. It is used mostly in treating jaundice, catarrh of the biliary duct, and for certain skin diseases. The plant is cultivated for medicine in China and Russia. In Canada, the United States, and nearly all countries having a temperate climate it is grown for food. The root winters in the ground in moderately cold climates, hence the young shoots appear early in the spring.

RHYME (rīm), a composition in verse, in which the terminating word or syllable of two or more lines correspond in sound. Poems differ in the degree of resemblance of the endings, but in strict rhyme it is required that the last stress vowels in the rhyming lines agree exactly, although the lines must differ in some respects. The words *rain*, *train* and *strain* rhyme with each other, but *rain* and *reign*, though widely different in spelling, are sufficiently similar in sound to form good rhyme. From this it will be seen that rhyme is governed by the sound instead of by spelling or meaning. In some poems each couplet, or two lines, rhyme, as in Whittier's "Maud Muller":

Maud Muller, on a summer's *day*.
Raked the meadow, sweet with *hay*.

This may be considered a simple style of forming rhymes, and productions written in this form are usually simple and clear in expression. Poems are formed by the writers according to their taste in stanzaic structure, some lines rhyming only at the end and others forming complete rhymes at various intermediate places. Some writers either introduce a limited amount of alliteration or use it extensively. Rhymes at the end of the lines are ordinarily between two or more verses, and sometimes the style is alternated, as in Shelley's "Cloud":

I bring fresh *showers* for the thirsting *flowers*,
From the seas and the *streams*;
I bear light *shade* from the leaves when *laid*
In their noonday *dreams*.

The writers of ancient Greece and Rome did not make extensive use of rhymes, but this style of writing has been popular among the Arabs, Chinese, and other people of Asia from remote antiquity. Systematic rhyme came into use among the Romans in the time of Augustus, in the latter part of the 4th century, and was taken up in Western Europe with much eagerness during the Reformation, when the

writing of religious songs formed an important branch of literature. Some of these writers, as Milton, made extensive use of alliteration.

RIBBON (rib'būn), the name originally applied to an article of ornament, but now employed to designate various products used in binding and tying articles of dress and for symbolical purposes. It is properly a narrow band of woven silk from less than an inch to not more than nine inches in width, but other materials are used extensively for the cheaper grades. The principal ribbons include *satin*, a smooth surface; *grosgrain*, a ribbed surface; and *plush*, a velvety surface. However, there are many varieties of each, differing in composition, weaving, and coloring. Crefeld is the center of ribbon manufacturing of Germany; Vienna, of Austria; Basel, of Switzerland; Saint-Etienne, of France; and Coventry, of England. The ribbon trade of America and Europe aggregates annually about \$95,000,000.

RIBBON FISH, the name of several fishes found in the deep waters of all the oceans. The body is long and compressed like a tape, while the head is short and the mouth is narrow. On the back is a long and high dorsal fin. The anal fin is absent, while the caudal fin is either absent or but slightly developed. Three families of these fishes have been described, but each is represented by only a few species. The skin is naked and silvery and the entire structure is delicate in nearly all these fishes. Some specimens are from twelve to twenty feet long, but the thickness rarely exceeds two inches. They are not very numerous in any locality, but are found widely distributed from the polar to the tropical seas. A fish common to the Gulf of Mexico and the West Indies is known by the same name, owing to its dark brown bands that characterize the body.

RIBS, the elastic arches of bone which constitute the larger part of the walls of the chest. Man has 24 ribs, twelve on each side of the chest. At the back they are attached to the spine. Seven pairs are tied by cartilages to the breast bone or sternum, in front, three are fastened to each other and to the cartilage above, and two are loose, or floating ribs. The first seven pairs are known as *true*, or *vertebro-sternal* ribs, and the others are designated as *false ribs*. The name intercostal spaces is applied to the spaces between the ribs. In respiration the ribs have more or less complex movement. A contraction of the seven upper intercostals causes the sternal end to be elevated and carried forward, causing the diameter of the chest to be increased. The natural form of the chest is that of a cone diminishing

upward, which, when the clothing is not too tight, gives the greatest freedom of motion in respiration.

RICE, an annual cereal plant native to India, but now extensively naturalized and cultivated for its seed. Many writers assert that rice was



RICE.

cultivated in China about 2822 B. C.; in the Euphrates Valley, about 400 B. C.; and near Pisa, Italy, as early as 468 A. D. It constitutes one of the most important foods and is used more extensively than any other food-stuff by the people of the world, being the principal food of nearly one-third of the human race. Several

thousand species have been enumerated, all depending somewhat on soil and climate. Some are grown on upland, but most of the rice sold in the market is tilled on marshy or inundated land, as in the swamps of the Carolinas, Louisiana, and Texas, and in the Nile and Niger valleys. The seed is sown like oats or wheat, after which the ground is flooded until it germinates, when the water is drawn off, but it is flooded a second time to kill the weeds, and a third time when about to head. In most regions the height of the plant depends principally upon the depth of the water, as the ear always grows above the surface, and the grain is produced in heads similar to oats. The water is drawn off shortly before the grain ripens and the crop is cut with reapers and threshed by machines much like oats and wheat.

Each grain of rice is covered with a husk, when the seed comes from the threshing machine, in which condition it is known as *rough rice*, or *paddy*. The husk, or hull, is removed by a huller, the essential part of which consists of heavy millstones that revolve rapidly, but are not close enough together to break the kernels. Several grades of rice result in the process of removing the husk on account of some grains being broken, but all of these are separated and sold as different classes of rice. The plan of cultivation and treatment varies some-

what in different countries, but in all cases moisture and a warm climate are quite essential to the production of the better grades. Asia produces more rice than all the other continents. The average yield is from 30 to 38 bushels per acre. Rice of the finest quality is produced in Georgia and the Carolinas. Land which is well suited for rice culture is worth about \$200 per acre. The fields are not as large as those in which corn and wheat are grown. Rice is chiefly a farinaceous food and contains only about seven per cent. of gluten. It is best for the system when eaten with milk or fatty substances.

RICE PAPER, a product manufactured from the pith of a plant native to Formosa. It is made extensively in China, whence it is exported in large quantities. Fine artificial flowers are made from this product and it is used to a considerable extent in water color drawings by artists. Several varieties of this paper are used in printing fancy and presentation books.

RICHMOND (rich'münd), a city of Indiana, county seat of Wayne County, on the White-water River, 68 miles east of Indianapolis. It is on the Grand Rapids and Indiana, the Pittsburg, Cincinnati, Chicago and Saint Louis, the Chicago, Cincinnati and Louisville, and other railroads. The surrounding country is a rich farming and dairying district. The principal buildings include the county courthouse, the Morrison-Reeves Public Library, the Richmond Law Library, the Earlham College (Orthodox Friends), the Saint Stephen's Hospital, and the Eastern Indiana Hospital for the Insane. It has a fine city hall, a large high school, and Glen Miller Park. Among the manufactures are flour, engines, boilers, farming implements, earthenware and furniture. The city has electric street railways, brick and macadam pavements, and systems of waterworks and sanitary sewerage. It was settled in 1816 and incorporated in 1840. Population, 1910, 22,324.

RICHMOND, the largest city of Virginia, capital of the State and county seat of Henrico County, 115 miles southwest of Washington, D. C. It is situated on the James River, about 125 miles from the Atlantic Ocean, and is reached from coast ports by steamship lines. The river has extensive rapids, which pass over a fall of 100 feet in six miles, hence furnish vast water power. Railway communication is provided by the Southern, the Chesapeake and Ohio, the Seaboard Air Line, the Atlantic Coast Line, the Norfolk and Western, and other railways. Intercommunication is facilitated by an extensive electric system, which has branches to Seven Pines and other interurban points. The

James River is spanned by several bridges, connecting with Manchester and other suburbs.

DESCRIPTION. Richmond is located on a beautiful site of gently rolling ground, including an area of about sixteen square miles. The site rises in terraces from the James and varies in altitude from 150 to 250 feet above sea level. The older part of the city is near the river, and the newer portion is toward the higher sections in the north and northwest, where a large residential district is located. The homes generally are well built and beautified by lawns and avenues of trees and shrubbery. All of the streets are platted on a regular plan, crossing each other at right angles, and many are improved by pavements of stone, asphalt, and macadam.

Capitol Square, a tract of twelve acres, occupies the central part of Shockoe Hill and is a place of historic interest. It is situated in the heart of the city and contains the State capitol, completed in 1796. It is modeled after the *Maison Carrée*, Nimes, France. The plans were sent from that country by Thomas Jefferson and are still preserved in the State library of Virginia. In the capitol are portraits and busts of eminent men, and in the rotunda is the celebrated marble statue of Washington by Houdon, the French sculptor. Upon the grounds are the Governor's mansion, the State library building, the life-size marble statue of Henry Clay, and the bronze statues of Governor Smith, Stonewall Jackson, and Hunter McGuire. An equestrian statue of Washington, by Crawford, near the west gate of Capitol Square, is considered one of the finest bronze works of art in America. Surrounding the base are bronze figures of George Mason, John Marshall, Andrew Lewis, Patrick Henry, Thomas Jefferson, and Thomas Nelson.

BUILDINGS AND MEMORIALS. The city hall, a handsome structure of granite, faces Capitol Square on the north and near it is the Saint Paul's Church. The post office, the chamber of commerce, the soldier's home, the State penitentiary, the Masonic Temple, the Valentine Museum, and the Union railway station are other structures of note. Foremost among the historic buildings is Saint John's Church, in which Patrick Henry delivered his famous address, closing with the words "Give me liberty, or give me death." The residence of Jefferson Davis, now used as a Confederate museum; the residence of General Lee, now occupied by the State Historical Society; and the home of Chief Justice Marshall are of historical interest. The Confederate soldiers' and sailors' monument is on Libby Hill, or Marshall Park, and near it is

the site of the famous Libby Prison. On Monument Avenue are a statue of J. E. B. Stuart, the defender of Richmond; an equestrian monument of Lee; and the famous monument of Davis, containing a balcony in which the Confederate States are represented. Monroe Park has a statue of General Wickham. Gamble's Hill Park affords a splendid view of the river and the historic Belle Isle. Hollywood Cemetery, the finest in the city, contains the graves of Jefferson Davis, John Tyler, James Monroe, J. E. B. Stuart, John Randolph of Roanoke, and 18,000 Confederate soldiers, whose memory is honored by a pyramidal monument of granite.

EDUCATIONAL AND OTHER INSTITUTIONS. Richmond is noted as a center of art and education. It is the seat of Richmond College, the Medical College of Virginia, the Union Theological Seminary, the University College of Medicine, the Hartshorn Memorial College for Girls, the Richmond Female Seminary, and the Virginia Mechanics' Institute. It has normal schools for white and colored students. Besides the State library with 100,000 volumes, it contains the Rosemary Public Library and the State Law Library. The Lee Camp Soldiers' Home, the Old Dominion Hospital, and the Saint Joseph's Orphan Asylum are among the benevolent and charitable institutions.

INDUSTRIES. In commerce and manufacturing industries Richmond occupies a place of eminence. It is the seat of one of the largest locomotive works in the Union, and has superior advantages for an extensive wholesale and jobbing trade. The manufacture of pipe tobacco and cigars is an extensive enterprise and as a tobacco market it ranks among the leading centers. Other manufactures include paper, baking powder, furniture, hardware, clothing, carriages and wagons, fertilizers, flour, and farming implements. Large interests are vested in manufacturing brick and tile. The streets are lighted with gas and electricity. Extensive systems of sewerage and waterworks are maintained.

HISTORY. Captain John Smith bought a tract of land from the Indians in 1609 and founded a settlement near the site of Richmond. Fort Charles was built in the vicinity in 1645. The name was changed to Richmond in 1733, when the town was platted, and it was incorporated in 1742. In 1775 it was the place of meeting for the famous assembly in which Patrick Henry took a leading part. It was made the capital of Virginia in 1739, when it was only a small village. Here was ratified the Federal Constitution in 1778, and in 1799 the celebrated

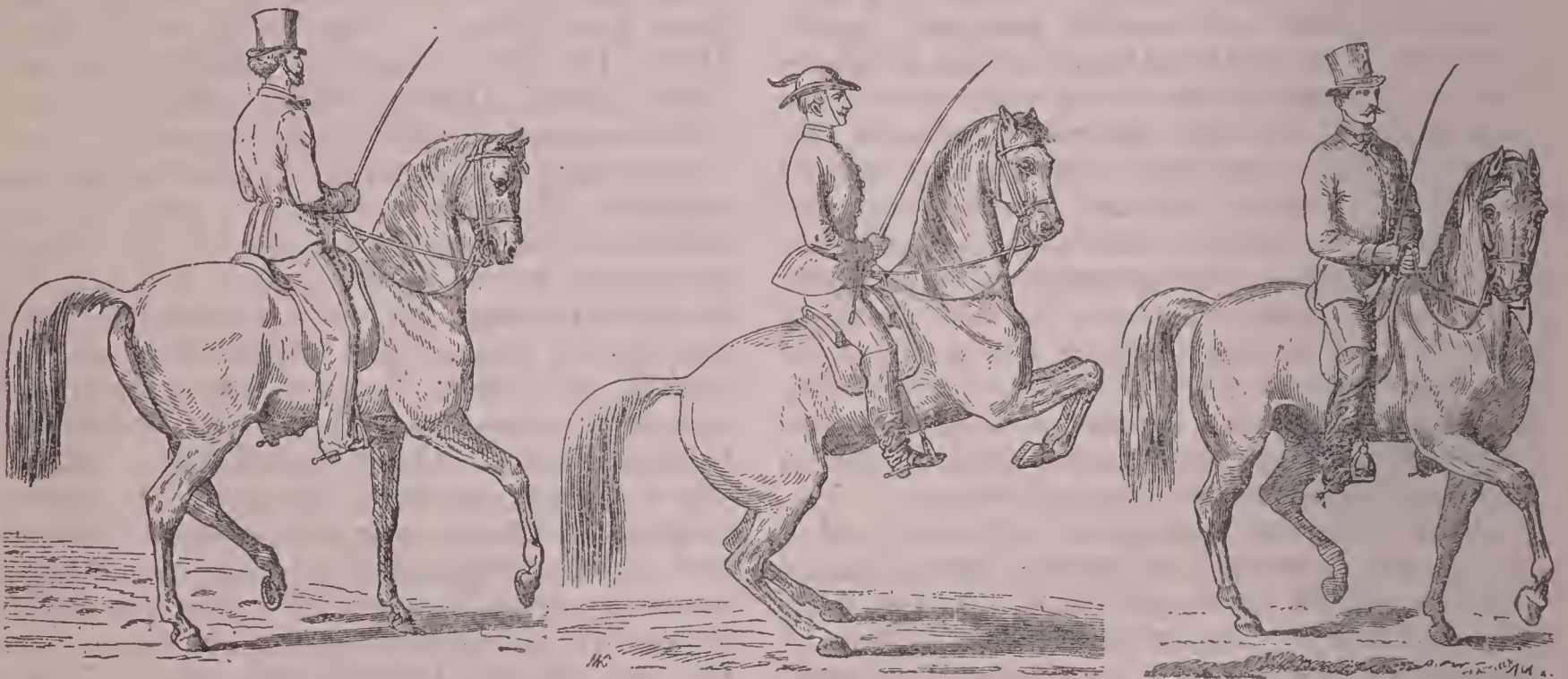
Virginia Resolutions were passed. Richmond was made the capital of the Confederate states in 1862, which it continued to be until 1865. During the Civil War it was the objective point of the Federal armies in the East and in its vicinity were fought a large number of pitched battles and skirmishes. The Confederate forces evacuated the city on April 2, 1865, when the warehouses were set on fire by order of General Ewell. Subsequent to the war it was rebuilt rapidly and has since continued to increase in wealth and population. Population, 1910, 127,628.

RIDDLE (rĭd'd'1), a proposition or question put in obscure terms to excite curiosity and exercise the ingenuity in discovering its meaning. Riddles may be regarded fables put in the form of questions, and like them they originated with primitive people. They have been perpetuated in the folklore of the peasants. In ancient times fables were used to enhance investigation and to exercise at least some degree of influence in disciplining the mind. This is illustrated by the mythology of Greece and many of the sacred writings, of which the riddles

been published, the most noted collection being the German work issued in 1883, known as Ohnesorgen's "Sphinx." An example quoted here will, perhaps, serve as an illustration, namely: "What is the worst bestowed charity one can give?" Answer: "Alms to a blind man; for he would be glad to see the person hanged who gave it to him."

RIDEAU (rê-dô'), a river of Ontario, which rises in Lake Rideau and, after a course of about sixty miles toward the northeast, flows into the Ottawa River at the City of Ottawa. It is important as a link in the Rideau Canal, which was completed in 1834. This waterway extends from the city of Ottawa to Kingston, on the Bay of Quinte, an inlet from Lake Ontario. It utilizes the Rideau River and Rideau Lake, and extends toward the southwest by way of Mud Lake and the Cataraqui River. The canal has 47 locks, is 127 miles long, and has a depth of about five feet. Formerly it was of much importance, but it is now little used, owing to the construction of railways and other canals.

RIDING, the art of training domestic animals, especially horses to fit them to be ridden



POSITIONS AND MOVEMENTS IN RIDING ON HORSEBACK.

proposed by Samson to the Philistines and those attributed by Josephus to Solomon are good examples. In the Middle Ages there was a marked disposition to construct and propound riddles as a pastime or for intellectual exercise, but the practice was limited greatly by the Reformation and has now gone entirely out of use in the more highly civilized countries. A tendency to use riddle making as a merry pastime still prevails in some of the countries of Western Asia. Many books on riddles have

for pleasure and for traveling. Horsemanship was first developed upon a high plane in the Orient, especially in Arabia and Persia, where the horse has been highly esteemed from remote antiquity. The Arabian steeds were noted for their agility and endurance throughout the historical period. The long stretches of pastoral lands made the horse of especial value in traveling rapidly for long distances, while the camel served more particularly for extended tours through the desert. Horsemanship was a highly

developed art among the Grecians, who employed the horse in festivals and for riding, and it was afterward introduced into Rome and the countries of Western Europe. Riding continued to be a favorite mode of traveling until modern times, when it was replaced largely by the use of steam and electricity. However, it continues to be a wholesome athletic pastime, in which the principal muscles of the body are called into active play and the organic functions are greatly stimulated. Although riding is limited to short trips in North America, it still continues to be an important factor in the sports and athletic exercises of Europe.

Horses have three natural paces, known as *walking*, *trotting* and *galloping*, but they may be quickened and beautified by training. The head should be held backward in a graceful position by the reins, the step should be shortened, and the animal should be trained to move with spirit. An upright position should be assumed by the rider, who should be provided with spurs and a short riding whip. The saddle should be well fitted to the horse and the stirrups need to be adjusted to the requirement of the rider. Considerable practice is needed to accustom the body to the natural position of riding, but this is soon acquired by those who exercise the art daily or several times per week. See **Horse; Race**.

RIESENGBIRGE (rē'zēn-gē-bērg'ē), or **Giant Mountains**, a mountain group of Europe, situated between the upper courses of the Elbe and Oder. It forms the boundary between Germany and Bohemia. The range covers an area of 425 square miles, most of which is in Austria. Schneekoppe is the culminating peak and the loftiest mountain in southeastern Germany, having a height of 5,260 feet. Iron, granite, and metamorphic slate are abundant in these mountains.

RIFLE (rī'f'l), the name of any firearm that has grooves in the surface of the bore, but usually the name is applied only to the arm that has superseded the musket. The firearms that were made originally for hand use consisted of long tubes without any lock, and were fired by means of a slow match or a live coal. They were at first laid on a wall or wooden frame, but later a handle was added for holding them up against the arm or shoulder. It was found soon after that the smooth bore in the barrel is not conducive to good results, since not only a part of the explosive force of the powder is lost, but there is a downward pressure in the barrel which tends to cause the ball to move forward in a direction different from that indicated by the barrel. Hence, a barrel with a smooth bore

does not make it possible to shoot with accuracy at any great distance.

The first material improvement was made in the 15th century by providing these weapons with straight grooves, but in 1520 Augustus Koster, of Nuremberg, Germany, found by experimenting that a spiral groove imparts rotation to the projectile and increases the accuracy of the weapon. Since then the barrels have been rifled in that manner, the number of grooves and twist of the spiral varying according to the intended use. The rapidity with which the bullet revolves depends entirely upon the character of the twist in the spiral and the force of the explosion, but the most important effect of the revolution is to cause the ball to move forward in a line with the barrel. In this the ball is subject only to the force of gravity, by which it is eventually brought to the ground.

It is to be observed that there is a difference between the balls formerly used and those now generally employed, in that the former were round, while the latter are elongated. Balls of the elongated type first came into use in 1851 and are the invention of Captain Minié of the French army, who is the inventor of the *Minié rifle*. The bullets first used by him had a hollow base, and the explosion of the powder caused them to expand and take on a form at the surface resembling the inner mold of the gun. There was some advantages in this particular gun, but its heavy weight caused it to be discarded for the *Enfield rifle* in 1853. This rifle was lightened materially by reducing the bore to .58 of an inch in diameter. The Enfield rifle was used in the British army until 1865, when it was converted into a breech-loading firearm by attaching to it a breech-loading mechanism. The United States adopted the *Springfield rifle*, a firearm with a caliber of .58 inches, in 1855, which was used to a considerable extent throughout the Civil War, though a large number of Enfield rifles were employed. A short time before the Franco-German War of 1870-71 the German army was supplied with the celebrated *needle rifle*, which was the first arm of this kind to acquire a reputation in warfare. It proved an efficient aid in the military contest so detrimental to France.

Rifles used at present by the leading nations are not only grooved spirally, but are breech-loading and repeating. Though the repeating rifle is not new, it has been improved within recent years. The *Spencer rifle* was among the first of the repeating kind and has a supply of cartridges in the stock of the arm, while the *Winchester rifle* has a tube under the barrel. All the newer rifles designed for rapid firing have a

quantity of cartridges in a detachable magazine, which may be replaced as soon as emptied by one filled with a new supply of cartridges. The German *Mausser-Mannlicher rifle* is a typical repeater of modern make. The cartridges are issued in packages of five and are placed in a tin or sheet-iron loading case. A magazine immediately in front of the trigger receives the case through an opening. When adjusted, the top cartridge is in position to be pushed into the chamber of the gun by a forward motion of a bolt. A spring presses and holds the case in position as long as any cartridges remain, but, when the last cartridge is pushed out by the bolt, the case drops through by its own weight and is then replaced by another. Other modern rifles are made somewhat differently, but in effect they produce practically the same results.

The United States adopted the *Krag-Jorgensen rifle*, an implement of German manufacture, in 1896, which is now used by Norway, Denmark, and several other countries. With the standard pattern of this firearm it is possible to dispatch 45 shots per minute, the ball traveling at the rate of 2,310 feet per second when it leaves the muzzle and speeding a distance of fully 4,560 yards. The *Mausser-Mannlicher* is used in Germany; the *Lee-Metford*, in England; the *Mannlicher*, in Austria and Holland; the *Mausser* in Belgium, Spain, and Sweden; the *Lebel*, in France and Turkey; the *Mauzin*, in Russia; and the *Schmidt*, in Switzerland. Rifles employed in warfare have a much longer barrel than those used for sporting, since long range and powerful penetration are not desired for shooting game.

RIGA (rē'gā), a seaport of Russia, capital of the government of Livonia, on the Duna River, six miles from the Gulf of Kiga. It is connected with other trade emporiums by railroads, has well-paved streets, and is the seat of an excellent cathedral. The streets are broad, except in the older part, and all are lighted by gas and electricity. It has an extensive system of rapid transit and numerous monuments and parks. The noteworthy buildings include the commercial exchange, the Church of St. Peter, the governor's residence, the public library, the seminary for priests, and the central railroad stations. Among the manufactures are cotton and woolen goods, leather, soap, starch, machinery, pottery, and tobacco products. It has a large trade in lumber, cereals, and live stock. Riga was founded in 1201 and was long an important member of the Hanseatic League. It was annexed to Poland in 1561, but became a Swedish possession in 1621 under Gustavus Adolphus.

Since 1710 it has been a part of Russia. More than half the people are Germans. Population, 1908, 288,406.

RIGA, Gulf of, an inlet from the Baltic Sea, in the western part of Russia. It is about 100 miles long and 65 miles wide. At its entrance is the island of Oesel. It receives the water of the Düna River.

RIGHT OF WAY, the privilege to pass over land belonging to another, either permanently or for a brief time, according to the nature of the easement. A right of way is said to be *private* when it is enjoined by a certain person or class of persons, while one that is open for general use is termed a *public* right of way. A highway is a public right of way, while a road reserved for special use is a private right of way. Tracts of land occupied by electric and railway lines may be classed with private rights of way, since the ownership is vested in a particular person or company, although they are used for conveying goods and persons by particular modes. A right of way may be established by an act of legislation, or by the owner dedicating a tract of land to the public.

RIGI (rē'gē), or **Righi**, a noted mountain of Switzerland, located between Lakes Zug and Lucerne, in the canton of Schwyz. It is 5,910 feet high and is one of the most scenic and beautiful peaks of Switzerland. The summit is reached by two rack-and-pinion railways.

RIMINI (rē'mē-nē), a city of Italy, on the Adriatic Sea, seventy miles southeast of Bologna, with which it is connected by a railroad. It is located on a fertile plain, on the banks of the Marecchia River, and contains a large number of monuments and historic buildings, including a cathedral adorned with sarcophagi. Among the manufactures are wine, glass sailcloth, clothing, and pottery. It has a considerable trade in agriculture products and merchandise. The city has several hospitals, a number of schools, and a public library of 30,000 volumes. About ten miles northwest of the city is a monumental pillar to mark the spot where Caesar stood at the time he addressed his army shortly before he crossed the Rubicon. Rimini had an unimportant history during the Middle Ages. It was attacked successively by barbarians, but for some time was important as an independent republic, its independence ending when Charlemagne annexed it to the papal territory. The independence of Italy and the construction of its railroad have given it a new era of prosperity. Population, 1906, 44,830.

RINDERPEST (rīn'dēr-pēst), or **Cattle Plague**, the name of an infectious fever among cattle, which is prevalent to a greater or less

extent in some parts of Europe and Asia. Rinderpest is the German name and some localities it is known as *steppe murrain*. It is caused by a minute microbe, or organism, and it has its seat in the digestive organs of cattle, though it sometimes attacks other ruminant mammals. The early symptoms include a high fever and rapid beating of the pulse, and later the mouth and respiratory organs become affected, viscid secretions are discharged, and death ensues after five or six days. Since from 30 to 60 per cent. of the animals die under any treatment, it is best to promptly destroy or isolate all diseased animals. Russia has experienced several widespread epidemics of this disease, and it has appeared in a less extensive form in Austria, Turkey, and the Philippines.

RING, an ornament worn on the finger from remote antiquity, usually made of some metal chiefly of gold or silver. The *signet ring* was worn in ancient times as a sign of confidence or to indicate authority. Later rings came into use as articles of ornaments among the civilized nations, especially among the Jews and Persians, who practice using betrothal and wedding rings. These frequently contain precious stones of great value. Rings as tokens of marriage came into almost universal use in Christendom and many were engraved with mottoes to indicate some sentiment, either of friendship or affection. The practice of wearing earrings is more recent, but rings seem to have been worn as adornments of the arms at a very early date. People low in the scale of civilization not only wear finger and arm rings, but they employ them as adornments to decorate the nose, ears, and toes. Some look upon a ring as a charm against evil, hence wear it a given number of days without removal. The Pope uses what is known as a fisherman's ring which is engraved with the picture of Saint Peter in a boat. With this ring the briefs are sealed. It is broken at the death of the Pope and his successor is presented with another by the city of Rome.

RING OUZEL (*ōō'z'l*), a species of thrush found in Europe, which resembles in size and appearance the blackbird. It is migratory, moving far northward in Europe and Asia in the spring, and passing to the Mediterranean region and Africa in the fall. A crescent of white extends across the lower part of the neck, while the general color of the male is blackish and of the female a dark brown. These birds do damage to cherries and other small fruits when ripe, but they also feed on insects and worms. Their nests are built in a clever manner of clay and grass, and usually from four to six eggs are

laid. After the young are reared, they generally gather in flocks.

RINGWORM, a skin disease that appears in the form of circular patches. It is caused by a microscopic fungus parasite. The parasite preys upon the epithelial coverings of the skin, chiefly on the scalp, but also on the body. In men it affects the skin in the vicinity of the beard, especially on the chin and lower lip. It is both chronic and contagious. The best treatment consists in removing the hair and applying sulphurous acid, iodine, or glycerin.

RIO DE JANEIRO (*rē'ō dā zhā-nā'rō*), the capital and metropolis of Brazil, on the southeastern coast, 75 miles southwest of Cape Frio. It stands on the western shore of the Bay of Rio de Janeiro, in which it has a magnificent harbor, one of the most beautiful and most secure in the world. The section along the bay is level, but it stretches westward over the slopes of low hills, and presents an appearance of remarkable beauty when viewed from the sea. The streets are well platted, though only a few have first-class pavements, while many of the buildings are small and of inferior architecture. Within recent years modern facilities have been supplied, such as telephones, electric and gas lighting, public baths, and electric street railways, but the city has long been noted for its beautiful gardens and parks, waterworks, and churches. Among the most noteworthy buildings are the capitol, the national museum, and the cathedral. It has numerous asylums, hospitals, and educational institutions. The College of Pedro II. was founded in 1837. Other institutions of learning include the Imperial Academy of Medicine, the National Educational Museum, and the Polytechnical Institute. It has several military, naval, art, and normal schools. The national library has 248,500 volumes and is open to the public. Another noteworthy feature of the city is its excellent water supply, with which are connected numerous fountains in the streets and public squares. Many of the public places are ornamented with statues and monuments.

The Bay of Rio de Janeiro was discovered in 1555 by the French, who formed a small settlement on the present site of the city, but it was captured by the Portuguese in 1567. Rio de Janeiro has always ranked as the most important trade center of Brazil. It is not only the chief military arsenal and political center of the republic, but it has fully one-half of the export and import trade of the country. The export trade consists largely of coffee, lumber, and minerals, and is estimated at a value of \$60,000,000 annually. The imports include mostly manufactured articles, though local enterprises are rap-

idly stimulating home production. Among the manufactures are furniture, tobacco products, cotton and woolen goods, metalware, glass, paper, pottery, and leather. Several railways furnish communication with the interior and railroad facilities are maintained at Nitcheroy, on the opposite side of the bay, with which Rio de Janeiro is connected by ferry lines. The country surrounding the city produces immense quantities of lumber, live stock, coffee, and tobacco. Population, 1906, 811,265.

RIO GRANDE (rē'ō grān'dā), a river of North America, which has its source in the San Juan Mountains of Colorado and, after a general course of 1,800 miles toward the southeast, enters the Gulf of Mexico a short distance below Brownsville, Tex. It is shallow in most of its course and is navigable only about 500 miles from its mouth. The channel is almost due north and south in New Mexico, where it receives the Puerco River, and thence forms the boundary between Texas and Mexico. The most important tributary is the Rio Pecos, in Texas. In Mexico it receives the Rio Conchos, the Rio Salinas, and the Rio San Juan. Brownsville, Tex., and Matamoras, Mexico, are the chief towns on its banks.

RIO NEGRO (nā'grō), a large river of South America, one of the chief tributaries of the Amazon. The source is in the plains of southeastern Colombia, thence it flows east to the boundary of Venezuela, makes a curve toward the south, and, after receiving the Dos Upes River, flows southeast and joins the Amazon at Manaos, Brazil. The entire course is 1,250 miles, much of which is navigable. Large forests are contiguous to the Rio Negro, direct communication is maintained between the Rio Negro and the Orinoco by the Cassiquiari, thus joining the Orinoco and Amazon river systems into a great commercial route. Rio Negro is likewise the name of a large river of Argentina, south of which is the region known as Patagonia. The source is in the Andes Mountain of Chile. In its course, which is 700 miles, are many rapids and waterfalls. It flows into the Atlantic Ocean at about 41° south latitude.

RIOT (rī'ūt), a tumult or disturbance of the peace by three or more persons, who assemble of their own authority to resist public officials or destroy public or private property. The assembly may be premeditated or spontaneous and it may have for its purpose to terrorize the public, or to carry out some process of a public character in an unlawful manner. Sometimes a mere frolic, as in a charivari, results in a tumultuous and terrifying riot. If three or more persons enter upon the execution of what ordinarily

constitutes a riot, but fall short in carrying out their purpose, their offense is termed a *rout*. Rioting is prohibited by statutory law and the punishments prescribed include a fine and imprisonment or both.

RIPARIAN RIGHTS (rī-pā'rī-an), the name applied to the right and privileges of those whose lands border upon or are bounded by streams or rivers. Navigable bays, arms of the sea, and rivers are in most cases considered public highways, but the owners usually have the right of access, wharfage, and ferriage. In some countries the owner of land lying upon an unnavigable stream owns the bed of such stream to its center, while in others he has only the right to use the water under certain circumstances. For instance, he is not permitted to waste or pollute the stream, to divert the channel, or even to use all the water to the exclusion of other owners farther down the course. Even where a private stream runs through a premises, a part of the course being exclusively upon the property of a single owner, it cannot be polluted or used in a manner that would operate an injury to others.

RIP VAN WINKLE, the name applied by Washington Irving to the hero of a legend published in 1820, which has taken a place among the classics of America. Almost all nations have a tradition about some sleeper who falls into the embrace of Morpheus and after a long period of dormancy awakens to marvel at the changes written in the sands of time. Among the noteworthy incidents of this kind handed down by tradition are the seven sleepers of Mount Celion, who slept 250 years. Nourjahad, wife of the Mogul emperor Geangir, who discovered the otto of roses, slept seven years. Epimenides, the Gnostic, is said to have slept 57 years.

Rip Van Winkle, according to the account given by Washington Irving of the legend, was a Dutch colonist of New York, who was noted at home as a good-natured, but idle and henpecked husband. It was his custom to spend much of his time in the quiet inn kept by old Nicholas Vedder instead of attending his patch of maize and potatoes, just at the outskirts of the little village on the Hudson River. Sorely tried by his scolding wife, he set out with his gun and dog for a hunt in the forests of the Catskill Mountains. In a wild glen among the rocks he met Hendrick Hudson and his strange crew of the *Half Moon*, whom he aided in carrying a keg of liquor. The strange company played ninepins in mysterious silence, and as the balls rolled together they caused sounds nearly resembling peals of thunder, which lost none of

their mystery as they bounded and reëchoed among the mountains. Rip became the waiter of this strange company, and as he drank of the sparkling liquid a deep stupor came over him until at length he fell into a sleep, from which he awoke only after a lapse of twenty years.

On awakening one pleasant summer morning, Rip found his dog gone and the firelock by his side was almost destroyed by rust. His beard had grown to an unusual length. On returning to his native village, he found strange faces on the streets and new names over the doors. His wife was dead, his own house was in decay, and the people who surrounded him looked upon him with distrust. At length he was recognized as Old Rip, who had disappeared mysteriously some twenty years before. Strangest of all is the realization that the quiet Dutch inn of Nicholas Vedder had been changed into the Union Hotel, and that before it was a painting of George Washington, instead of George III., due to the fact that the American Revolution had made him a citizen of an independent country. The story has been dramatized by a number of Americans, the most popular being the one of 1865, with which the name of Joseph Jefferson is associated.

RITUAL (rit'ū-əl), a book which contains the prayers and ceremonials of any kind, such as are used in churches, civic societies, or similar formal organizations. The term *ritualism* is generally applied to the extensive development of church ceremonials in the Church of England, especially as it came to be associated with the service of the Holy Communion by the High Church party about 1863. The purpose was to make the services more ornate and to employ a larger measure of the symbolic. In a general sense, ritualism may be said to embrace a system of conducting public worship according to prescribed forms, as distinguished from a system in which the form of worship is left chiefly to the discretion of the person in charge. Rituals are used largely in the Anglican, Roman, Greek, and several other churches.

RIVER, a stream of considerable size, usually formed of several brooks or creeks. It may flow into another river, a marsh, or some large body of water, as a lake, a gulf, or an ocean. Rivers are caused by drops of water falling upon the land, some of which sink into the surface and form springs and rivulets, while portions run down the slopes of the land and give rise to rills. The rivulets and rills usually combine with others and form creeks, which finally merge into a river. The land bordering on the sides of a river constitutes its *banks*. When descending a stream, the *right bank* is on the right hand and

the *left bank* is on the opposite side. The depression in which it flows is called its *bed*, or *channel*. Other streams uniting with it are called its *affluents*, or *tributaries*. The place where it begins is its *source*, and where it ends, its *mouth* or *dé-bouchure*. A region or district drained by a system of streams is termed a *river basin* and the division between two or more river systems is called a *divide*, or *watershed*. When two or more streams unite at the same place, as the Allegheny and the Monongahela at Pittsburg, they are said to form a *junction*.

Most rivers flow from higher land into lakes or into the sea, but many streams in arid countries either evaporate or the water sinks into the ground, such as the Humboldt River of the United States. The steepest slope is usually near the source and the most gentle near the mouth, but in many instances the head streams are in a flat country, as in the case of the Mississippi, and in others the rivers flow over escarpments in the lower course, as the Potomac and other streams of the Piedmont Plain. Large quantities of earth and rock are eroded by the action of the running water, but this effect depends upon the character of the channel and the rapidity of the flow. Where the bed offers considerable resistance, as in the Niagara, great falls and rapids result. In many instances the larger rivers flow into the sea or lakes by a slow current, as the Nile and the Mississippi, which gives rise to deltas. This is true likewise of the Saint Lawrence, but it has no delta for the reason that the silt is dispersed or carried away by high tides or oceanic currents.

Below is a table showing the length and area of some of the principal rivers:

NAME.	MILES IN LENGTH.	AREA OF BASIN, SQUARE MILES.
Mississippi-Missouri, N. A.....	5,545	1,600,000
Nile, Africa.....	4,100	1,425,000
Amazon, S. A.....	3,500	2,500,000
Yang-tse-kiang, Asia.....	3,200	950,000
Yenisei, Asia.....	3,000	1,100,000
Lena, Asia.....	2,775	950,000
Congo, Africa.....	3,000	1,300,000
Mississippi, N. A.....	2,625	1,600,000
Cambodia, Asia.....	2,800	955,500
Amur, Asia.....	2,739	200,000
Hoangho, Asia.....	2,700	750,000
Niger, Africa.....	2,000	800,000
Volga, Europe.....	2,400	550,000
Obi, Asia.....	3,000	1,200,000
Colorado, N. A.....	1,200	230,000
Mackenzie, N. A.....	1,900	575,000
Yukon, N. A.....	2,000	200,000
Rio Grande, N. A.....	1,800	245,000
Brahmaputra, Asia.....	1,800	575,000
Indus, Asia.....	1,800	375,000
Danube, Europe.....	1,750	315,000
Tocontins, S. A.....	1,700	350,000
Irish, Asia.....	1,625	412,000
Murray, Australia.....	1,125	270,000

Rivers are of vast importance in the history of mankind, since they supply means of transportation and drainage, thus causing the rise of important cities and the growth of nations. They were even more important in the economic and political conditions of nations formerly than at present, since the building of railroads has made it possible for many manufacturing and commercial cities to develop importance even at considerable distances from the ocean or rivers, though it must be admitted that nearly all the great cities of the world are supplied with water navigation facilities.

RIVER LAND SETTLERS, a name applied to settlers on so-called Des Moines River lands in the State of Iowa. These lands embraced each alternate section of the public lands remaining unsold, or otherwise undisposed of, in a strip five miles wide on each side of the Des Moines River from its mouth to the north line of the State. They were granted to aid the Territory of Iowa in the improvement of the navigation of the Des Moines River. The settlers in many instances held patents or other evidences of title issued by the government subsequent to the grants. Some were evicted and others held continuous possession. Litigation involving the title to these lands continued over a period of nearly fifty years and ended in 1892.

Congress in 1893 passed an act to indemnify those settlers, their heirs, or assigns, holding patents or other evidences of title from the United States, who had been in continuous possession, and those persons, their heirs, or assigns, holding written evidences of title from the United States who had been evicted, and, third, those persons whose chain of title ran back to the person making the original entry and who had purchased the paramount title.

In July, 1898, Congress passed an act appropriating additional funds and included those settlers who had in good faith filed preëmption or homestead claims, made settlement, and resided upon their lands for a period of not less than five years, unless sooner evicted, cultivated and made valuable improvements upon the land claimed, and in cases where such persons made actual settlement in good faith under the preëmption and homestead laws at a time when others were permitted to file on like lands and in good faith resided upon the same for a period of not less than five years, and who did not abandon said lands or procure title to other public lands.

RIVERSIDE, a city of California, county seat of Riverside County, on the Santa Ana River, 65 miles east of Los Angeles. It is on the Atchison, Topeka and Santa Fé, the Southern Pacific, and the San Pedro, Los Angeles and

Salt Lake railways. The surrounding country is devoted to farming and fruit growing, especially figs, lemons, oranges, and grapes. Among the noteworthy buildings are the public library, the courthouse, the high school, and many fine churches. Wine, clothing, canned fruits, and machinery are among the manufactures. It has systems of public waterworks and sanitary sewerage. The first settlement in its vicinity was made in 1870, and it was incorporated in 1883. Population, 1900, 7,973; in 1910, 15,212.

RIVIERA (rē-vē-ā'ra), meaning seashore, the name applied in Italy to a region bordering on the Gulf of Genoa. It is properly separated into two divisions, the western coast, or Riviera di Ponente, and the eastern coast, or Riviera di Levante. This region has beautiful scenery and may be reached by a railroad traversing the coast.

RIXDORF (rīks'dôrf), a city of Germany, in Prussia, situated immediately south of Berlin, with which it is connected by steam and electric railroads. The principal buildings include the city hall and courthouse, the post office, the central railroad station, and the public library. Among the manufactures are cotton and woolen goods, furniture, rubber and gutta-percha, linoleum, machinery, and scientific instruments. It is the seat of a noted school of agriculture and mechanic arts. The place was founded by Friedrich William I. in 1737. A large majority of the inhabitants are Protestants. Population, 1905, 153,513.

ROAD, an open passage appropriated to public traffic, forming a line of communication for public use. The construction of highways is a matter of public concern and varies according to the state of civilization and the resources of the country through which they pass. Highways of an excellent quality were built by the Romans, which were in fact pavements resting on a foundation of rough stones consolidated into one mass by mortar or grout. However, they designed them on systems so that they centered into particular cities, instead of making them general, thus contributing largely to build up particular towns as trade emporiums. The roads as a whole were in a poor condition in Europe until the rise of the western powers, France and Germany taking an advanced rank in road making. It may be said that a marked change in road building has taken place since railroad construction began. Nations do not now expend as much time and money in highway building, but instead vest their construction and maintenance largely in local authorities.

Roadways are in a very backward condition in most of the Spanish-American countries, but

there are notable exceptions, as in Cuba, where many of the highways are exceptionally well graded and macadamized. In Canada and the United States road building is a local matter. The work is done partly under county supervision in some instances, but generally it is under town or township superintendence. Congress authorized the construction of a national road westward from Boston in 1796, which passed through Pennsylvania, Ohio, and Indiana, but the construction of railroads caused it to fall into a state of neglect, though this particular road is still well graded. In hilly regions and many of the older settlements of North America, the roads do not conform to the direction of the compass, but in the newer sections the roads are located a distance of one mile from each other, thus dividing the land by straight lines into squares. This is true in general in the upper part of the Mississippi valley and in the south central part of Canada, where each section of land usually is surrounded by a road.

In road building it is necessary to take into account such natural obstructions as streams, swamps, and hills, these requiring either bridges, embankments, grades, or tunnels. The breadth of the right of way usually is 66 feet, or four rods, and the width of the grade depends upon locality and traffic, though as a rule it is sufficiently wide for the passage of teams in all places. The advent of the bicycle and automobile has made the necessity of good roads even more apparent than formerly. Associations to promote the building of good roads are maintained in some localities, under whose direction new methods are studied and object lessons are given in the art of building culverts, grades, bridges, and other improvements that enter into the construction of a good road. It is customary for the driver to keep to the right when meeting vehicles and in driving on roads that cross each other, the right of way belongs to the driver who first reaches the intersection. It is obligatory on all persons driving upon the highway to exercise reasonable care in the safety of foot passengers and bicycles. The latter are considered to be in possession of a vehicle within the meaning of the law, and are entitled to one-half the improved road on an equal footing with drivers of other vehicles.

ROAD RUNNER, a bird of the cuckoo family, so named from its habit of running rapidly. The bill is long and slightly compressed, the head has an erectile crest, and the tail feathers are stiff and long. Some of the species are nearly two feet long and have a tail ranging from ten inches to a foot. The color is copper

or bronze-green, with naked colored skin around and behind the eyes. This bird is frequently seen upon the roads ahead of carriages, and it is able to run faster than the fleetest horse. Although it lives chiefly upon the ground, it is very shy. Locally it is called *snake killer* and *chaparral cock*. Several species are native to Mexico and the southwestern part of the United States.

ROANOKE (rō-ā-nōk'), a city of Virginia, in Roanoke County, 250 miles west of Norfolk, on the Norfolk and Western Railroad. It is pleasantly situated on the Staunton River, which joins the Dan River at Clarksville to form the Roanoke River, and is surrounded by mining and agricultural country. The noteworthy buildings include the public library, the Rebekah Sanitarium, the high school, and the Virginia Female College. Among the manufactures are tobacco products, machinery, ironware, locomotives, cars, and hardware. In its vicinity are a number of mineral springs possessing medical value. It has electric railways, public waterworks, sanitary sewerage, and pavements of brick, macadam, and asphalt. Originally it was called Big Lick, but was incorporated as Roanoke in 1884. Population, 1910, 34,874.

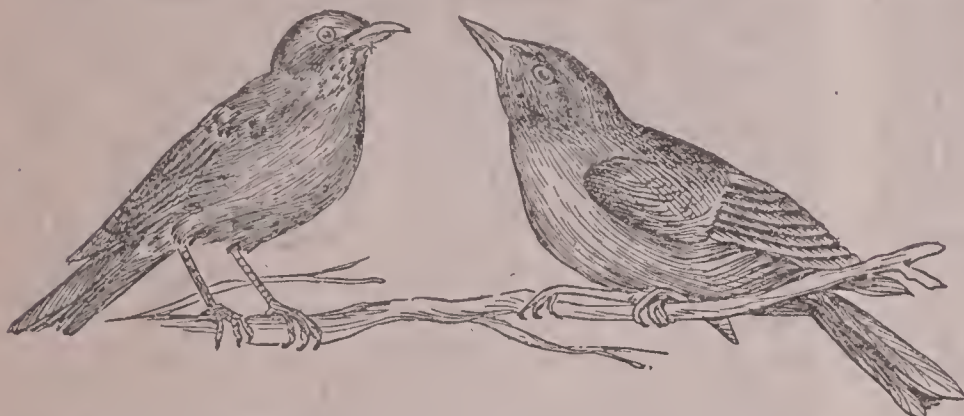
ROANOKE, a river of the United States, formed in southern Virginia by the confluence of the Staunton and Dan rivers, and, after a course of 255 miles toward the southeast, flows into Albemarle Sound. It is navigable to Weldon, N. C., a distance of 150 miles.

ROBBERY (rōb'bēr-ÿ), the crime of taking money or goods from the person of another, or in his presence, against his will, with force or violence. It differs from larceny in that robbery is accompanied by violence or intimidation and is committed in the presence of the owner. This crime is termed *highway robbery* when it is committed by taking property from travelers. The punishment is various, depending upon the conditions under which the offence is committed. If the offender is armed with a dangerous weapon at the time of such robbery, the penalty is severe. In most cases an assault with an intent to rob is punishable by confinement in prison. Robbing or attempting to rob a passenger train is punishable in some countries by imprisonment for life.

ROBIN, or **Robin Redbreast**, the name applied to several species of birds of the warbler family, which are native to Europe. They are so named from the red breast of the male, the female having a breast of a yellowish-brown color. The robin in America is a species of thrush and is much larger than the redbreast. It is ten inches long, has a black head and back,

and the breast is chiefly of an orange color. The female is duller than the male. It is migratory, reaching the northern states and Canada in the spring. Two broods of young are reared each year, usually from four to six in each brood, and they return to the same locality the following season. Robins are familiar birds and have a pleasantly modulated song.

ROC, or **Rukh**, in Arabian and Persian mythology, a huge bird, capable of carrying off an elephant and devouring it. It is mentioned in the "Arabian Nights' Entertainments" and, ac-



ROBIN REDBREAST.

GOLDEN ROBIN.

ording to Adolf Erman, was suggested by the fossil tusks of a giant bird. In the Middle Ages a general belief prevailed in the existence of such a bird, a fact borne out by a number of writings coming down to us from that period. The first knowledge of this myth spread in Europe soon after the first Crusade.

ROCHDALE (röch'däl), a city of England, in Lancashire, ten miles north of Manchester. It is situated on both sides of the Roch River, has extensive railroad connections, and is surrounded by a country which is rich in deposits of coal and building stone. Among the manufactures are cotton and woolen goods, machinery, hats, hardware, and pottery. A cathedral dating from the 12th century is the most conspicuous building, but it has many fine modern structures, such as hospitals, schools, and churches. The commercial trade is enhanced by canal and railroad connections with many trade centers of northern England. It has electric street railways, public waterworks, and stone and macadam pavements. Anciently it was known as *Recedam*. Population, 1907, 87,999.

ROCHEFORT (rösh-fôr'), a city of France, in the department of Charente-Inférieure, eighteen miles southeast of La Rochelle. It is situated on the Charente River, nine miles from the sea, and is strongly fortified. The harbor is well improved with wharves and by dredging and has extensive dockyards. It has a fine marine hospital, several schools and colleges, and a growing trade in merchandise and cereals. The manufac-

tures include cannon, clothing, sailing vessels, furniture, and machinery. Rochefort was a fishing village until 1666, when Louis XIV. established a naval station and planned the fortification. Population, 1906, 36,694.

ROCHELLE (rö-shël'), La, a seaport of France, on the Atlantic, capital of the department of Charente-Inférieure, 95 miles northwest of Bordeaux. It is strongly fortified, has railroad facilities, and maintains a commodious harbor. The streets are well planned and beautifully improved, many of them having fountains and monuments. Among the manufactures are sugar, glass, cotton goods, spirituous liquors, and machinery. The trade consists principally in wines, merchandise, and supplies intended for the colonies. Its ancient name was *Rupella*, meaning little rock, and it has been the seat of a number of important battles. At the time of the Reformation it was a stronghold of the Protestants. A Catholic army besieged it in 1573, but a treaty was concluded by which the Huguenots were granted liberty of worship. Population, 1906, 32,595.

ROCHESTER (röch'ës-tër), a city in Minnesota, county seat of Olmsted County, on the Zumbro River, 35 miles south of Red Wing. Communication is furnished by the Chicago Great Western and the Chicago and Northwestern railroads. It is surrounded by a fertile farming and dairying country, which produces cereals and grasses. Rochester has large grain elevators, stock yards, flouring mills, and machine shops. The noteworthy buildings include the county courthouse, the high school, the opera house, the Saint Mary's Hospital, the Masonic Temple, the Odd Fellows' Hall, and the State Hospital for the Insane. It has systems of public waterworks and sanitary sewerage. Rochester was settled in 1854 and incorporated in 1858. Population, 1905, 7,233; in 1910, 7,844.

ROCHESTER, a city of New Hampshire, in Strafford County, on the Cocheco River, 76 miles north of Boston, Mass. It is on the Boston and Maine Railroad and has a large trade in merchandise. The chief buildings include the public library, the high school, and the Gaffney Home for the Aged. Among the manufactures are woolen goods, leather, boots and shoes, bicycles, machinery, and earthenware. The surrounding country is agricultural, and produces fruits and cereals. The place was settled in 1728 and incorporated as a city in 1891. Population, 1900, 8,466; in 1910, 8,868.

ROCHESTER, a city of New York, county seat of Monroe County, the third largest city of

the State. It is situated on the Genesee River, seven miles from Lake Ontario and seventy miles northeast of Buffalo. Communication is furnished by navigation on the Great Lakes and by the Pennsylvania, the West Shore, the New York Central, the Erie, the Lehigh Valley, and other railroads. In the northern part of the city are extensive falls and rapids in the course of the river, which furnish an abundance of water power. The river is crossed by about ten bridges, some of which are over 200 feet above the stream. The river has a total fall of 257 feet within the city limits and the largest cataract has a descent of 95 feet. A stone aqueduct 850 feet long and 45 feet wide carries the Erie Canal across the river.

DESCRIPTION. Rochester has an elevation of 260 feet above Lake Ontario and 500 feet above sea level. It is regularly platted, the streets crossing each other at right angle, and it covers an area of twenty square miles. Beautiful lawns and avenues of shade trees give the residential part a fine appearance and many parks are well improved. The city has a park system of 700 acres. These include a number of small parks and squares in various parts. Those of the larger size are Highland, East and West Seneca, and Genesee Valley parks. Genesee Park, the largest in area, includes 340 acres. In East Seneca Park are fine zoölogical gardens and Highland Park has an extensive collection of shrubs and rare trees. In Washington Square is the Soldiers' and Sailors' Monument. Mount Hope Cemetery, one of the finest in the city, contains the grave of Frederick Douglass, and in one of the city squares is a statue to his honor. Many of the streets are paved with granite, asphalt, and macadam. They are well graded and drained, are lighted with gas and electricity, and contain an extensive system of drainage. Intercommunication is by electric railways, which extend to many interurban points and other cities, including Syracuse and Buffalo.

BUILDINGS AND INSTITUTIONS. The architecture is modern and substantial. Among the principal buildings are the county courthouse, the city hall, the post office, the State arsenal, the chamber of commerce, the Masonic Temple, the Wilder building, the German-American building, and the Powers Hotel. It is the seat of a State industrial school, a hospital for the insane, the Western New York Institution for Deaf Mutes, and various scientific and educational associations. The leading institutions of learning include the University of Rochester, the Rochester Theological Seminary, the Wagner Memorial College, and the Saint Bernard's Seminary. Mechanics' Institute, a celebrated industrial school,

has an attendance of about 4,225. The public school system is well organized and supplied with apparatus and libraries. The largest collection of books in the city include the Reynolds library, the Central library, and the Law library, the first mentioned having a collection of 60,000 volumes. All the leading denominations have fine church buildings and some of them maintain schools for the education of the youth.

INDUSTRIES. The manufacturing enterprises of Rochester are very extensive, due chiefly to its supply of water power and excellent avenues for distributing the products. It carries a large lake commerce, as well as an extensive inland wholesale and jobbing trade. The manufacture of flour is an important enterprise. Photographic apparatus and optical instruments are made in large quantities and the output is shipped to nearly all countries of the world. In its vicinity are extensive nurseries of shrubs, flower bulbs, and fruit trees. Clothing, boots and shoes, pipe tobacco and cigars, machinery, and furniture are produced in large quantities. Other manufactures include vinegar, malt liquors, saddlery, lubricating oil, and farming implements.

HISTORY. The first settlement on the site of Rochester was made in 1810, when the land was owned by Nathaniel Rochester, after whom the city was named. In 1822 it was known as Rochester ville, when it contained only a few frame houses, and it was chartered as a city of Rochester in 1834. Trade was greatly extended by the opening of the Erie Canal in 1825, through which it became directly connected with Buffalo, Albany and New York City. It has had a rapid growth continuously since the Civil War. Population, 1905, 181,666; in 1910, 218,149.

ROCKET. See **Fireworks.**

ROCKFORD, a city in Illinois, county seat of Winnebago County, on Rock River, 86 miles northwest of Chicago. It is on the Illinois Central, the Chicago and Northwestern, the Chicago, Milwaukee and Saint Paul, and the Chicago, Burlington and Quincy railroads. The noteworthy buildings include the county courthouse, the Carnegie Library, the high school, the Saint Anthony's Hospital, the Rockford College for Women, and the Ransom Medical and Surgical Sanitarium. Power for industrial purposes is obtained by a dam across the river. The principal manufactures include cotton and woolen goods, sugar, flour, machinery, hardware, and dairy products. It has electric and gas lighting, sanitary sewerage, public waterworks and an extensive system of electric street railways. The surrounding country is noted for its fertility and the production of large quantities of dairy products. The place

was settled in 1834 and incorporated as a city in 1852. Population, 1910, 45,401.

ROCK HILL, a city of South Carolina, in York County, eighty miles north of Columbia. It is on the Southern Railroad and is surrounded by a fertile fruit and cotton growing region. The Winthrop Normal and Industrial College of South Carolina is located here. It is the seat of the Catawba Military Academy. The manufactures include cotton textiles, flour, furniture, machinery, brick and pottery, and lumber products. Electric lighting, waterworks, and sewerage are among the public utilities. Population, 1900, 5,485; in 1910, 7,216.

ROCKING STONES, or **Logan Stones**, the large stones that are poised so as to rock when pressure is applied. It is thought that this phenomenon is due in many cases to boulders having been deposited by the action of glaciers, but some rocking stones have been formed by the action of wind, water, and other similar natural causes. The most remarkable example of this class is found in the rocking stone of Tandil, in Argentina, about 200 miles south of Buenos Ayres. It weighs 700 tons and is so nicely poised as to rock in the wind. Rocking stones may be seen in some parks, but they have been formed artificially by cutting around the center points of their bases, in imitation of those originated naturally. Examples are found in Greece, where they are used as monuments for the dead.

ROCK ISLAND, a city of Illinois, county seat of Rock Island County, on the Mississippi River, opposite Davenport, Iowa. It is on the Hennepin Canal and on the Chicago, Rock Island and Pacific, the Chicago, Milwaukee and Saint Paul, the Chicago, Burlington and Quincy, and other railroads. A fine bridge built by the government, costing about \$1,200,000, connects it with the opposite side of the river. Rock Island, an island in the Mississippi, contains the United States arsenal and armory, which covers about 1,000 acres. The streets are well paved and finely improved. It has extensive machine shops, foundries, and railroad roundhouses. Among the chief manufactures are cotton goods, ironware, wagons, glass, flour, lumber products, machinery and agricultural implements.

Rock Island has many fine buildings and beautiful houses. It is the seat of the Lutheran Augustana College, an institution founded in 1860, which has about 600 students. Other noteworthy buildings include the county courthouse, the Federal building, the public library, the high school, and the Saint Anthony Hospital. Rock Island is surrounded by a rich

farming country, which contains deposits of bituminous coal. It has a growing trade in merchandise. The place was settled in 1834 and was incorporated in 1852. Population, 1900, 19,493; in 1910, 24,335.

ROCKLAND, a city in Maine, county seat of Knox County, on Penobscot Bay, 85 miles northeast of Portland. It is on the Maine Central Railroad and has a fine harbor. Among the features are the county courthouse, the public library, the Federal building, and many schools and churches. The chief manufactures are boots and shoes, clothing, boilers, sailing vessels, lime, and machinery. The surrounding country is fertile, producing cereals and grasses, and contains mineral deposits, mostly granite and limestone. In 1630 the first settlement was made in its vicinity. It was first known as East Thomastown, but the name was changed to Rockland in 1850. Population, 1910, 8,174.

ROCKLAND, a town of Massachusetts, in Plymouth County, 16 miles southeast of Boston. It is on the New York, New Haven and Hartford Railway and is a commercial and manufacturing center. The public library contains 12,500 volumes. It has electric lighting, waterworks, and several fine schools and churches. The manufactures include boots and shoes, hardware, clothing, and machinery. Originally it was a part of Abington, but was incorporated as a separate town in 1874. Population, 1905, 6,287; in 1910, 6,928.

ROCK RIVER, a stream that rises in Wisconsin, thence flows through Illinois and joins the Mississippi immediately south of Rock Island. It has a course of 375 miles and flows through a rich farming country. Among the cities on its banks are Janesville, Beloit, Rockford, Sterling, and Rock Island.

ROCKS. See **Geology**.

ROCK SPRINGS, a city of Wyoming, in Sweetwater County, 252 miles west of Laramie. It is on Bitter Creek and the Union Pacific Railroad and is surrounded by extensive coal-mining districts. Electric lighting, waterworks, a public library, and a system of drainage are among the public improvements. It has several fine schools and churches and is the seat of the Wyoming State Hospital. It is the center of a large trade in coal, clothing, lumber, and machinery. Population, 1910, 5,778.

ROCKVILLE, a city of Connecticut, in Tolland County, on the Hockanum River, fifteen miles northeast of Hartford. It is on the New York, New Haven and Hartford Railroad, and has an abundance of power from the river, which has a descent of 250 feet in the city. The supply of water is obtained from Snipsic Lake.

Among the principal buildings are the public library, the high school, and many fine churches. It has manufactures of cotton, silk and woolen goods, paper, stationery, and machinery. The vicinity was settled in 1721, but the place was not platted until 1840. It was incorporated as a city in 1889. Population, 1910, 7,977.

ROCKY MOUNTAIN GOAT, a ruminant quadruped native to the Rocky Mountains, ranging from Idaho to the Arctic Circle. It is a beautiful animal, covered with long white



ROCKY MOUNTAIN BIGHORN.

hair, and its skin is valued in the market. The flesh is tender and nutritious. Its size is about that of the domestic goat, but the limbs are stronger and the body is heavier. The mane is erect, the horns are slightly curved, and the beard on the throat is quite like that of a goat, but it is a much finer looking animal. The *Rocky Mountain sheep*, or *bighorn*, is an allied animal. It has shorter hair and immense horns.

ROCKY MOUNTAINS, an extensive mountain system, embracing the most elevated peaks of North America. The name is sometimes applied to the entire mountain region in the western part of the United States, but it belongs more particularly to the eastern system of the Cordilleras of North America, extending from the southern part of New Mexico to the Arctic Ocean, terminating near the north-eastern corner of Alaska. This portion of the western highlands extends from New Mexico in a northwesterly direction, has a length of more than 1,000 miles, and incloses several very arid and elevated plateaus. It is widest at about the latitude of 40° and the trend is nearly parallel to the Pacific coast.

The principal ranges in New Mexico are the San Andres, Manzano, Gallinas, and Taos mountains. Castilla Peak, in the last named

range, is one of the highest elevations, being 12,615 feet above sea level. In Colorado many complicated ranges extend nearly parallel to each other, the most elevated peaks being Pike's Peak, 14,150 feet; Gray's Peak, 14,345 feet; Long's Peak, 14,275 feet; and Mount of the Holy Cross, 14,176 feet. The Laramie, Big Horn, and Shoshone mountains are among the ranges of Wyoming; Fremont Peak, in the Wind River range, is one of the most elevated peaks in Wyoming, being 13,570 feet. The Wasatch Mountains trend in many parallel ranges through Utah, and in the northern region of that State is an extensive lake system, including Great Salt Lake. The principal ranges include Gilbert Peak, 13,690 feet; Mount Hilgard, 11,460 feet; Mount Terrill, 11,600 feet; and Wheeler Peak, 12,075 feet. The lofty ranges of the Bitter Root Mountains form part of the boundary between Montana and Idaho, with connected ranges in each State and in Washington, whence the Rocky Mountain system passes into Canada.

In Canada it forms the boundary between Alberta and British Columbia, whence the principal ranges pass through the upper part of the latter and thence northwesterly through Yukon, with ranges trending westward into Alaska. The most elevated peaks of Canada include Mount Brown, 16,000 feet; Mount Hooker, 15,700 feet; Mount Logan, 19,514 feet; and Mount Saint Elias, 18,010 feet. The two last named are near the Alaska boundary and some distance northwest in Alaska is Mount Wrangel, 19,400 feet high. In 1901 the United States geological survey reported that Mount McKinley, height 20,464 feet, is the highest peak in territory belonging to the United States. It is situated about 200 miles northwest of Mount Wrangel, which was formerly considered the highest peak in Alaska.

The Rocky Mountains are rich in minerals, which include gold, silver, copper, iron, granite, coal, petroleum, and many others, and the region possesses some of the most extensive and productive mines in the world. The building of railroads in practically all parts of this mountain region has caused the rise of great cities, while settlers have been attracted there to establish productive vineyards, orchards, and farms. In many regions stock raising is a vast industry. Some portions are noted for their excellent scenery, particularly the Yellowstone National Park, in Montana, and the Rocky Mountain Park, near Banff, Alberta. The Missouri, Columbia, Colorado, Rio Grande, Arkansas, Mackenzie, Saskatchewan, Yukon, and other great rivers of North America have their source in the Rocky Mountains.

RODENTIA (rō-dĕn'shĭ-à), or **Rodents**, an order of mammals characterized by the incisors being shaped so they can gnaw with ease the hard vegetable substances upon which they principally feed, such as nuts, grains, and the bark of trees. The *rodents*, as they are frequently called, include about twenty families and several thousand species, such as the mice, rats, squirrels, beavers, agouti, rabbits, and lemmings. Most of the species are covered with fur, but some, as the porcupine, have spines. Some are aquatic, as the muskrat, and some live largely in trees, as several species of squirrels, but the greater number live upon or burrow in the ground. While many are injurious to agriculture or obnoxious pests to dwellings, many are valuable for the fur they bear. In these animals the brain is small, especially in those that feed strictly on herbs, but most of the species are characterized by great vigor and activity. Many fossil remains of rodents are found from the earliest Tertiary epoch, including many species that differ from the animals now in existence.

ROEBUCK (rō'bŭk), or **Roedeer**, a species of deer native to the mountains of Southern Europe. It is found only in the timbered highlands. Its weight is sixty pounds and it is about thirty inches high at the shoulders. The color is tawny-brown. Its tail is almost concealed in the hair and is characterized by a large, white anal disk. The horns are seldom over nine inches long and the flesh is valued as food, being considered better than that of the stag.

ROGATION DAYS (rō-gā'shŭn), the three days immediately preceding Ascension Day; hence, they always occur on Monday, Tuesday, and Wednesday. They are observed with litanies, and in some places with processions, to obtain God's blessing on the crops and to invoke His assistance in times of public peril.

ROLLING MILL, an establishment in which metal is made into desired forms by being worked between pairs of rollers. The crude iron ore taken from the mine by blasting is transferred to the rolling mill, where it is puddled and rolled. Puddling involves heating by means of a furnace, whereby such impurities as sulphur, carbon, silicon, and others are separated from the iron. The separation takes place while the ore is in a melted condition, the iron forming into granules as the mass is stirred by the puddlers with an iron rod or by machinery. When a bulk of molten iron has collected by the union of granules, it is taken to the hammer, where it is formed into balls. Thus heated and balled, it is made into bars or sheets by the rolling mill.

This machine consists of one or more pairs of iron rollers, so adjusted that they may be set nearly in contact by means of set screws. The rollers are supplied with grooves so made that the desired form is given to the heated iron as it passes between them. It is gradually decreased in size and increased in length in the process of passing through the rollers, by reason of each roller having a series of grooves gradually decreasing in size toward one end. The process differs somewhat according to the product desired. Generally the ore is passed through the mill two different times. The first time it is worked to remove the impurities remaining after puddling, after which the iron is reheated and passed through the mill a second time to form it into bars, sheets, rails, hoops, or any form desired.

ROMAN CATHOLIC CHURCH, the denomination of Christians that recognizes the Pope or Bishop of Rome as its visible head, which assumes to be the only catholic and apostolic church. The word catholic, meaning *universal*, was used by early Christians and continued to be the common designation of the vast number of Christians throughout the Middle Ages. Protestants refused to admit that the church which they left is entitled to call itself Catholic in the sense in which the term is used. From the beginning of the Reformation they prefixed the adjective *Roman*, while the Catholics claim the designation *Catholic* without a qualifying adjective. Theoretically the Roman Catholic Church claims spiritual authority on earth. This claim is based on the belief that Christ conferred upon Peter a primacy of jurisdiction, that Peter fixed his see at Rome, and that the bishops of Rome have succeeded him in his prerogatives of supremacy. This view is strengthened by Catholic historians in that they refer to Rome as a center at which appeals from other churches on matters of doctrine and discipline were decided, bishops were nominated, and heresies were condemned. However, Protestant historians question whether Peter fixed his see at Rome. They regard the superiority of Rome as a center largely the result of its political and social power.

The teachings of the Roman Catholic Church are based on the Scriptures and tradition. They are set forth distinctly in the Apostles' Creed, the Nicene Creed, and the Athanasian Creed. To these Pope Pius IV., in 1564, added the articles on the invocation of saints, on entire transubstantiation of the eucharistic elements in the body and blood of Christ, and others that distinguish it largely from the Protestant creeds and those of other Christian sects. Seven sacraments are recognized, those of baptism, confir-

mation, the eucharist, penance, holy orders, matrimony, and extreme unction. In 1854 the dogma of the immaculate conception of the Virgin Mary was added and in 1870, that of papal infallibility.

Roman Catholics believe in the existence of a purgatory and the necessity of confession, and make a clear distinction between doctrine and discipline. *Doctrine* is held to be embodied in the teachings of Christ and his disciples. On the other hand, *discipline* includes the rules laid down for the government of the church by the councils, the religious observances and practices, the administration of sacraments, and confessions and fasting. The membership of the church consists of all persons who, having been baptized, hold to its doctrines and recognized jurisdiction.

The Pope is chosen for life by the College of Cardinals. He is the center of unity and the supreme head, and without his consent no bishop can be consecrated. Cardinals at the head of congregations direct the administration of the church, and these answer to ministers established in Rome by papal authority. In the Western churches the clergy are bound by a vow of celibacy, but in the Armenian and Greek branches orders are granted to persons married, but marriage after ordination is forbidden. Celibacy is practiced by all the monks and nuns.

A vast monastic system is maintained, which comprises orders known as seculars and religious. Each has its own superiors and is responsible directly to the Pope or to the bishops. Among these orders are the Franciscans, Augustinians, Carmelites, Capuchins, Dominicans, Carthusians, and Jesuits. The missionary work of the Catholic Church takes high rank in all countries of the world, through which means it has promoted a high standard of morality. Latin is used almost exclusively in all recognized rites in America, Europe, and the missionary jurisdictions, but various other languages are employed in the East, as Coptic, Greek, Armenian, and Syro-Chaldaean.

The total membership of the Roman Catholic Church in the United States, in 1909, was given at 11,468,485. In the same year it had 12,704 churches, 15,962 priests, and 68 institutions of higher learning. These institutions were attended by 6,042 students. In addition to these it had 4,031 parish schools, with 884,680 pupils. In 1908 there were 1,985 Roman Catholic churches and 1,462,840 communicants in Canada. The total Roman Catholic population of the world is placed at 228,666,533. See *Pope*.

ROMANCE (rō-māns'), the name of a class of literature which originated among the people

who employ the Romance languages, that is, the French, Italians, and Spaniards. It is distinguished by comprising a class of literature of fiction, either prose or verse, in which the marvelous or uncommon incidents are prominent. As a branch of literature it belongs essentially to the Middle Ages and first attained prominence during the four centuries of knighthood, but became especially popular in the 15th and 16th centuries. While many of the Greek writings represented men and incidents as they were believed to be, the *Odyssey* is a series of marvelous tales of an essentially romantic character. This and other writings were followed more or less in the verse romance of the Middle Ages, and from its original seat in Southern Europe it finally extended to the western and northern countries.

Geoffrey of Monmouth published his Latin work entitled "Historia," which was revived and republished in its present form in 1147. Soon after it was translated into French and versified. The romances of Arthur published in this work induced literary interest on the continent as well as in England, where Arthur became a national hero of romance and a leading figure around whom might be grouped the adventures of subordinate knights. French writers treated Charlemagne in much the same manner, but he had the advantage of being a more distinct historical character than Arthur. Other heroes of romance include Alexander, Guy of Warwick, Roland, and Havelok de Dane. In the German *Nibelungenlied*, the Anglo-Saxon *Beowulf*, and the Spanish *Amadis de Gaula* we have other examples of heroes who figured in romance. Among the latter English productions that belong to this class of literature may be mentioned the historical romances of Sir Walter Scott and a host of writers who succeeded him, such as Robert Louis Stevenson and Alfred Tennyson. Besides furnishing a distinct class of literature of fiction, romance has exercised a more or less wide influence upon the development of the novel.

ROMANCE LANGUAGE, the name applied to the spoken language in the southern part of Europe from the 10th to the 14th century. It was composed of a corrupt form of the Latin. While some writers treat the languages that grew out of the corruption of the Latin as a distinct tongue, it is generally conceded that there was no uniform general language of this character, but the dialects spoken were of great similarity. Provençal is the most important branch of this period, but it is followed closely by the Wallachia and Romansh.

The term *Romance languages* is generally ap-

plied by recent writers to the spoken and written tongues that had their origin in the Latin, or which owe their development to the extension of the dominion and civilization of the Romans. At present not less than seven of these languages are used more or less extensively. These include the Italian, Spanish, Portuguese, Provençal, French, Ladino, and Rumanian. *Italian* is harmonious in form and is distinguished by the rich fullness of its tones. *Spanish* is peculiar for its short, distinct sounds, fixed tones, and the adoption of Arabic words. *Portuguese* is the western dialect of the Spanish and has almost the same words, but the pronunciation is in the style of the French. Grace and delicacy characterize the *French*, which is the most historical of the Roman languages, and *Provençal* is closely related to it. *Ladino* is spoken along the Adriatic, is also called *Romansh*, and lacks uniformity in orthography and pronunciation. *Rumanian* is the language of Rumania, but is thought to have come from the northern part of Italy rather than from the Roman colonists of Dacia. All of these languages have elements in common with Latin, hence the study of the latter is helpful in the mastery of the others.

ROMANS, Epistle to the, a book of the New Testament, written by Saint Paul to the church of Rome. It was probably written at Corinth, where Saint Paul remained about three months, and is assigned by commentators to the year 58 or 59 A. D. The epistle consists of two principal parts, one of which is argumentative and the other is hortatory. It contains a complete statement of the doctrine held by the writer, including justification by faith as a means of salvation to all men, Gentiles as well as Jews. He deplors the fact that many Jews rejected Christ, and admonishes the Romans to embrace the spirit of humility, which will enable the strong to bear with the weak. The book is concluded with various salutations and directions. The authenticity of the epistle has been conceded by practically all writers.

ROMANTICISM (rō-măn'tī-sīz'm), the name applied to the productions of a school of writers who sought to revive certain forms and methods in opposition to the classical style. The latter had its origin in the literature of Greece and Rome, while romanticism relates more especially to the writings that belong to the nations of Western Europe. In Germany the name romantic was introduced to designate the poetry which resulted from chivalry and Christianity. In general the terms *classic* and *romantic* have reference to treatment, not to subject, and the difference is that in the classic the treat-

ment is with the view of representing the idea as directly and with as exact an adaption of form as possible, while the romantic leaves the reader to discover the idea from suggestions and symbols. The classic form is adversely criticized in that it does not appeal to the imaginative faculty.

Lessing and Herder are among the leading opponents to the classic ideas in German literature. The movement had a supporter in Goethe, whose "Sorrows of Werter" is a fine example of the romantic style. Other German writers of this class include Novalis, Tieck, Schlegel, Schelling, and Schleiermacher. Victor Hugo is one of the leading romantic writers of France and his "Odes and Ballads" is his finest example. The English writers of this school are very numerous and are represented by Thomson, Keats, Scott, Byron, Burns, Coleridge, Pope, and Wordsworth. At least two essentials characterize romanticism, the first is a love of the picturesque and the other is a spirit of unconscious reaction to the writings of the period that immediately preceded.

ROMAN WALLS, the remains of lines of defense constructed by the Romans in various parts of Europe. The most noted of these structures is on the frontier between the Rhine and the Danube, known by the Romans as the *Limes*. It extended from Hienheim on the Danube, near Ratisbon, Germany, almost due west to Stuttgart. Another wall of this kind extended from Rheinbrohl, on the Rhine, in a direction toward the southeast, to the border of Rhætia. These structures were mostly of stone, but in some places they were in the form of earthworks protected by ditches. A similar wall was erected to protect the northern boundary of Britain. Another wall was built of turf from the Solway to Newcastle-on-the-Tyne. It was about eighty miles long and was completed in the year 120 A. D. by Hadrian. Septimius Severus, about 90 years later, replaced the turf structure with a stone wall, and this may be traced at the present time. It was built as a means of defense against the Picts and Scots.

ROME, a city in Georgia, county seat of Floyd County, on the Coosa River, which is formed here by the junction of the Etowah and the Oostanaula rivers, sixty miles south of Chattanooga, Tenn. It is on the Southern, the Central of Georgia, the Nashville, Chattanooga and Saint Louis and other railroads. The surrounding country is fertile, producing cotton, fruit, and cereals. This is the seat of Shorter College for Women, a Baptist institution. Other features include the county courthouse, the

Federal building, the public library, the Hearn Institute, the Everett Springs Seminary, and Mobley Park. It has systems of waterworks and sanitary sewerage, brick and macadam pavements, and electric street railways. Among the manufactures are cotton goods, furniture, leather, farming implements, and machinery. It was chartered as a city in 1847. At the time of the Civil War it was captured by a Federal force. Population, 1900, 7,291; in 1910, 12,099.

ROME, a city of New York, in Oneida County, on the Mohawk River and the Erie Canal, fifteen miles northwest of Utica. It is on the New York Central, the New York, Ontario and Western, and other railroads. The surrounding country produces large quantities of grain, cheese, butter, hops, and fruit. The chief buildings include the Jervis Library, the high school, the Saint Peter's Academy, the Y. M. C. A. building, the State Custodian Asylum, and many fine churches. It has well graded and paved streets, electric street railways, and systems of public waterworks and sanitary sewerage. Among the manufactures are engines, furniture, ironware, machinery, saddlery, glue, cigars, and wire. Rome occupies the site of Fort Stanwick and near it the battle of Oriskany was fought. The place was incorporated as a town in 1796 and was chartered as a city in 1870. Population, 1905, 16,567; in 1910, 20,497.

ROME, a city of Europe, the capital of Italy, formerly the capital of the Roman kingdom, republic, and empire. It is situated on the Tiber River, about fifteen miles from the sea, being partly on a plain and partly on the slopes of the famous Seven Hills. Formerly it was unhealthy, being in the Campagna, but now it is one of the most sanitary cities of Europe. The range of temperature is from 23° to 99° and the climate is less severe than that of Florence.

ANCIENT ROME. The early history contains much of interest, since it was not only one of the most important cities of the ancients, but has long been noted as a religious center of western Christendom. According to tradition, the city was founded by Romulus and Remus, two sons of Rhea Silvia, a priestess of the goddess Vesta, and of Mars, the god of war. These two children were ordered thrown into the Tiber by a usurper, but were cast ashore at the foot of Mount Palatine, where they were nursed by a wolf, but afterward they were rescued and brought up as the children of one Faustulus. The city was named after Romulus, who became its first king.

The founding of ancient Rome is generally placed at 754 B. C. and the founders are regarded as Latins, who left Alba Longa in a

colony to establish an outpost against the Etruscans. No reliable account of the early history of Rome is in existence, as the records were burned when the city was destroyed by the Gauls in 390 B. C. The early inhabitants were shepherds or farmers, who tilled the land upon the plain near by, but lived for protection within their fortifications on Palatine Hill. At the time the Gauls destroyed the city, they left most of the buildings in ruin, and it was hastily rebuilt without planning for regularity in its streets. The leading thoroughfares remained narrow and crooked in many parts of Rome until Augustus Caesar became emperor, in 31 B. C. He beautified the city by adorning it with monuments and works of art so that it was said of him, "He found the city of brick, and left it of marble." However, the groundwork for a great city was laid long before his time. The low places between the hills were improved by grading in the early history of the city, when also a huge system of drainage was constructed. The great aqueducts were begun by Appius Claudius Caecus in 312 B. C., by which water was brought to the city from springs seven miles distant, and material additions were made until fourteen aqueducts were completed. These had a length of 300 miles. They still form a very interesting feature of modern Rome.

The Campus Martius was originally a marshy tract lying between Capitoline Hill and the Tiber. It was so named because of its use for military exercises. In this stood the theater of Pompey, an immense structure with a seating capacity for 40,000 persons. On Capitoline Hill was the splendid temple of Jupiter Capitolinus, called the *Capitol*. Near it was the theater of Marcellus, finished by Augustus in 11 B. C., and also the Colosseum, an immense oval building used for gladiatorial exhibitions, in which many Christian martyrs suffered death. It was about 600 feet long by 500 feet wide, and had a height of 160 feet. Its capacity was ample for 87,000 spectators. The largest structure was known as the Circus Maximus, situated between the Palatine Hill and the Aventine Hill, and had a seating capacity for 250,000 persons. The Circus Maximus has been long destroyed, but the ruins of the Colosseum are still to be seen.

Ancient Rome had numerous public baths, the largest being the Thermae of Titus, traces of which remain on Esquiline Hill. The famous Diocletian bath was the largest and most magnificent, and a portion of it is now used as a church. Its buildings included many large and substantially constructed palaces, temples, and private residences. The most noted temples were the Temple of Venus, built by Caesar; the Temple of

Peace, a magnificent structure built by Vespasian; and the Temple of the Sun, erected by Aurelian. Near the Forum are the triumphal arches of Severus, Titus, and Constantine, while that of Drusus is in the Appian Way. The beautiful Trajan pillar in the Forum is still standing. Remains of catacombs, subterranean galleries used as burial and meeting places, and remnants of street pavements, may still be seen in many parts of the city. The Tiber was spanned by a dozen substantial bridges, eight or nine of which are intact. It is estimated that the population of Rome in time of Augustus was 1,300,000, but in the time of Trajan it is said to have reached about 2,000,000.

MODERN ROME. At present Rome extends to both sides of the Tiber, as did the ancient city. However, it is difficult to determine whether the limits coincide with those of Ancient Rome, when they probably extended some distance beyond the present boundary, especially in some directions. It has substantial walls, those on the east bank of the Tiber dating from the time of Aurelian, in the 3d century. The city has been improved remarkably since it became the capital of United Italy, its streets having been not only extended and straightened, but material improvements having been added in the way of sewerage, paving, electric lighting, and rapid transit. Embankments have been constructed along the Tiber to prevent overflows, thus guarding against damages and disease common to the city in former times. Through the medium of vast excavations it has been possible to restore many historic structures and monuments, notably the Forum Romanus, the Temple of Castor and Pollux, and the famous Sacred Way, which was the great central street of the ancient city. Many alterations and improvements have been made in the piazzas, parks, and boulevards, while monuments of modern structure have been dedicated to representative statesmen of modern Italy.

BUILDINGS. The most notable building in Rome is the Church of Saint Peter, which is considered the finest structure of the kind in the world. It is decorated by monuments and paintings by the great masters. Besides this place of worship, the city has about 325 churches. Many of these are memorial churches and are opened only on the day of the year assigned to the saint to whom they are dedicated. The Vatican adjoins Saint Peter's and is the palace of the popes. It contains the Vatican library, a picture gallery, and splendid museums. The palace on the Quirinal, formerly a summer residence of the popes, has been occupied by the King of Italy since 1870, but the Palazzo

della Cancelleria is still occupied by those in connection with the Roman Catholic Church. Rome is noted for many great educational institutions, the most important being the university founded by Pope Boniface VIII., in 1303. It has departments of physics, zoölogy, mineralogy, botany, astronomy, anatomy, law, medicine, and theology. Among the equipments are included a fine collection of apparatus, botanic gardens, and an astronomical observatory. It is attended by about 2,350 students. Rome has a system of common schools, which is maintained by public grants and taxation, but the instruction is chiefly in parochial schools and monastic institutions. The city is the seat of numerous hospitals, charitable institutions, academies, and many large libraries.

LATER HISTORY. Rome was identified with the rule of the popes from the downfall of the Roman Empire, in 476 A. D., until the rise of United Italy, in 1871. An army under the constable of Bourbon captured and sacked the city in 1527, and Napoleon occupied it in 1798. He made Pope Pius VI. a prisoner and carried him to France, and soon after a Roman republic was established. A republican army under Garibaldi and Mazzini expelled Pope Pius IX. from Rome in 1848, but he was restored to power by a French army sent the following year to consummate the overthrow of the new republic. With the fall of the French Empire in 1871, new life was enkindled for the union of the Italian states. In July of the same year the city became the capital of United Italy, when the king, Victor Emmanuel, took up his residence in the Quirinal. Population, 1906, 482,983.

INDUSTRIES. As compared with other cities of the same size, Rome is not important as a center of commerce and industries. It is the converging center of several railroads, but has only a very limited trade by navigation, since the Tiber is navigable only for small vessels. Grain, wine, and cattle are imported. Most of the export trade is carried on by way of Fiumicino, its seaport on the Mediterranean, with which it is connected by railway. Among the manufactures are silk and woolen goods, earthenware, toys, jewelry, musical instruments, leather, flour, soap, macaroni, and artificial flowers. Large quantities of art products are made, such as cameos, mosaics, bronzes, and church ornaments. Rome is a gathering place for tourists and travelers, who come here to view its historical treasures. It is the Mecca that attracts students to study its paintings and sculptures.

ROME, an ancient nation of Southern Europe, one of the most powerful and historic of antiquity. The history extends from the found-

ing of the city of Rome, in 754 B. C., to its downfall, in 476 A. D., over twelve centuries. This long expanse of time may be divided into three periods, according to the form of its government. They include the kingdom from 754 to 509 B. C., the republic from 509 to 31 B. C., and the empire from 31 B. C. to 476 A. D. It is thought that the Latins who founded Rome came as a colony from Alba Longa, and that the latter city was founded by Ascanius, a descendent from fugitive Trojans.

EARLY HISTORY. Many accounts have been published in regard to the founding of Rome, but the one most generally accepted is that the destruction of Troy by the Grecians caused many fugitive Trojans to flee to Italy, where they were received kindly by King Latinus. Rhea Silvia, daughter of a deposed King of Italy, was the mother of Romulus and Remus, two children who were designed to be killed by the reigning king, but they were discovered and reared by a shepherd. Romulus became the founder of Rome, in 754 B. C., and was the first of the kings. He encouraged settlements by constructing fortifications to protect the citizens against hostile tribes, building them in such a manner that the people could reside within the fortifications while they tilled the soil and reared their herds in the adjoining region. It is probably true that the early settlements were greatly enlarged by Aryans coming from Asia by way of Greece, and that the cities of Latinum formed a confederacy with Alba Longa at its head. The settlements grew rapidly, expansion being due largely to the fertility of the soil and natural advantages in the way of river and sea navigation.

KINGDOM OF ROME. The early government of Rome was aristocratic, being administered under a priest-king, who was assisted by a senate and an assembly. However, the city was frequently attacked by the Sabines, a tribe occupying the upper valley of the Tiber, and afterwards they captured the Quirinal and Capitoline hills. After many years of conflict the two tribes became united and formed the two parties known as the *Romans* and the *Quirites*, both having seats in the senate, while the king was taken alternately from each. Later the city was conquered by the Etruscans, who placed the Tarquins on the throne and ornamented the city with elegant structures in the Etruscan style of architecture. They extended the city to include the Seven Hills, inclosing the whole with a wall that endured eight centuries. It was due to the Etruscans that Rome became the head of the thirty Latin cities within 150 years after it was founded.

As the adjoining cities of Italy were conquered, many people of foreign birth were brought or removed into the city. This element gave rise to the *plebeians*, while the Latins, Sabines, and Etruscans constituted the class known as the *patricians*. However, the Tarquins were the friends of the plebeians. The nobles, becoming dissatisfied with the advance of the plebeian power and the corresponding restriction of the kings, joined other Latin cities to expel their Etruscan rulers, which they did in 509 B. C. The following is the chronology of the Roman kingdom, as generally given by historians: Romulus, 754-716; Numa Pompilius, 716-672; Tullus Hostilius, 672-640; Ancus Martius, 640-616; Tarquinius Priscus, 616-578; Servius Tullius, 578-534; and Tarquinius Superbus, 534-509.

REPUBLIC OF ROME. With the establishment of the republic, in 509 B. C., two chief magistrates were chosen. These were at first called *praetors*, but the name was later changed to *consuls*, and a constitution modeled by Servius was adopted. Conflicts continued between the Romans and the Etruscans until 295 B. C., when the latter were not only subdued, but Rome became the master of all Italy. However, contests of a political character were constant between the patricians and the plebeians. The former were descendants from the first settlers, and were rich, proud, and exclusive, making a demand of all the offices and emoluments of the government. On the other hand, the plebeians were the common people. They were denied the rights of citizens and were not allowed to intermarry with the patricians. Besides, they were obliged to serve in the army without pay and their want of means to carry on industrial enterprises at home rendered them creditors to the patricians, who reduced them to a form of slavery and sold them as slaves when they became unable to pay their debts.

The plebeians urged their demand for equal privileges with the patricians for the first 200 years of the republic and gradually their demands were complied with, a consummation hastened by the fact that they formed the principal part of the army. In 445 the law against intermarriages was abolished. Soon after the plebeians were granted three military tribunes with consular powers and in 367 B. C. their victory was finally won, when they succeeded in rapid succession in securing the dictatorship, the censorship, the praetorship, and the right to be pontiff and augur.

The period of contest between the patricians and plebeians was disturbed more or less by foreign wars and internal strife among the differ-

ent tribes. Rome was captured and nearly destroyed by the Gauls in 390 B. C., and the invaders agreed to recross the Apennines only on condition that they receive a heavy ransom. This invasion was in some respects beneficial to the Romans, since they were deeply impressed by the courage and strength of the Gauls, and at once began to rebuild their city. The next war took place in 280-276 B. C., against Pyrrhus, a Grecian colony in southern Italy, which resulted in the subjugation of the latter. Thus triumphant at home, Rome entered upon the First Punic War, in 264, and continued this contest against Carthage until 241 B. C. The Second Punic War occurred in the period from 218 to 201 and the Third from 149 until 146 B. C. These wars with the Carthaginians and their attendant contests covered a period of about 100 years. Carthage, a city of Africa that had flourished over 700 years and numbered 700,000 inhabitants, was utterly destroyed and the Carthaginian territory became the Roman province of Africa. While Hannibal was commanding the Carthagians he made a treaty with Philip, King of Macedon, and out of this grew three wars against the Macedonians, which culminated in the Battle of Pydna in 168 B. C. The results of these wars were reaped within a brief period and included the downfall of Greece. In 146 B. C. Macedon became a Roman province, Corinth fell the same year that Carthage was captured, and all of Greece was made the Roman province of Achaea. Thus victorious in Carthage and Greece, the Romans began to look toward the East for conquest. They had already defeated the Syrians at Thermopylae in 190 B. C. and had overthrown their power on the field of Magnesia, in Asia Minor.

The Roman nation extended its influence by the year 133 B. C. so as to include the vast region from the Atlantic to the Bosphorus, besides a part of Northern Africa and much of Western Asia. Its soldiers had come in contact with both civilized and savage opponents, while many parts of Italy had been swept with fire and the sword by Hannibal. Both of these circumstances had brought about material changes in economic conditions, since there was need for restoring rural prosperity, and the capital city needed a more rigid government. Conditions hastened on the civil wars, and Rome in rapid succession passed through conflicts that operated to destroy the republic. The first material internal disturbance arose over the measure introduced by Tiberius Gracchus in 123 B. C. This tribune sought to have the public land assigned in small farms to the natives with the view of giving every man a homestead, and

proposed in addition that those receiving land should be allowed means from the public treasury to build houses and buy cattle. This measure was supported by all the friends of the common people, but it was opposed with great vigor by the nobles, and resulted in the assassination of Gracchus and his leading supporters by agents of the aristocracy. Soon after Jugurtha usurped the throne of Numidia, which occasioned the war against him in 118 B. C., known as the Jugurthine War.

The invasion of Rome by the Teutons and Cimbri began in 113 B. C. These were followed by the Social War, due to the question of admitting Italians to citizenship, in 90 B. C.; the first Mithridatic War, in 88 B. C.; the Gladiatorial War, in 73 B. C.; and the great Mithridatic War, in 74 B. C. In the meantime occurred several wars resulting from disagreements among the generals and statesmen. The leading men of Rome at that period were Caesar, Crassus, Cicero, Octavianus, Pompey, and Cato the Stoic. The first triumvirate was concluded by Pompey, Crassus, and Caesar in 60 B. C., forming a compact so strong that they were able to manage the affairs of the republic at their pleasure, and it was cemented by Pompey marrying Julia, only daughter of Caesar. Soon after followed the banishment of Cicero and the appointment of Cato to Cyprus, while Caesar became consul and was afterward appointed as governor of Gaul. A civil war between Caesar and Pompey began in 49 B. C., and, though Pompey had boasted that he could raise an army by stamping his foot upon the ground, he was obliged to flee from Rome without striking a blow. A battle between the two rivals occurred on the plain of Pharsalia, Greece, in 48 B. C., which resulted in the defeat of Pompey and he was obliged to flee to Egypt, where he was assassinated. Cleopatra was elevated to the throne of the Ptolemies by Caesar and the Syrians were so completely defeated that Caesar sent his celebrated dispatch: "I came, I saw, I conquered." Victorious in the East, Caesar hastened to celebrate a four-days' triumph in Rome, where he was created dictator for ten years and censor for three. In the meantime he attained other victories and established peace in Spain.

The government of Caesar was administered honestly. During his administration canals and highways were built, the poor were given employment, Rome was enlarged and beautified, and his vast dominion from the Euphrates to the Rhine was guarded with remarkable vigor. The senate created him dictator for life, but differences and jealousies arose that finally ter-

minated in his assassination in 44 B. C. Caesar's death was followed by the second triumvirate, which was concluded by Antony, Octavianus, and Lepidus. By its terms Brutus, Cicero, and Cassius were proscribed. Cicero was shortly after beheaded and Brutus and Cassius met their opponents in the Battle of Philippi in 42 B. C., but their complete defeat caused them to commit suicide in despair. Rome was divided between Octavianus and Antony, the former receiving the West and the latter the East. A civil war between the two great leaders terminated in the naval Battle of Actium, in which Antony and Cleopatra were defeated and fled to Egypt. With the Battle of Actium ended the civil wars and the Roman republic. Octavianus, now master of the civilized world, became Emperor of Rome in 31 B. C., and assumed the title of Augustus.

EMPIRE OF ROME. Although an empire had been established, Augustus made no radical changes, but kept all the forms of the republic. This course was necessary, since a radical assumption of power would have resulted in his deposition. However, he really exercised absolute sway and all the offices of trust were centered in him, including those of pro-consul, consul, censor, tribune, and high priest. The empire at that time contained 120,000,000 inhabitants. It extended from the Euphrates on the east to the Atlantic on the west, and from the deserts of Africa on the south to the Danube and Rhine on the north. Fully 100 different nations were included in this vast dominion, each speaking its own language and worshiping its own gods.

The Age of Augustus was one of general peace and prosperity. It was not only the design of the emperor to maintain schools, extend literature, and effect internal improvements, but also to Romanize his subjects. This had already been accomplished in Gaul and was under way in Germany, but Arminius, a brave leader of the Germans, aroused his countrymen in opposition. In the year 9 A. D., Varus and his entire army in Germany met destruction, and Roman authority never was fully re-established in the country of the Teutons. The most important historical event of his reign was the crucifixion of Christ at Jerusalem, under Pilate, then Roman procurator of Judaea. On the death of Augustus, in 14 A. D., Tiberius, his stepson, became emperor by a decree of the senate. The emperors succeeding Tiberius were Caligula, in 37; Nero, in 54; Vespasian, in 69; and Domitian, in 81. Domitian was succeeded by the five good emperors, Nerva, Trajan, Hadrian, Antonius Pius, and Aurelius, who reigned

from 96 until 180 and gave Rome both peace and prosperity. Aurelius is regarded one of the most virtuous and wisest of earthly rulers, but the later years of his reign were disturbed by invasions of the Germans and the Slavs of Russia. He was succeeded by his son, Commodus, in 180, and from that time Rome began to decline.

The decline of Roman power is due to many causes. It may be said that the most prolific were the rise of factional militarism, the continuous invasions by the Goths, Germans, and Persians, the concentration of wealth into the hands of a few, and a low state of political and moral aptitude. During the 1st century Christianity spread rapidly over the Western Empire and became a potent force in displacing the gods of the Romans. Though tolerant of all religious beliefs in every nation they conquered, the Romans persecuted the Christians. This was due to the fact that they alone refused to offer sacrifice to the gods of the empire. They absented themselves from the games and feasts and were accustomed to hold their meetings at night. Soon they came to be regarded enemies of the state and were persecuted by even the best rulers, as Trajan and Diocletian. Besides, a marked change came about in Roman citizenship, since the emperors were of provincial birth and the army consisted chiefly of Germans and Gauls.

Constantine was declared emperor by his troops in 306 and, after overthrowing five rival contestants for the throne, he became sole ruler in 324. His reign marked an era in the history of the world, for the reason that he established Christianity as the state religion and removed the capital from Rome to Byzantium, a Greek city on the Bosphorus, which was renamed Constantinople in his honor. He made the government absolutely despotic by establishing a court of titled nobility and weakened the power of the army. While Christianity made it possible for the empire to resist three centuries of barbaric invasions, it did not supply enduring strength. Julian the Apostate sought in vain to restore the old religion and Valens taxed every energy of the empire to repel the invading Goths, who pressed forward to the very gates of Constantinople, but he was captured and burned.

Theodosius the Great for a few years stayed the division of the empire by enlisting 40,000 Goths under the eagles of Rome, but at his death, in 395, a division occurred between his two sons. The Eastern, or Byzantine Empire, passed to his son Arcadius and the Western Empire, to Honorius. Continuous jealousies

between the two empires greatly weakened both governments and, to save his dominion from ruin, Arcadius induced the invaders from the north to turn against Italy. The three great barbaric leaders were Alaric the Goth, Attila the Hun, and Genseric the Vandal. Alaric captured Rome in 410, while Attila swept like a scourge across Italy and only spared Rome from utter destruction, in 451, at the entreaties of Pope Leo. Genseric secured control of the Mediterranean and sailed up the Tiber in 455. Pope Leo met Genseric to entreat that the city might be spared, but he turned it over to the warriors to be sacked. He carried 30,000 slaves and vast treasures from Rome to Carthage, where he had founded an empire on the site of the city destroyed by the Romans six centuries before. Rome was now at the mercy of Odoacer, a German chief, who commanded that Romulus Augustulus, the last Roman monarch, lay down his useless scepter. The emperor yielded in 476, and thus passed away the great Roman Empire. It is a curious incident in history that both the founder and the last sovereign of Rome bore the name of Romulus. Byzantine continued a recognized nation for a thousand years after the fall of Rome, ending with the capture of Constantinople by Mohammed II., in 1453. Rome was a province of the Byzantine Empire until 800, when Charlemagne received its crown, though its history had become merged into that of Italy some centuries before. See **Italy**, subhead HISTORY.

LANGUAGE. Politically there was a clear distinction between Rome and Latinum, but the language of the two sections was the same and it was called *Latin*. It belongs to the Aryan family of languages and was perhaps spoken in several dialects as early as 1500 B. C. It is probable that the Latin and Greek came originally from the same source, since there is a manifest connection between the two languages. Classical Latin was formed in the period when Rome was a republic and an empire, though during the last two centuries of its history many foreign words were injected through contact with other languages, and by the 8th century it ceased to be spoken as a distinct tongue. The tongues developed from the Roman include the modern Romance languages, which are chiefly the Italian, Rumanian, Spanish, Portuguese, and French. The literature and language of the Latins were preserved in remnants of the great libraries, which were carried by the clergy to the convents in the Middle Ages, and were afterward brought to the great libraries of Europe, particularly those of Rome. Many of the leading writers of Europe, following the revival

of learning, wrote largely in Latin, and both the language and its literature were subjects of profound interest in all the higher institutions of learning for many centuries. All the modern languages of European people contain a large proportion of Latin words, the Latin addition to English being made at the time of the Norman conquest. Latin is characterized by a peculiar accuracy in expressing thought. This element, in connection with its supplying the roots of many derivative words, causes it to still hold its place of prominence as a study in the secondary and higher institutions.

LITERATURE. Roman literature was limited to a few writings for about five centuries after the founding of Rome. It may be said that the "Law of the Twelve Tables," prepared about 450 B. C. and hung up in the Forum, was the first prose composition of importance. The earliest writings were fashioned almost exclusively after Greek models and their lyric, heroic, and dramatic meters came from the Greeks. Rome had elementary schools as early as 450 B. C., where reading, arithmetic, writing, and music were taught. Many of the teachers were Greeks and the children of wealthy families were sent to Greece to complete their education, but excellent higher schools and colleges were later established in all the Roman cities. The first translation of Greek classics into Roman was made by a Grecian slave who came to Rome about 250 B. C. He also wrote and acted plays inspired by Greek writings. "The Origines" is a work written by Marcus Portius Cato in the 2d century. It consists principally of a history of the origin of Rome and several other cities of Italy. Ennius, a Roman of the same period, introduced a new style of literature, somewhat resembling the Grecian. His writings are largely poetical history and his "Annals," a poetical history of Rome, was for two centuries the national poem. He was honored by having his bust placed in the tomb of Scipio. The writings of Plautus belong to the early part of the 2d century, and are noted for their vigorous and brilliant wit. Terence, a learned and graceful humorist, who flourished about the middle of the 2d century, turned attention to greater refinement and more cultured forms of expression.

The Latin tragedies of the early Roman period were copied from the masterpieces of Sophocles and Euripides. Their comedies were translated from Aristophanes and other writers, their philosophy was borrowed from the Portico and the Academy, and their orators, even in the palmiest days, proposed to pattern after the speeches of Demosthenes and Lysias. To the

1st century B. C. belong the illustrious names of Varro, Cicero, Virgil, Horace, Livy, and Sallust. Varro founded large libraries and a museum of sculpture, cultivated the fine arts, and sought to awaken literary tastes among his countrymen. He wrote on history, theology, philosophy, and agriculture. Cicero is the most eloquent of all the Romans. He ranked high as an essayist, orator, and letter writer; his principal productions include his four orations on the "Conspiracy of Cataline." The Roman schools used his orations for lessons and many of his essays still are familiar Latin text-books. Virgil and Horace are known as poets of the Augustan age. Virgil's "Aeneid" is modeled after the Homeric poems and has been used as a text-book up to the present time, holding its place in the schoolroom. Livy wrote 42 volumes of Roman history, beginning with the fabulous landing of Aeneas, and closing with the death of Drusus in the year 8 B. C. Sallust is another historian of eminence, his most noted writings embracing the "Conspiracy of Cataline" and the "Jugurthine War."

The noted writers of the 1st century A. D. include Seneca, Juvenal, Tacitus, and the two Plinys. Seneca was a brilliant orator, poet, and Stoic philosopher. His writings are remarkable for their moral purity. They include "Ethical Essays," "Tragedies," and "Instructive Letters." Juvenal produced works remarkable for their satire and eloquence. Tacitus wrote in a grave and stately, though sometimes sarcastic, style. His writings include "History of Rome," "Life of Agricola," and a treatise on Germany. Pliny the Elder is the author of "Natural History," a work of 37 volumes, covering the whole range of scientific knowledge of his time. Pliny the Younger was a charming letter writer; his writings extant include the "Epistles" and the "Eulogium upon Trajan." Quintilian was the most eminent rhetorician and literary critic of Rome. He lectured for 25 years and afterward published his discourses in a work entitled "Institutes." His writings belong to the early part of the 2d century. Other writers of Rome include Emperor Marcus Aurelius, Saint Jerome, and Aurelius Augustine. Marcus Aurelius is remembered as a stoical writer, Saint Jerome as the translator of the Bible into Latin, and Aurelius Augustine as the author of the prophetic book called "The City of God" and of "Confessions."

ROOF, the covering of a building, designed to protect its interior from the weather, especially rain. The most important part of it is the framework, which in large buildings is very carefully and substantially constructed. The roof

may be covered with a large variety of materials, such as tin, sheet iron, tiles, shingles, or slate. As used in carpentry, the roof consists of the framework by which the covering is supported. The principal timbers are the *rafters*, which set upon the *plates*, and are usually supported by *purlins*, which have a horizontal position and support the main or common rafters. The width between the supports is called the *span*, which is quite large in buildings of considerable size. The points at which the rafters meet indicate the height, called the *rise*, which is the distance above the level of the supports, while the slope, or angle, is called the *pitch*. In primitive carpentering the roof is common or plain, while the more ornamental styles are curved and hipped. Rafters are usually covered with sheathing made of lumber one inch thick. The shingles or other outside coverings are nailed to the sheathing.

ROOK, a species of crow. It differs from other birds of the crow family in having a naked spot at the base of the bill and in feeding on grain and insects instead of carrion. It is about twenty inches long and the alar extent is forty inches. The color is black with a purple gloss. Rooks are sociable and gather in large flocks. They mostly inhabit cultivated and wooded districts, and prefer to nest near buildings. Rooks are native to Europe and are common birds in the vicinity of the Mediterranean.



ROOK.

They are permanent in milder sections, but in the colder regions move southward on the approach of winter.

ROOT, in mathematics, such a number or quantity which, multiplied by itself one or more times, produces a given quantity; thus, 3 is a root of 9, since $3 \times 3 = 9$. If a given number is used twice as a factor, the product is called the *second*, or *square*, root of that number; if used three times, it is called the *third*, or *cube*, root; if used four times, the *fourth*, or *biquadrate*,

root, etc. The term root is used in algebraic expressions to represent the value or values of the unknown quantity or quantities, which value or values, substituted in the equation, will make the two members of it identical. To discover this value or these values is the object proposed in the solution of the equation.

ROOT, in botany, that organ which usually penetrates the earth, to imbibe from it nourishment suitable to the growth of the plant. In its development it divides itself into branches which are called *rootlets*, or *fibers*, and which terminate in smaller and hairlike ends of a spongy tissue. No true root produces buds or leaves, even if exposed to the air and light; if roots apparently do so, they are to be regarded as subterranean stems. The potato tuber is a familiar example of a swollen subterranean stem, though usually called a root; and some cacti and orchids have long, tough, aerial roots. Sometimes these are adventitious, as in the rootlets which issue from the lower joints of the Indian corn and from the joints of the grape vine.

Roots are either *annual*, *biennial*, or *perennial*, according as they perish in one or two years, or survive for several years, but even these conditions depend in a degree on climatic circumstances. Some that are normally perennial change to annual, as in the garden nasturtium, in which case a single season is sufficient to produce flowers and seeds, and others naturally annual are made biennial or perennial, by preventing the flowers from expanding and the fructification from taking place. Roots are liable to change in form and size, especially under cultivation, as in the cultivated carrot, whose normal root thickens and becomes fusiform, or in the turnip, where it swells laterally and becomes broad and flat, or in the dahlia, where the fibers increase to tubers. There is little proportion of the roots to the rest of the plant, and even this diminishes, until the root entirely disappears in whole genera of the lower orders.

The office of the root is not only to find nourishment, but to excrete various substances. It possesses the extraordinary power of penetrating bodies harder than the earth. The general tendency of the root to seek an opposite direction to the stem is admitted, but the exact reason cannot be assigned. Roots are frequently the stores of nutriment for the use of the next year's vegetation. They contain gums, resins, acids, and other properties found important in medicine and the arts.

ROPE, the name of cordage formed of twisted fibers, such as fibers of flax, hemp, jute, cotton, or other vegetable species. The name is

applied in an extended sense to cordage made of steel, iron, or other metallic wire. In the trade the distinction between a cord and a rope, other than of wire, is based on a collection of fibers one inch in circumference, though in popular usage smaller sizes are often termed ropes. Ropes made of vegetable fibers are composed of a number of rope yarns or rope threads. They are first twisted into strands, which in most cases are twisted together to form the finished product. The principal kinds are known as hawser-laid, cable-laid, and shroud-laid. In making a *hawser-laid rope* three strands are twisted left hand, the rope yarns being laid up right hand. A *cable-laid rope* is composed of three strands of hawser-laid rope twisted right hand. A *shroud-laid rope* is made of four strands, three strands being twisted round a central strand. In cases where great strength is needed a series of hawser-laid ropes is formed into a *flat rope* by being placed side by side and fastened together by sewing.

The vegetable fibers used in rope making are derived largely from tropical countries. They include such fibers as the coir, secured from the husk of the cocoanut, the sisal hemp from South America and the manila or wild plantain produced largely in the Philippines. Formerly rope making was carried on mainly by hand, but now machines are used for making all kinds of cordage. Ropes are made with great care, because uniformity of strength is necessary, for, as in a chain, the strength of a rope depends upon its weakest place. Among the improvements of recent times is the manufacture of wire ropes, which are made from a number of wires twisted together. The strongest wire ropes are made of steel, but iron and other metals are used also, and to preserve them against rust a galvanic coating is applied. Ropes are used for various purposes in connection with mining, farming, manufacturing, and other productive enterprises. Metal ropes are used quite extensively in rigging ships, in elevators, and for many purposes in mining.

RORQUAL (rôr'kwəl), the largest genus of the whale family, found in the Arctic Ocean. It is distinguished from the Greenland, or right, whale by the presence of a dorsal fin, and by having nearly parallel longitudinal folds extending between the arches of the lower jaw, from the under lip along the chest and abdomen. The largest species is the *great northern rorqual*, found chiefly off the northern coast of Asia and Europe, and it is probably the most bulky and powerful of living animals. The body is longer and more slender than in the right whale, and the head is about one-fourth the

length of the body. It attains a length of 90 to 110 feet. The food consists of crustaceans, medusae, and fishes. According to Desmoulins, a large quantity of pilchards and 600 good-sized cod have been found in the stomach of a single whale. The blubber is much thinner than in the right whale, hence it is comparatively of less value, and the yield rarely exceeds eight to ten barrels of oil. The longest baleen plates seldom measure four feet, hence it yields much less whalebone than the right whale. Two or three species have been described, all of which are active and restless, and they blow so violently as to be heard a great distance in calm weather. Fossil remains of small species of rorqual are found in regions that are now above the level of the sea.

ROSACEAE (rō-zā'sê-ē), an important family of plants, including herbs, shrubs, and trees. This family embraces not less than 90 genera and 2,000 species, most of which are native to the North Temperate Zone. It includes a large number of beautiful and useful plants, many of which are cultivated very extensively for their fruit and for ornamentation. To this family belong the almond, apricot, apple, blackberry, cherry, peach, pear, plum, quince, raspberry, rose, and strawberry. The fruits are wholesome, except that of the cherry laurel, which is poisonous, and the kernels of the stone fruits have poisonous properties. These plants are distinguished by having regular flowers, seeds without albumen, and alternate leaves with stipules. Many of the species furnish articles of use in medicine, these properties being derived from the bark in some, from the roots in others, and from the flowers and fruits of still others. See **Rose**.

ROSARIO (rō-sā'rê-ō), a city of Argentina, on the Paraná River, 170 miles northwest of Buenos Ayres. It is the capital of the Province of Santa Fe and the second city of Argentina. The climate is temperate and healthful. It is finely located, has convenient railroad facilities, and is the center of a large interior and river trade. Among the manufactures are soap, flour, lumber products, furniture, utensils, leather, and machinery. The streets are regularly platted, intersecting each other at right angles. They are well paved and lighted with gas and electricity. The city has a fine cathedral, numerous other churches, and a number of

schools, hospitals, academies, and institutions of higher learning. Population, 1908, 152,184.

ROSARY (rō'zā-rÿ), the name of a popular form of prayer in the Roman Catholic Church, applied generally to the bunch or string of beads used in counting such prayers. The beads are of various sizes and material, usually made of stone, wood, or ivory. A complete Dominican rosary contains 150 small beads, separated into groups of ten or fifteen large beads, the small ones being used for the aves and the large ones for the paternosters. An ordinary rosary consists of fifty small beads, which are divided into groups by five large beads, hence a full rosary is formed by repeating three times. Every tenth ave is used in saying the doxology. The Pope, bishop, or some other dignitary or priest blesses the rosary before it is used. The rosary in its present form was introduced by Saint Dominic, the founder of the Dominicans, in the first half of the 13th century. Both Buddhists and Mohammedans use a string of beads for counting their prayers. The string of the Mohammedans has 99 beads, which they drop while pronouncing the 99 names of God occurring in the Koran.

ROSE, the common name of plants of the genus *Rosa* and its natural order *Rosaceae* (q. v.). They have prickly stems and unequally pinnate leaves. About fifty species in a wild state have been described, most of which



TEA ROSE.



MOSS ROSE.

are confined to the North Temperate Zone, but by cultivation about 1,000 species have been secured. These include both simple and double flowers and a large variety of colors. Some of the species differ so materially from those in a native state that they are difficult to

classify. The rose is easily cultivated, requiring sunshine, rich soil, and plenty of moisture. Among the common species are the *tea*, *damask*, *sweet brier*, *yellow*, *musk*, *Provence*, *moss*, *evergreen*, and *monthly*. The *American Beauty* is an elegant species originated in the United States, and is cultivated for its fragrant and beautiful, large flowers. Some species, as the *common climbing rose*, may be trained to ascend arches, arbors, and trellises. Poets have made the rose famous, oratory has been enriched with its virtues, and it has long been the emblem of reserve and faithfulness. It is the most beautiful and fragrant of flowers. Many millions of roses are sold annually in the market, being among the most popular of the cut flowers. Attar (q. v.), or otto of roses, is the most important product, but roses also possess medicinal properties. See **Perfumes**.

ROSE ACACIA, an ornamental shrub of North America, found in the mountains of Mexico and the United States. It is a species of locust, has very large inodorous flowers, and bears pods that are covered with coarse hair. The plant is native to the southern part of the Allegheny Mountains, but is now cultivated as an ornamental shrub.

ROSEMARY (rōz'mā-rÿ), an evergreen shrub of the mint family, which is native to Southern Europe and Western Asia. It is from three to eight feet high, has narrow, opposite leaves, and bears pale blue flowers. All parts of the plant have an aromatic flavor. The leaves have a pungent taste and yield an essential oil, called *oil of rosemary*, which is used as an aromatic perfume and in cookery. It possesses medicinal properties of use in headache and mental weariness, and is an essential ingredient in a perfume called Hungary water. Spain is noted for the prolific growth of the rosemary, which furnishes good bee pasture and may be smelled many leagues off the coast.

ROSES, Wars of the, the contest between the houses of Lancaster and York for supremacy in England. It constituted a disastrous warfare, with short intervals of peace, for thirty years, from 1455 to 1485. The former chose the red rose as an emblem and the latter chose the white, hence the name. The house of Lancaster had been in possession of the throne for three generations, attaining to the crown in 1399 and being represented successively by Henry IV., Henry V., and Henry VI. The latter began to exhibit weakness of mind in 1454 and Parliament accordingly appointed Richard, Duke of York, protector of the realm during his illness. Richard had already ad-

vanced claims to the throne and, on the recovery of Henry, he declined to give up his power and vigorously organized to maintain it by force of arms. In 1455 the Battle of Saint Albans was fought between the contending parties, in which the king's army was defeated and he became a prisoner.

The queen of Henry, Margaret of Anjou, immediately organized a force in the north of England and won the Battle of Wakefield, in which the Duke of York was defeated and slain. Soon after Edward, son of the Duke of York, raised an army and eventually defeated the forces of the queen, becoming Edward IV. in 1461. He was compelled to leave England shortly after by the army raised under the direction of Queen Margaret and the Earl of Warwick, when Henry VI. was restored, but Edward returned in 1471 and defeated Warwick at Barnet and the queen at Tewkesbury, both being among the slain. Edward was succeeded by his son, Edward V., who, with his brother Arthur, was murdered in the Tower and Richard III. became king. His reign ended with the Battle of Bosworth in 1485, in which he was defeated and slain by the Earl of Richmond, who succeeded him as Henry VII.

ROSETTA STONE (rō-zēt'tà), the name of a stone found near the city of Rosetta, Egypt, by a French engineer in 1798. It consists of black basalt and bears an inscription of the year 196 B. C. in honor of Ptolemy Epiphanes. The inscription forms a key to the reading of the hieroglyphic characters. It is in the British Museum. The city of Rosetta is near the mouth of the Nile, thirty miles west of Alexandria. Population, 1907, 18,648.

ROSEWOOD, the name given to various hard, close-grained woods derived from different species of trees, so called from their roselike scent when newly cut. Most wood of this class is dark-colored with several shades and stripes, and is used extensively in the manufacture of furniture and cabinet products. It is heavy and expensive, and is employed principally as veneers and for ornamental purposes. The finest quality is produced in Brazil and other South American countries, but there are also productions of it in the West and East Indies.

ROSICRUCIANS (rōz-ĭ-kru'shanz), the name of a secret society organized in Württemberg, Germany, in the 17th century, whose aim was to vitalize and prolong human life. The moving spirit in this society was Johann Valentin Andreae, a Lutheran divine, who founded it upon reports published by a certain Christian Rosenkreutz in relation to discoveries



TEA ROSE.



HYBRID TEA ROSE.



made in Egypt. The latter spent a large portion of his life among the Brahmans, in the pyramids of Egypt, and in Western Asia, gathering while abroad much information in regard to the modes of life in the East. Some writers have connected the society with the Freemasons and other fraternities and it is generally termed the Honorable Order of the Rosa Cross. The leaders extended their organization to many countries of Europe, but they are now looked upon as impostors who laid claim to supernatural powers.

ROSIN (rōz'īn), a substance obtained by distilling a mixture of water and turpentine. Crude turpentine from cone-bearing trees, such as the pine, yields from 65 to 90 per cent. of rosin. It is translucent when entirely freed from water and the odor is similar to that of turpentine. Large quantities are manufactured in British Columbia and some parts of the United States, especially in North Carolina and Florida. It is used mainly in making soap, sealing wax, varnishes, basilicon ointment, and adhesive plasters and cements. See **Resins**.

ROSSLAND (rōs'land), a city of British Columbia, six miles north of the international boundary, on the Canadian Pacific and other railroads. It is located in the western part of the Kootenay mining district and is surrounded by a region that produces large quantities of gold, silver, and copper. The noteworthy buildings include the high school, the Allen Hotel, the city hall, and several fine churches. It has flour mills, bottling works, engineering works, and an electric power and light plant. Twelve miles distant by rail, at Trail, are large smelters. Rossland has a large trade in merchandise and manufactures. Population, 1906, 3,859.

ROSTOCK (rōs'tōk), a city of Germany, in Mecklenburg-Schwerin, on the Warnow River, sixty miles northeast of Lübeck. It is six miles from the Baltic Sea, has a good harbor, and is connected with interior Germany by important railroads. Rostock has an active trade in cereals, live stock, fish, timber, salt, and merchandise. The principal manufactures include leather, cotton and woolen goods, chemicals, machinery, pottery, lime, toys, and clothing. The University of Rostock was founded in 1419. This institution has 88 professors and lecturers and a library of 180,000 volumes. Among the numerous churches are Saint Mary's and Saint Peter's. It has excellent public schools and hospitals and several academies. Electric lighting and street railways, waterworks, and street pavements are among the improvements. Rostock is the birthplace of Blücher and contains a colossal monument to that eminent military leader. It was an

important member of the Hanseatic League. Population, 1905, 60,793.

ROT, the name of a class of diseases that affect many plants. They are due to the attacks of fungi or other low vegetable organisms. These diseases are variously named, depending upon their nature and the plants they affect. *Root rot* is a disease of many cultivated plants and frequently proves injurious to the grape and forest trees. It is due to the growth of some of the larger fungi, which attack the roots and cause them to decay. *Black rot* is peculiar to grapes and causes the leaves and fruit to turn black in spots and finally die. *Bitter rot* causes brownish or blackish spots in apples, while *tomato rot* causes the fruit to decay when nearly ripe. The tissues of wood are destroyed by *dry rot*, which is due to the fungi attacking the timber kept in damp places, such as the supports in cellars, mines, and foundations of buildings.

ROTATION OF CROPS (rō-tā'shūn), the name applied to the practice of changing from year to year the crops cultivated in a given field. It is practiced chiefly to maintain or increase the fertility of the soil, from the fact that plants differ in their habit of growth and in the proportion of elements necessary for their maturity. For instance, the productiveness of a field decreases from year to year if wheat is grown continuously, but if the crops are rotated, that is, if wheat, oats, corn, and clover are alternated, the productiveness is maintained to a considerable extent or even improved. Rotation of crops differs materially in different sections, owing to the crop suited to the soil and climate. Corn, potatoes, cotton, or any crops that can be cultivated act to free the ground from weeds, while deep-rooted plants, such as clover and alfalfa, draw their nutrition largely from great depths, hence tend to mellow the soil and leave the surface enriched. Insects and diseases that affect one crop do not destroy another. For instance, chinch bugs and rust injure barley and wheat, but do not affect corn cultivated on the same ground the following year. Agriculturists aim to grow crops that can be consumed upon the farm rather than those that are sold, and in this way enrich the soil by associating the cattle industry with the cultivation of the soil.

ROTTERDAM (rōt'tēr-dām), a city and river port of the Netherlands, the second city of the kingdom, 45 miles southwest of Amsterdam. It is situated on both sides of the Maas River, fifteen miles from the North Sea, and is intersected by a splendid system of canals, thus giving it advantages of vast importance. It has

extensive electric railway and railroad facilities. The trade is the most important in the Netherlands, aggregating annually a vessel tonnage of 13,750,000 tons, a figure excelled by only a few cities of the world. The export trade is principally in manufactured goods, provisions, mineral waters, and spirits, while the imports consist of cotton, coffee, spices, sugar, and dye-woods. Among the manufactures are beet sugar, ironware, jewelry, cotton and woolen goods, soap, vinegar, liquors, sailcloth, windmills, and machinery. The city is supplied with electric and gas lights, stone and asphalt pavements, sewerage, waterworks, and rapid transit.

Rotterdam is well built and is divided into two parts by the main thoroughfare, known as Hoog Straat. It has fine gardens and parks, numerous charitable and educational institutions, and many fine monuments. The Saint Laurence Church is a Gothic structure of the 15th century and the Museum Boyman's is a celebrated building, but was partially destroyed by fire in 1863. Other features include the commercial exchange, the courthouse, the town-hall, the post office, the central railroad station, and the public library of 145,000 volumes. In the Great Market is a bronze statue of Erasmus. Other statues are dedicated to Tollens, De Witt, and the engineer Stieltjes. The docks and quays are extensive and the river and canals are crossed by numerous bridges. Rotterdam was founded in 1416. Population, 1906, 390,364.

ROUBAIX (rōō-bā'), a city of France, in the department of Le Nord, six miles northeast of Lille. It is a modern city, coming into importance in the last century. The Roubaix or La Marca canal furnishes connections with the Scheldt River in Belgium. It has modern municipal facilities, extensive railroad connections, and an important trade. The manufactures include cotton textiles, woolen and silk goods, beet sugar, carpets, leather, and machinery. Roubaix is the seat of the celebrated École Nationale des Arts Industriels. Population, 1906, 121,017.

ROUEN (rōō-ān'), a city of France, formerly the capital of Normandy, on the Seine River, 86 miles northwest of Paris. It is a beautiful and modern-appearing city, has extensive railroad and navigation facilities, and is the center of a large domestic and foreign trade. The river has been improved so sailing vessels of the largest kind can reach the city, principally by dredging, and it has a spacious and well-improved harbor. It is provided with modern municipal facilities, such as telephones and electric street railways, and has sanitary sewerage, municipal waterworks, and public baths.

The public library contains 145,000 volumes. Other features include the Church of Saint Ouen, the cathedral erected by Philip Augustus, the Palais de Justice, the Hotel de Ville, and the central railroad station. Among the manufactures are silk textiles, cotton and woolen goods, cordage, chemicals, hats, paper, hardware, lace, ribbons, sailing vessels, and machinery. The Northmen took possession of Rouen in 843, and in 1066 it served as the residence of the Duke of Normandy, who in that year conquered England and established his court in London. Joan of Arc was burned here in 1431 and the spot is now commemorated by a beautiful statue dedicated to her. German troops occupied Rouen in the War of 1870-71. Population, 1906, 118,459.

ROUGE (rōōzh), the name of a cosmetic prepared from safflower and used to improve the complexion. In the market it is known as vegetable rouge. This product is obtained from drying the leaves and then pulverizing and digesting them in a weak solution of carbonate of soda. Into this is placed some finely carded cotton, and the alkaline mixture is neutralized with lemon juice or vinegar. A solution of soda is used to wash the color out of the cotton, when it is again precipitated with vinegar, or citric acid. To the solution is added a quantity of finely powdered chalk, which becomes colored and gives body to the preparation. Jewelers use a preparation known as rouge to polish their wares. This product is obtained by calcining sulphate of iron in a high temperature, after which it is washed with water until it ceases to affect litmus paper.

ROUGE-ET-NOIR (rōōzh-ā-nwār'), the name of a game played with cards. It is so called because it is played upon a table marked with two spots of red and black, the name meaning *red and black*. The game is played principally at the fashionable watering places of Europe and is a favorite among those who practice gambling.

ROUGHRIDERS (rūf'rid-ērz), the name of a regiment of volunteer cavalry organized by Theodore Roosevelt and Leonard Wood for service in the Spanish-American War. The former was first assistant secretary of the United States navy at the beginning of the war and induced many cowboys from the states lying west of the Mississippi to join the organization. This regiment took an active part in the battles of El Caney and San Juan. In 1899 a patriotic society of Roughriders was organized, to which the members of the regiment and their descendants are eligible.

ROULETTE (rōō-lēt'), a game of chance

played with a small ivory ball on a table. A revolving disc is located in the center of the table, the sides of which are divided into 38 compartments painted half red and half black. The compartments are numbered from one to thirty-six, besides a zero and a double zero. Players place their wager upon one of the compartments and, if the ball falls into the compartment of their choice, they receive thirty-six times their stake. A player may bet on two or more numbers, depending upon the rules of the game. Roulette is usually associated with public gambling.

ROUNDERS (round'ērz), a game of ball played extensively in England as an outdoor exercise. Each side has nine players, who alternate as the *in* and the *out* sides. The ground is platted into a square, which has three goals and a batter's station. It is the aim of the batter to drive the ball as far into the field as possible and run completely round the goals, or make as many goals as possible. The batter has three strikes, but must run the third time whether he hits the ball or not, and is declared out if the ball is caught in the air by one of the fielders, or he is touched by the ball before he reaches a goal. When three men are out, the side playing must take the field, while those in the field take the bat. This game is the origin of the more highly developed American game of baseball.

ROUNDHEADS, the name given as a mark of derision to the Puritans, or supporters of Parliament, during the Civil War in England, from their fashion of wearing the hair short. The Cavaliers, or adherents of Charles I., wore their hair in long ringlets.

ROUND TABLE, the name given to the fraternity of knights which were associated with Arthur, King of the ancient Britons. They were so called from the round table at which they took their seats in his palace.

ROWAN TREE. See **Mountain Ash.**

ROWING, the art of propelling a boat or vessel by means of oars. The term *rowing* applies properly to the method of propelling a vessel by a number of men, each of whom handles an oar and is known as an *oarsman*, while the act of handling an oar by each hand is called *sculling*, and such oars are properly *sculls*. Rowing by means of oars was formerly an important enterprise and anciently much freighting was done by this means, but civilized nations have displaced it almost exclusively by the application of electric, gasoline, and steam power. Sculling is now carried on extensively in competitive races. In the larger exercises

single sculling is almost universal, but in some instances a number of scullers work in unison, usually in pairs, fours, sixes, or eights.

Rowing is an ancient pastime and economic enterprise, but it did not become prominent as a sport until about the middle of the 19th century. Crews for rowing were organized at the leading colleges of Europe as early as 1820, and boats carrying from two to eight rowers soon came into use. Races have been held annually by Cambridge and Oxford since 1856. The course employed chiefly by these institutions is on the Thames, from Putney bridge to Mortlake church, or the reverse, an expanse of four and a half miles. Up to the present the honors are about equal, though Oxford has a small lead in the scores. Regattas are maintained with great success in Germany, Holland, Denmark, and Sweden, and the contests are both national and international.

Rowing associations are maintained both in Canada and the United States, and these countries have had competitive tests with various associations of England, both at Henley and on the Thames. In 1873 was founded the National Association of Amateur Oarsmen, which is one of the leading American organizations, but there are many others, including the regattas on the Schuylkill River in Pennsylvania, the Hudson River in New York, and the course at New London, Conn.

ROYAL GORGE, a celebrated cañon in Fremont County, Colorado, through which flows the Arkansas River. In many places it is skirted by bluffs that rise fully 3,000 feet above the river, which pursues a rapid and tortuous course. The rocks are variously colored and grandly formed, giving the region a most picturesque and imposing aspect.

ROYAL INSTITUTION OF GREAT BRITAIN, an organization established in London, England, in 1799. It was chartered the following year under the name of the Royal Institution for the Promotion, Diffusion, and Extension of Science and Useful Knowledge. Scientific and literary research, the diffusion of experimental science, and the application of new discoveries to the arts are the principal objects of this institution. It has a library of 60,500 volumes and is supplied with a splendid collection of apparatus and scientific instruments. The election of new members is by ballot. Many bequests have been bestowed upon the institution, but support is provided for by an admission fee and annual subscription paid by the members. Benjamin Thompson, Count Rumford, originated the idea of such an institution. Among the lecturers may be named Sir Hum-

phry Davy, John Tyndall, Michael Faraday, Thomas Young, Thomas H. Huxley, and many other men prominent in science.

ROYAL SOCIETY, The, an association for the advancement of mathematical and physical science, whose charter name is the Royal Society of London for Improving Natural Knowledge. It is the oldest scientific society in England, founded in 1660, and thus is one of the oldest in Europe. Weekly meetings are held from November to June for the purpose of discussions, which are preceded by the reading of papers on scientific subjects, after which the discussions are general. The *Philosophical Transactions*, founded in 1665, is an annual in which the more important papers and proceedings are published, and *The Proceedings*, first issued in 1880, is a periodical devoted to publishing abstracts of papers and accounts of general transactions. Fellows are elected by the members, the election occurring annually. The society is supported by an endowment and additional support is secured by each fellow contributing annually \$20, or a life payment of \$300. The membership comprises about 550 fellows. Since its organization nearly all the eminent men of Great Britain have been enrolled. The presidents have included Sir Isaac Newton, Samuel Pepys, Sir Hans Sloane, Sir Jay Banks, and Sir Humphry Davy.

ROYAL SOCIETY OF CANADA, an institution founded at Ottawa, Canada, in 1882. It was promoted by the Marquess of Lorne and others, and the first meeting was presided over by Sir William Dawson. Four departments are maintained, including those of French-Canadian literature and history; English-Canadian literature and history; mathematical, physical and chemical sciences; and geological and biological sciences. Ottawa is the usual place of meeting and the meetings are held annually in May. This association has been prominent in general research, especially in matters of discovery and in preserving historical records. The transactions are published annually at the expense of the Dominion government.

RUBBER. See **India Rubber.**

RUBICON (ru'bi-kūn), a river of northern Italy, which flows into the Adriatic. It is of interest historically in connection with Caesar crossing the stream with an army in 49 B. C. The Rubicon was the boundary line that separated his province from the republic of Rome. His act of crossing the stream with an army at the outbreak of the civil war between him and Pompey constituted a declaration of war. Writers represent Caesar as hesitating before crossing the stream, and, while passing over, he

is said to have uttered the words *Jacta est alea*, meaning "The die is cast." "Crossing the Rubicon" has since passed into proverb, and signifies the undertaking of a hazardous task. It is thought that the Rubicon is the river now known as the Fiumicino.

RUBIDIUM (ru-bīd'ī-ŭm), one of the alkali metals. It was discovered by Bunsen and Kirchhof in 1860, while examining the waters of Dürkheim, Germany, by means of the spectroscope. This mineral occurs in minute proportions in association with caesium. It is silver white, is as soft as wax at ordinary temperatures, and oxidizes rapidly in the air. When raised to a dull red heat, it evolves a bluish vapor.

RUBLE (ru'b'l), a silver coin and unit of account in Russia. It began to be coined in the 15th century. The ruble is divided into 10 *grivens*, or 100 *kopecks*. In the money of Canada and the United States, the ruble has a value of 51.5 cents. Fractions of the ruble are in silver, while gold is coined in denominations of 5 rubles and of 10 rubles. Paper or bank rubles are in circulation, but these have a nominal value of about two-thirds of the silver coin.

RUBY (ru'bŷ), a transparent gem of a deep color, which is considered one of the most valuable of the precious stones. It is a species of sapphire, but differs from it in that the latter is of a bluish color and less hard, ruby being the hardest of all gems except the diamond. Ruby is rare, is seldom found of large size, and possesses great value. The value increases in proportion to its size. A ruby of five carats, if perfect in color, is valued at about ten times as much as a diamond of the same weight. Ruby of the kind described here is generally called *oriental ruby* to distinguish it from a less valuable variety known as *spinel ruby*. The former kind is a corundum formed largely of alumina, while the latter is an aluminate of magnesium and is inferior both in value and hardness. Jewelers often offer for sale articles of ornament containing spinel rubies, the oriental variety possessing a value too great to be generally purchased. Rubies are obtained in Burmah, Siam, Ceylon, and Australia. Inferior grades occur in America and also in the countries named. It is now possible to produce rubies chemically. The artificial kinds serve the purpose in watches equally as well as rubies produced in nature.

RUDDER (rūd'dēr), a broad, flat device by which a boat or ship is steered, serving to change its course when swung to either side. It is hinged vertically to the stern port of a ship, or at the stern of a boat, and is so adjusted that it may be moved by means of a tiller or wheel. A

rudder chain is shackled to the rudder by bolts immediately above the water line, but it is slack enough to permit the free motion of the rudder. This is necessary to prevent it from being lost in the event of its becoming detached from the ship.

RUFF, or **Reeve**, a genus of wading birds allied to the sandpiper. These birds are widely distributed in the northern parts of North America, Europe, and Asia. They inhabit marshy places, and are migratory in their habits. The length of the body is about twelve inches and the colors are various, but they are generally variegated brown or black above and white below. In all species the bill is long and slender and the wings are short. The male is peculiar for having a long ruff, formed of feathers, around the neck in the spring, which disappears after two months, but serves during the breeding season as a defense when fighting against other males. The fights occurring at that time are for the possession of the females, which are smaller than the males, and are called *reeves*. Ruffs feed on worms, seeds, and insects. They breed in the coarse grasses of marshes and swamps, where they construct nests in the early spring, the brood usually consisting of four. Their flesh is edible and much sought in the fall.

RUGBY (rŭg'bŷ), a town in England, on the Avon River, fifteen miles northeast of Warwick. It is surrounded by a fertile country, has convenient railroad facilities, and is noted as the seat of the celebrated Rugby School. This institution was founded by Laurence Sheriff, a grocer and merchant to Queen Elizabeth, in 1567. It first attained a national reputation when Dr. Thomas Arnold became master in 1828. Its endowments produce about \$25,000. It is attended by about 500 students. Among the famous students were Lord Derby, Matthew Arnold, Dean Stanley, and Thomas Hughes. The last named wrote "Tom Brown's Schooldays," a book still purchased largely for home and school libraries. The town of Rugby has a number of fine churches, hospitals, and associations. It has a brisk trade in produce and merchandise. Population, 1907, 14,408.

RÜGEN (rŭ'gŕn), an island in the Baltic Sea, off the coast of Pomerania, from which it is separated by a narrow channel. It is 33 miles long by 10 miles wide, and has an area of 390 square miles. The shore is very irregular, being indented by numerous bays, and the surface is generally undulating and fertile. It has no prominent elevations. Stubenkammer is the highest point, being a precipitous chalk cliff 410 feet above sea level. The principal productions in-

clude vegetables, cereals, and fish. Cattle and sheep are reared. A number of the coast towns are noted as popular resorts for sea-bathing and sight-seeing. Bergen, with a population of 6,106, is the chief town and seat of local government. The island belonged to Sweden until 1815, when it became a part of Prussia. It is now an integral part of the German Empire. Population, 1905, 48,959.

RUM, an alcoholic liquor distilled from the juice of sugar cane and from the drainings and scummings obtained in sugar making. The material used is first allowed to ferment and the liquor is then drawn off by a simple process of distillation, which is usually conducted in connection with the cane-sugar establishments. The best grade of rum is secured from the scummings taken from the sugar pans, a second grade is made from scummings and molasses, and an inferior grade is obtained from molasses alone. Rum is colorless as it issues from the still, but it is colored to suit the customer before it leaves the premises of the distiller. The most extensive productions are in connection with the manufacture of cane sugar in the West Indies and Central America, but inferior grades are made by flavoring plain spirit with rum and coloring with burnt sugar. *Jamaica rum* is considered the finest, but in late years the name has been applied to the best grades made anywhere. A pineapple flavor is often given to rum by bringing it in contact with sliced pineapples, when it is called *pineapple rum*. The French make a kind of rum known as *tafia*.

RUMANIA (rŭ-mă'nŷ-ă), or **Roumania**, a kingdom in the southeastern part of Europe, one of the Balkan states. It is bounded on the north by Austria-Hungary, east by Russia and the Black Sea, south by Bulgaria, and west by Servia and Austria-Hungary. The coast on the Black Sea is about 130 miles long. It is separated from Bulgaria by the Danube. The area is 50,715 square miles.

DESCRIPTION. The western part is mountainous, being traversed by the Carpathians and the Transylvanian Alps. Much of the surface is a low plain, but spurs of these mountains extend some distance inland. The highlands in the northern part serve as a great wall on the Austro-Hungarian frontier, the highest peaks rising about 800 feet above sea level. These highlands are cut deeply by river channels, which flow in valleys between spurs of the mountains. In the eastern part of the country is the Moldavian plain, and the Wallachian plain occupies the entire south, both of which are highly fertile.

All of Rumania lies in the Danube basin. The drainage is toward the south and east into the

Black Sea. A part of the western and most of the southern boundaries are formed by the Danube River, which turns northward near Silistria, and, after being joined by the Pruth, it forms the boundary between the province of Dobrudja and Russia. The greater part of the Danube delta is included with Rumania. It contains the celebrated wall built by the Romans under Trajan in the 2d century from the vicinity of Kustenji to the Danube. Many small streams flow south from the northern border to join the Danube, including the Aluta, the Arjesh, and the Sereth.

The climate is subject to marked extremes. The summers are hot, the autumns are dry, and the winters are cold. In winter the winds blow from the Russian steppes and in summer, from the Mediterranean, making the latter subtropical. The extremes range from 20° below zero to 98° and even 104° in the shade. Heavy snows fall in the mountains. The rainfall ranges from 15 to 22 inches, but is not equally distributed. Much of the surface is highly fertile, particularly the black earth of the Danube basin. The country has a fine growth of timber.

MINING. The country possesses great mineral wealth, especially in coal, salt, and petroleum. In the output of petroleum Rumania ranks fifth with the nations of the world, but the capital invested to promote the enterprise is almost exclusively foreign, chiefly German and Dutch. Coal of a fine quality is obtained for domestic consumption and export. Salt has been mined for centuries. Other minerals include iron, gold, copper, lead, silver, and quicksilver. Clays suitable for brick and pottery and sands fitted for porcelain and glass wares are abundant. Granite, marble, and limestone are widely distributed and these minerals are quarried to a considerable extent for construction purposes. In Moldavia and Wallachia are beds of salt that have a thickness of 700 feet. Salt mining is a state monopoly.

AGRICULTURE. The lands were almost exclusively under feudal ownership from remote antiquity until 1864, when the government provided a popular loan of its resources to the people. Under it the peasants have come into possession of small farms, consisting mostly of ten-acre tracts, and the loan is being rapidly repaid under an installment system with low interest. Fully 70 per cent. of the people are engaged in farming and stock raising, but the methods are still primitive. Wheat and maize are the principal crops, the former being grown on 6,000 and the latter on 7,000 square miles. Other important crops include barley, oats, rye, tobacco, hemp, and vegetables. Fruit growing receives marked attention, especially grapes, prunes, and apples.

Sheep are grown in large numbers in the highlands in the north, where grazing is profitable. Cattle are reared for meat and dairying. Other live stock includes horses, swine, and poultry.

MANUFACTURES AND COMMERCE. Formerly a large part of the manufactured products were produced in small establishments, but the factory system is developing rapidly. Flour is made in large quantities for export. Sugar is manufactured of beets and is sufficient to supply the home demand. Butter and cheese of a superior grade are made, both from the milk of cows and goats, and in the output of wines Rumania vies with Hungary. Extensive petroleum refineries are operated. Other manufactures include soap, leather, cement, glass, cloth and hosiery, furniture, machinery, and cigars. Foreign trade is largely with Austria-Hungary, Germany, France, and Great Britain. Flour, wines, hides, and fruits are the principal exports. The imports include textiles and metal manufactures.

COMMUNICATION. The Danube is important as a highway of commerce, since it furnishes a continuous route from the Black Sea to the western border. It has been improved in many places by dredging and the construction of canals. Deep-water navigation on the Danube extends to Galatz and Braila. Kustendje, on the Black Sea, has direct railway communication with the interior, where lines of railroads extend in all directions, furnishing communication with commercial centers in Russia and Austria-Hungary. About 2,150 miles of railways are in operation and these are owned by the state. Bucharest, Jassy, and other cities have electric railways, many of which extend to rural districts and interior towns.

GOVERNMENT. The government is a constitutional monarchy and the king holds his office by heredity. He is assisted by a cabinet of eight members and has power to veto acts of the legislature. Legislation is vested in a congress of two houses, the senate and chamber of deputies, members of both branches of which are chosen by electoral colleges. The senators, of whom there are 120, are elected for a term of eight years. This branch includes the heir apparent, two representatives selected by the universities of Jassy and Bucharest, and eight bishops. In the chamber of deputies are 183 members, all chosen for four years. Rumania is divided into 32 districts for local government. It consists of the three provinces of Moldavia, Wallachia, and Dobrudja, all of which are under state or provincial governments.

EDUCATION. Though school attendance is free and compulsory, illiteracy among the adult popu-

lation is about 88 per cent. No schools have been established in many of the village communes, hence education is still backward and the school attendance is comparatively small. Two universities are maintained, one at Jassy and one at Bucharest, the former having an attendance of 800 and the latter having an attendance of about 4,100 students. Secondary schools have been provided in many of the towns and cities, but the normal training of teachers is still greatly neglected.

INHABITANTS. The Rumanians call themselves *Romani* and are descendants from a colony of Romans established by Trajan. At present the language spoken is constituted of many dialects, but they may be classed generally with the Romanic tongues. The Greek population is 15,500; the Magyar, 50,000; the German, 85,000; the Bulgarian, 110,000; the Gypsy, 200,000; and the Jewish, 425,000. Religious worship is free, but Orthodox Greek is the state religion, to which the people generally belong. The Protestants number 27,000; the Mohammedans, 30,000; the Roman Catholics, 132,000; and the Hebrews, 300,000. Bucharest is the capital and the largest city. Other important cities include Jassy, Galatz, Braila, Craiova, and Ploësti. Population, 1906, 6,585,534.

HISTORY. The region now included in Rumania formed part of Dacia in ancient times. Trajan made it a province of Rome in 106 A. D., when extensive Roman colonies were established. It was overrun by the military hordes of barbarians, including the Goths, Huns, Bulgars, and Slavs, in the early centuries of our era, all leaving traces of their occupation on the people and architecture to the present time. The Bulgarian kingdom annexed it in the 9th century, but it was joined to the Eastern Roman Empire, in 1019, and soon after became a part of Turkey. Turkish occupation was disturbed at various times by insurrections and wars. With the beginning of hostilities between Russia and Turkey, in 1768, Turkish influence began to wane. This may be attributed to the fact that both the Rumanians and Russians belong largely to the Greek church, and Russia claimed a protectorate over its fellow Christians against Turkish atrocities committed in the Balkan region.

The Crimean War (q. v.) was followed by the Treaty of Paris, in 1856, which, while recognizing the suzerainty of Turkey, added a part of Bessarabia to the principalities of the Danube and made ample provision for maintaining the rights and privileges of the Balkan States. Moldavia and Wallachia were united under one ruler in 1858, and three years later a national union was formed under a prince. At the beginning

of the Russo-Turkish War, in 1877, Rumania permitted the free passage of Russian troops across its territory with the understanding that the scenes of hostilities were to be as much as possible outside the limits of the principality. This action at once caused Turkey to proclaim the Rumanians rebels, when they organized their military forces and with an army of 32,000 men under General Cernat assisted in the siege of Plevna.

Moldavia and Wallachia were provinces of Turkey for many years, but secured an independent government after the Russo-Turkish War. The Treaty of Berlin, in 1878, recognized the independence of the two united provinces and approved the annexation of Dobrudja, in return for which Bessarabia was ceded to Russia. Carlo I., the present king, was elected Lord of Rumania in 1866, but was proclaimed king in 1881.

RUMELIA (rōō-mē'li-à), or **Roumelia**, a region of Southern Europe, extending from the Black Sea to Albania and from the Balkan Mountains to the Aegean Sea. The name has been applied in different times to an area differing greatly in extent, owing to the fortunes of war, but it refers generally to the country between the Balkans and the Aegean Sea which corresponds to ancient Thrace and most of Macedonia. *Eastern Rumelia* long formed a part of Turkey, but, by the Treaty of Berlin, in 1878, its government under Turkey became autonomous and the following year it united with Bulgaria: of which it is now an integral part. See **Bulgaria**.

RUMINANTS (rū'mī-nānts), the name of a large group of grazing animals, distinguished in that they chew a cud. They were classed as *Ruminantia* by Cuvier, but are now regarded as a group of the cloven-hoofed, or even-toed, ungulates. Nearly all the animals of this group have a stomach composed of four distinct bags, or cavities, but in some it is divided imperfectly into four chambers, while in others there are only three cavities. When grass or other food is swallowed, it passes by the gullet into the largest cavity of the stomach, called the *paunch*, or *rumen*, where it is soaked with a fluid. The second pouch, which is connected with the gullet, receives the fluids direct, though in some species a part of the liquids enter into other cavities. A direct connection also exists between the gullet and the third pouch, which is lined with a membrane which has many deep folds and hard tubercles. The fourth cavity, called the *reed*, or *rennet*, is lined with a mucous membrane that secretes the gastric juice.

The food passes at the will of the animal into

the first or second cavity, but such foods as hay and grasses are deposited in the former, the paunch. When this is well filled and the animal is at rest, a portion is brought up and chewed slowly between the large molar teeth. This process, called *chewing the cud*, or *ruminating*, may occur when the animal is standing or laying down. After the food is chewed and thoroughly mixed with saliva, it is reswallowed and passes by the first two pouches into the third, whence it passes on into the fourth pouch and finally into the intestines. All the cloven-hoofed herbivorous animals, except the swine and hippopotamuses, are ruminants. They include the antelopes, camels, cattle, deer, giraffes, goats, musk ox, and sheep.

RUMP PARLIAMENT, the popular name given in English history to a remnant of the Long Parliament. The soldiers under Cromwell expelled three-fourths of the members of parliament on Dec. 6, 1648, these being known as the Pride's Purge, while the remaining sixty members constituted the Rump Parliament. This body coöperated with Cromwell in the trial and condemnation of Charles I. After resisting certain encroachments of the army, this body was dissolved, in 1653, but was restored during the protectorate of Richard Cromwell. It was again expelled in 1659, was restored in 1660, and finally dissolved by its own decree on March 16, 1660.

RUNES (rūnz), a system of writing used among the Germanic peoples at an early date, of which mention was first made in the 6th century A. D. It consisted of sixteen letters, but the number of characters was extended later by the Germans to 24 and afterward to 40. Many inscriptions in the runes have been found in various parts of Europe. In Sweden these inscriptions are chiefly on rock or stone monuments, of which many specimens have been found in the vicinity of Upsala. These inscriptions are in Icelandic with runic characters. In Denmark verses have been found engraved upon monuments, but in some localities they are on arms, amulets, wooden tablets, and instruments of various kinds. Runic manuscripts, including a collection of laws written in the 13th century, are preserved in the library of the University at Copenhagen. An Icelandic prayer that victory should crown the arms of Herold against the Swedish king Sigurd, in 735, was discovered on a rock in the southern part of Sweden. Writings of this character were found in some parts of England, especially in the regions formerly known as Mercia and Northumbria. Since magical influences were attributed to the runic writings, they were succeeded by other systems

through the influence of Christian missionaries, though a few Christian inscriptions in the runic characters have been discovered.

RUNNYMEDE (rūn'ni-mēd), or **Runnymede**, a narrow strip of meadow land on the bank of the Thames, in the northwestern part of the county of Surry, England. It is memorable as the place where King John, in 1215, was compelled by his barons to grant the privileges of the Magna Charta. This tract of land now contains the Egham race course, so named from the town near by.

RUPEE (rū-pē'), a silver coin of British India, the standard unit of exchange in that country. It was first coined in 1542, but the value and fineness varied somewhat in different periods and various portions of the country. The rupee is equal to sixteen *annas*, while 100,000 rupees equal a *lac*, and 100 lacs make a *crore*. Formerly the nominal value was about 50 cents, but the depreciation of silver causes it to fluctuate between 30 and 48 cents. The denominations coined are one, half, quarter, and eighth rupees.

RUPERT'S LAND, an extensive region of Canada, so named from Prince Rupert, who was one of the founders and first governor of the Hudson Bay Company. The region includes what is now Manitoba, Alberta, Saskatchewan, and a large part of Keewatin. Subsequently it was transferred to the Hudson Bay Company and in 1870 was admitted into the Dominion of Canada. See **Hudson's Bay Company**.

RUSH, the name of several plants belonging to the Sedge family. Most species are grasslike herbs with jointed stems. They are either leafless or bear flattened, knotted leaves and greenish or brownish flowers. The *common rush* has a perennial root and the stem is filled with a spongy pith. A species known as *black grass* is cut for hay early in the season. Many of these plants are valuable in the industries, since they furnish material for mats, thatching, twine, and chair bottoms. They grow in moist meadows and swampy places.

RUSSIA (rūsh'á), an extensive empire of Europe and Asia, embracing about one-sixth of the land area of the earth. It is about three times as large as the United States, exclusive of Alaska, and is exceeded in size only by Great Britain. The total area is 8,660,394 square miles, of which 2,095,616 square miles are in Europe. It embraces 56 per cent. of Europe and all of Northern Asia, extending from the Baltic Sea and the Gulf of Bothnia, in the West, to the Bering Sea and the Sea of Okhotsk in the East. Asiatic Russia comprises about 38 per cent. of Asia. The empire is bounded on the north by the Arctic Ocean; east by Bering Strait and the

Pacific Ocean; south by the Chinese Empire, Afghanistan, Persia, Turkey in Asia, and the Black Sea; and west by Rumania, Austria-Hungary, Germany, the Baltic Sea, the Gulf of Bothnia, Sweden, and Norway. The extreme length from east to west is about 7,000 miles, this being the distance from the border of Poland to the Sea of Okhotsk, and the width from north to south is 2,175 miles. Russia includes by far the largest region lying contiguous within a single government.

European Russia is divided into fifty provinces, but Russia in Europe includes, besides these, the Grand Duchy of Finland and the ten governments of Russian Poland. Several popular designations are used for convenience in describing particular regions of Russia in Europe. These embrace *South Russia*, along the northern shore of the Black Sea; *Little Russia*, immediately north of South Russia; *Great Russia*, extending through the center from Little Russia to the Arctic Ocean; *East Russia*, lying west of the Ural Mountains and the Ural River; *West Russia*, bordering on the Baltic Sea and Germany; and *White Russia*, embracing the northwestern part. Russia in Asia embraces Western Siberia, Eastern Siberia, Turkestan, Northern Caucasia, Transcaspia, Transcaucasia, Kirghiz Steppes, Amur, and the Maritime Provinces. Saint Petersburg is the capital of all the Russias and the largest city of the empire.

DESCRIPTION. Russia in Europe includes the vast region lying north of the Black Sea and the Caucasus Mountains and east of Sweden, Germany, Austria-Hungary, and Rumania. The surface consists chiefly of an immense plain, which is well watered by numerous rivers and many small streams. The Valdai Hills form the only elevated region of the interior. They are situated between Moscow and Saint Petersburg, forming the important interior watershed, though their average height is only 500 feet, and the most elevated peaks are about 1,200 feet above sea level. On the eastern boundary are ranges of the Ural Mountains, which separate Northern Europe from Asia. Between the Caspian and Black seas trend the Caucasus Mountains, which separate the valley of the Terek from that of the Kura, and on the southern shore of the Crimea are the Taurida Mountains. Mount Elbruz, 18,570 feet high, is the most elevated peak of the Caucasus Mountains and of Europe. The highest elevations of the Ural Mountains do not exceed 7,000 feet, and those of the Taurida are not over 4,000 feet.

The inland waters of Russia include a number of valuable lakes, all of which are in the northwestern part, embracing lakes Onega, Ladoga,

Sego, Bieloe, Saima, Ulea, and many others. The White Sea is the principal coast indentation from the Arctic and the gulfs of Finland and Riga, from the Baltic. In the southern part is the Sea of Azov, while the Black and Caspian seas, both on the southern border, are important for supplying navigation facilities. The principal inland waters in Asia, belonging to Russia, include the Aral Sea and the lakes of Balkash, Baikal, Issyk-kul, and Chany. Most of the drainage in Europe is toward the south. The Volga and Ural rivers flow into the Caspian Sea; the Don, into the Sea of Azov; and the Bug, Pruth, Dnieper, and Dniester, into the Black Sea. The Baltic Sea receives the waters of the Vistula, Niemen, Duna, Neva, and Narova and the Arctic receives those of the northern Dwina, Onega, Petchora, and Mezen. Asiatic Russia also has a large number of important rivers, many of which are partly frozen the greater portion of the year. Those flowing into the Arctic include the Lena, Indigirka, Yenisei, and Obi. The southeastern part is drained largely by the Amur and the southwestern part, into inland seas, chiefly by the Oxus (Amu) and the Syr-daria.

CLIMATE. The climate is distinctly continental, but it is greatly diversified on account of the immense extent of the empire. The winters are colder and the summers are hotter than in the same latitudes of the countries in Europe, but the annual temperature is somewhat higher in the West than in the East. This is due to the fact that the East has a higher elevation above sea level and is influenced noticeably by the Pacific Ocean. In the southern part the climate is favorable to the growth of sugar cane, the vine, and other fruits, but there is a gradual decrease in vegetable forms toward the north until the Arctic region is reached, where only slight traces of lichen and mosses prevail. Winds sweep across the country from the north and the south, owing to the absence of mountain barriers, and changes in temperature are quite sudden and violent.

At Saint Petersburg the mean temperature is 15° in January and 65° in July, but in the southern part, adjacent to the Caspian Sea, the summers are very hot, with extremes of 96° to 110°. Astrakhan and the country surrounding the Aral Sea have a very slight rainfall, ranging from four to ten inches per year, but it increases toward the northwest, being about twenty-two inches at Saint Petersburg. The rainfall in the entire country is given at twenty inches. Snow falls in all parts of Russia, but remains only a short time in the southern part, while the northern section has localities that are covered with

snow perpetually. In general the climate is healthful and bracing, well calculated to support a hardy and vigorous people.

FLORA AND FAUNA. Few regions of equal extent have a more fertile soil than is found in the Russian possessions, but the country has vast sandy tracts, morasses, and swamps. The greater part of the unproductive surface is in the vicinity of the Caspian and Aral seas, owing to the arid climate and the presence of large deserts or sandy wastes. Swamps of considerable extent abound north of Saint Petersburg, and unproductive regions stretch through the country between the Obi River and the Ural Mountains. However, a large part of both European and Asiatic Russia consists of a rich, black loam of great fertility. The forests are boundless and extend far toward the north, but the size of the trees gradually diminishes toward the Arctic seas, where only small shrubs are found in isolated tracts. Fully 40 per cent. of the country is still covered with timber, including the birch, larch, fir, alder, oak, hornbeam, maple, ash, and conifers.

In the northern section are many wild animals of large size, such as the polar bear, elk, and deer. Other animals include the wolf, lynx, wild boar, glutton, and wild fowl. The beaver is found in large numbers in the government of Minsk. Foxes, squirrels, partridges, and hazel hens are numerous in the central part. Cod and salmon are found in large numbers off the northwestern coast. Seal fishing is prolific in the Arctic. Herring, sturgeon, and other valuable fishes are taken in large numbers from the seas, lakes, and rivers. Bird life is well represented in the southern and central parts, but is very scant along the coasts of the Arctic.

MINING. Russia has deposits of practically all the minerals, and most of those which enter the important industries are found in large quantities. Mining has received attention for many centuries, but its extensive development is of comparatively recent date. Anthracite coal is mined near the Donets River. Extensive fields of bituminous coals are worked in Poland, Silesia, and many sections of Siberia. Though the annual output is 18,500,000 tons, it is scarcely sufficient to supply the demand for all purposes. Iron ore occurs in the Urals and in the central and southern parts of Russia, the annual yield being 3,500,000 tons. Copper is obtained chiefly in the Urals and the Caucasus, but productive fields are worked on a lesser scale from Finland to Poland. Russia produces more platinum than all the countries of the world combined, furnishing about 90 per cent. of the entire output. In the production of petroleum it holds a high

rank, the output of crude oil averaging about 80,500,000 barrels per year. It is obtained chiefly in the celebrated fields of Baku, in Transcaucasia, which rank among the greatest sources of mineral oil in the world. The larger supply of gold is obtained in the Ural Mountains and in Siberia, where auriferous veins are worked extensively. Peat bogs furnish fuel and are worked in the vicinity of Moscow and along the Baltic. Building stones and fire and brick clays are widely distributed. Other minerals include zinc, salt, mercury, jasper, lead, manganese, amethyst, and diamonds. Amber of fine quality is found on the Baltic.

AGRICULTURE. About four-fifths of the inhabitants are engaged in agricultural enterprises, although the tundras in the north and the steppes of the Caspian are not fitted for cultivation. Besides, western Russia has large regions of unproductive salt lands. However, large areas consist of black soil of great fertility, including some of the richest wheat land in the world. Primitive methods of farming are still in vogue, but modern machinery is coming slowly into use. It exceeds any other country in the world in the production of flax, hemp, and wheat, and produces about half the rye and two-thirds of the oats grown in Europe. In the production of barley it exceeds any other country of the Old World. The larger part of the wheat grown is confined to the southwestern section, while rye and barley are cultivated extensively in the north, though they thrive in all parts where farming is possible. Maize yields well in the southwestern section, where it is rotated by seasons with wheat and oats. Fruits are grown extensively in the southern and central parts, especially apricots, apples, plums, grapes, and strawberries. Large interests are vested along the border of Rumania and the southwest in silk culture and the mulberry tree. Rice is grown to a large extent in the southern part of Siberia and the Caucasus.

In stock raising Russia surpasses any other country of Europe. It has nearly half the horses of the continent and leads all countries in the number of cattle, goats, and sheep. In the number of swine it is exceeded only by Germany. The animals live in the open air the entire year on the steppes of the southwest, but in the central part they must be sheltered and fed from three to six months. While horses are bred with much care, other domestic animals are not of a high grade. Sheep culture is particularly abundant in the arid regions of the Caspian and Aral seas, where rainfall is insufficient to insure the maturity of crops, but is adequate for the growth of excellent pasturage. Vast interests

are vested in raising reindeer in the northern region, while the Tartars along the Caspian and the inhabitants of Turkestan engage extensively in rearing camels.

MANUFACTURES. It may be said that Peter the Great was the founder of the manufacturing industry of Russia, and since his time there has been a steady advance in the number of different products and the quantity produced. A high tariff is imposed by the government to protect home industries. The larger part of the factories are small and the establishments are located rather in rural than in urban districts. However, large plants have sprung up recently in the cities, which have grown rapidly in population on account of the impetus obtained by laborers coming from the country. Textiles rank as the most important products, both in the number of people employed and the value of the product. Next in value are metals, articles of food, lumber, leather, pottery, and paper. Marked attention is given to the manufacture of sugar from beets, but this industry is confined chiefly to the southern part. Silks and embroidery, pipe tobacco and cigars, chemicals, and steel and iron products are made in large quantities. The fisheries yield a large output for canning and curing, while preserved fruits and packed meats are produced in abundance. The larger manufacturing establishments are located in Lodz, Moscow, Saint Petersburg, and Warsaw.

TRANSPORTATION AND COMMERCE. Extensive means for transportation are available, including streams which are navigable for large steamers a distance of 14,250 miles and for small vessels fully 25,500 miles. Canal systems are maintained to unite the Baltic and the White Sea basins, the Baltic and the Caspian basins, and the Baltic and the Black Sea basins. Other navigable waters include the Gulf of Bothnia, the Aral Sea, Lake Baikal, the Sea of Japan, and the Sea of Okhotsk. During a short period in the summer it is possible to navigate the Kara Sea and the Arctic Ocean, but these waters are frozen or dangerous the greater part of the year. About 36,200 miles of railroads are in operation, of which 6,500 miles are in Asiatic Russia. About half of the railroads are owned by the national government and the remainder by provinces and private corporations. The Trans-Siberian Railway, extending from Saint Petersburg to Vladivostok, on the Sea of Japan, is the longest trunk line in the world. Another line extends eastward from the Caspian Sea, passing to the western border of the Chinese Empire. However, the railway mileage is less in proportion to area and population than that of other European nations. A considerable mileage of electric lines

has been constructed, especially in the larger cities and more populous sections.

The domestic trade has developed without intermission the last two decades, but it has been closely paralleled by that with foreign nations. Germany controls the larger part of both the export and import trade, largely for the reason that Russian business men use the German language very extensively. Other countries that have a considerable share include Great Britain, France, Austria-Hungary, Turkey, China, and the United States. The leading imports include manufactured goods, such as textiles and machinery; articles of food, including tea and coffee; and raw cotton and cotton goods. Cereals, flour, live stock, timber, petroleum, and linseed oil are the principal exports. Owing to an old and well-established custom, a large share of the trade is conducted at great fairs, where live stock, wool, and cereals are dealt in very extensively. The principal fairs are those at Poltava, Moscow, Kharkov, Irbit, and Nizhni-Novgorod. The last mentioned is the largest fair in the empire, but Siberian goods are sold principally at Irbit, in the government at Perm.

GOVERNMENT. Russia had an absolute government until 1905, before which year the country had neither a written constitution nor a representative legislative body. Nicholas II. issued a decree, as a result of the revolution of 1905, granting constitutional government. The chief executive holds office by heredity. He bears the title of Emperor and Autocrat of all the Russias, Czar of Poland, and Grand Prince of Finland. He is limited in his ruling by certain precedents, such as the decree of Emperor Paul, in 1796, concerning the succession to the throne, and that of Peter I., requiring the emperor and princes of the royal blood to be members of the Greek Orthodox Church. Four imperial councils are maintained, including the council of state, which has superintendence of legislation, finance, and civil and church administration; the ruling senate, which has executive and judicial functions; the holy synod, which controls matters ecclesiastical; and the committee of ministers, consisting of twelve ministers, such as of public instruction, of war, of internal affairs, of foreign affairs, etc.

Since 1905 a part of the legislative functions is exercised by the *duma*, or national assembly, which has a membership of about 500. It is the body that represents the people in national legislation and its members are elected by the *zemstvos*, as the assemblies of the districts are called. Bills that are passed by the *duma* and sanctioned by the council of state, or council of the empire, become law when approved by the

emperor. The provinces or governments of Russia are supervised by national police, but each has certain executive and legislative functions. These include the power to manage its municipal, educational, and other general affairs, suffrage being invested for that purpose in the male citizen. Revenues are raised chiefly by issuing trade licenses, by a protective tariff system, and by the control of a large portion of the railway, telegraph, and canal business. The government derives an income from the manufacture of tobacco and sugar, which industries are controlled by it. Internal revenue on spirituous liquors and a tax on land are likewise among the resources.

RELIGION AND EDUCATION. The Greek Orthodox Church is the national church, which has a membership in Russia estimated at 80,300,000, but all sects are granted freedom of religious worship. Other denominations are represented by about 8,250,000 Roman Catholics, 3,225,000 Jews, 3,150,000 Protestants, chiefly Lutherans, 2,650,000 Mohammedans, and 60,000 Armenians. No general system of education has been established, but public schools are maintained in the provinces. Since 1888 the national authorities have been promoting the establishment of common schools, for which purpose grants have been made. Illiteracy is placed at 50 per cent. in the army, which is about the ratio of the people generally. Excellent secondary schools and academies are supported in many of the cities, and twelve noted universities are maintained. Less than half the children of school age receive public training. The nation is divided into fifteen educational districts, all under the direction of the minister of public instruction, and the common schools are supported jointly by local and general taxation. It has many normal and technical schools. A large per cent. of the higher institutions are under the direction of the Holy Synod of the Greek Catholic Church. In 1909 the number of university students was reported at 20,248.

INHABITANTS. Russia has increased rapidly in population the past fifty years, although it has a large number of races. About three-fourths of the inhabitants are true Russians, who constitute a distinct Slavic group of the Caucasian stock. They are divided into Great Russians or Muscovites, Little Russians or Malo-Russians, and White Russians, who number respectively about sixty million, eighteen million, and six million. The population classed as non-Russian includes Germans, Finns, Lapps, Mongols, Jews, Poles, Iranians, Lithuanians, and Tartars. Poland is populated largely by Poles; the Baltic Provinces, by Germans; the north-

western part, by Lapps and Finns; the Caucasus, by Iranians and Georgians; Central Siberia, by Kalmucks and Buriat Mongols; the Baltic region, by Letts and by Lithuanians; and parts of Poland and western Russia, by Jews.

Saint Petersburg, the capital and largest city, is situated in the western part, on the Gulf of Finland. Thirty-five cities have a population of more than 50,000 and twelve exceed 100,000. The chief cities in Russia are Saint Petersburg, Moscow, Warsaw, Odessa, Lodz, Riga, and Kieff, and those in Asia include Baku, Tiflis, and Tashkend. Among the principal ports are Onega, Archangel, Helsingfors, Reval, Cronstadt, Saint Petersburg, Libau, Riga, Odessa, Kertch, Astrakhan, Tanganrod, and Baku. The latest official census gives the total population of the empire at 130,240,679, of which 105,437,895 were in European Russia. Population, 1909, 147,350,000.

LANGUAGE. The Russian language is an important member of the Slavonian family of the Aryan, or Indo-European, tongues and is the successor of the Old Slavic. It was modified remarkably by the Mongolian conquest, in 1224, and by Polish elements being introduced from the West. Modern Russian may be said to date from the time of Peter the Great, but since then many German, Dutch, and French words have been added and the grammatical construction has become modified. The language contains few conjunctions. It is peculiar for the slight grammatical connection between the sentences, but has a remarkable capacity for forming derivatives and compounds. Its alphabet has 37 letters, which form combinations and sounds difficult for foreign students to learn. The language is spoken in its purest and most grammatical form in Great Russia, of which Moscow is the literary and intellectual center. About forty different languages are spoken in the empire. The chief of these, besides Russian, are the German, Lithuanian, Finian, Turanian, and Persian.

LITERATURE. Russian literature may be said to date from the introduction of Christianity by Vladimir in 980. It was in his reign that the first ballads in Russian were written. At that time knowledge began to be disseminated by the monasteries, at which were published numerous treatises on beliefs of the church and a number of historical works. The first writing of note in the Russian is a book of the Gospels that appeared in 1056, but the military contests with the Tartars and Mongols long retarded material literary advancement. In 1560 Makarius published his "Lives of the Saints," the first writing of note after the expulsion of



NICHOLAS II.
CZAR OF RUSSIA.

NICHOLAS II.

The Czar of Russia, Nicholas II., was born in Saint Petersburg on May 18, 1868. He is the son of Alexander III., whom he succeeded on the throne in 1894. The same year he married Princess Alix of Hesse-Darmstadt.



the Mongols and Tartars, and in 1596 appeared Zizania's "Slavic Grammar." Alexei Michailovitch authorized his prime minister to collect Russian laws, which were printed in 1644, and soon after an academy was founded at Moscow. Peter the Great established the Russian language for universal use in public business and communication and founded many schools, among them the famous Saint Petersburg Academy. The writers of the early part of the 18th century were influenced greatly by German and French writers, the most eminent writers of this period being Lomonosov (1711-1765). Gerhardt F. Müller, a German writer, established the first literary journal at Saint Petersburg, in 1755, and Novikov (1744-1818) published a journal called *The Painter*, through which medium he greatly enlarged the book trade.

Literature became popular in all parts of Russia in the reign of Alexander I., who was a liberal patron of progressive education and greatly increased the number of universities. Since that time other czars have done likewise, and Russian literature in all departments has been enriched by the contributions of native writers as well as by liberal translations from other languages. The most eminent poets of Russia include Alexander Pushkin, Michael Lermontoff, and Baron Delvig; the novelists embrace Feodor Michailovitch, Prince Odojevski, and Count Leo Tolstoi; the dramatists include Nikolaus Polevoi and Nestor Kukolnik; and the historians embrace Michailovoski Danileveski, Vasili Berg, and Professor Pogodin. Russian philosophy was drawn principally from German and English sources, but the country has some eminent writers in jurisprudence and philosophy, the former including Simonof and the latter Sokolof. Among the recent publications are "Russian Officials in Past and Present Times," by E. Karnovich, in 1898; "Emperor Alexander I.," by N. K. Schilder; "Dominion of Muscovite Emperors," by Alexei Michailovitch; and "Russian Books," by S. Vengerov, in 1899. Russia possesses some of the largest libraries in Europe, among which the vast collections of books at Saint Petersburg and Moscow are the most noteworthy.

HISTORY. The early history of Russia is wrapped in myth and tradition. Nothing definite is known prior to the 9th century of the Christian era. No country in the world has so great a variety of nationalities, but the chief one is the Slavonic. It is thought that eastern Slavs were the ancestors of the Russians. They settled on the northern shore of the Black Sea in the early part of the Christian era, but, being

harassed continually by neighboring tribes, they invited Rurik, a Scandinavian, to come and reign over them. It appears that he and two brothers established a government in 862, in the vicinity of Kieff. The name *Russes* appears to have originated and came to be applied to them from Norman warriors, who served in the army of the Byzantine emperors, from the circumstance that they passed through the country. Olga succeeded to the government in 945 and in 955 she embraced the Christian religion under the patriarch of Constantinople, but in 957 abdicated in favor of her son, Sviatoslaf. The government passed to Vladimir in 980. In the 35 years of his reign he fully established Christianity as the religion, founded cities and schools, and built a number of canals and other improvements. At that time Kieff rose as a city quite equal in importance to Constantinople. His reign is counted the heroic effort of Russian history.

Vladimir was succeeded by his sons, who established a number of principalities, making it possible for the Mongols and Tartars to invade the country under Genghis Khan in 1224 and inflict material damage to its prosperity. Soon after the Russian princes became tributary to the Khan, placing Russia in an unfortunate condition, for the reason that its civilization and industries became retarded, while the peoples in the region of Poland, Livonia, and Lithuania made rapid advancement in both. This condition caused the Poles and Teutonic Knights to make invasions from the west, but both Kieff and Novgorod continued to gain in commercial importance and power. Novgorod, being an influential city, was the capital a large part of that period and was an important member of the Hanseatic League. The capital was removed to Moscow in 1328 by Ivan I., whence originated the term *Muscovite*. In 1481 the Tartars were expelled by Ivan III., surnamed The Great, who ruled from 1462 to 1505. He married the niece of the last Byzantine emperor, conquered Novgorod, and otherwise extended Russian dominion. Ivan IV., surnamed *The Terrible*, succeeded to the throne in 1533 and reigned 51 years. His armies were everywhere victorious and, after consolidating Russian territory, he became absolute ruler with the title of *czar*. He began the conquest of Siberia, which was finally annexed to Russia in 1699. The present Czar of Russia descended from the house of Romanoff, which came into power in 1613, and since then the empire has grown continuously in strength and commercial importance.

Alexis Michailovitch succeeded to the Russian

throne in 1645, reigning until 1676. His reign was made famous by conquering Little Russia and White Russia from the Poles. In the meantime the Cossacks of Ukraine were compelled to recognize Russian supremacy, but the country was disturbed by contentions because of changes made in the liturgy of the Greek Church. However, Russia's greatness may be said to date from the accession to power of Peter the Great in 1689. His reign of 36 years was at first shared by his half-brother, Ivan, but he soon obtained absolute sway, made Saint Petersburg the new capital, and gave Russia a European rather than a Mongolian tendency. His achievements include the final conquest of Siberia. He annexed Livonia, Ingria, Esthonia, and other territory taken from Sweden by the Peace of Nystadt, in 1721, and constructed canals, encouraged agriculture, and instituted manufacturing and mining. He was succeeded by his widow, Catharine I., in 1725, but she died after a reign of two years and was succeeded by Peter II. The latter was succeeded in 1730 by Queen Anna, the daughter of Ivan, and in her reign the German party became prominent at court. Nothing of importance may be said to have occurred until the accession of Catharine II., in 1762, who reigned until 1796. Within that period Russia conducted successful wars against Sweden, Turkey, Persia, and Poland. The contests resulted in material extensions toward the east, south, and west. This accession of territory was due chiefly to the three partitions of Poland, in 1772, 1793, and 1795, by which nearly two-thirds of that kingdom became incorporated with Russia, and the annexation of the Crimea in 1783.

Freedom of worship gained a wide foothold under Paul I. (1796-1801), but he greatly retarded the progress of learning by excluding foreign publications and establishing a strict press censorship. In the reign of Alexander I. (1801-1825) many important events tended to enlarge Russian influence. These include the annexation of Finland from Sweden, in 1809; the annexation of Bessarabia from Turkey in 1812; the defeat of Napoleon at Moscow, in 1812; the annexation of part of the Caucasus, in 1813; and the final absorption of Poland, in 1815. Nicholas I. (1825-1855) annexed additional territory from Turkey and Persia and began the Crimean War. Alexander II. (1855-1881) concluded the Crimean War by the Peace of Paris, in 1856, by which Russia lost territory on the north side of the Danube and navigation advantages in the Black Sea, but in 1868 it destroyed every vestige of Polish independence.

In the meantime Russia annexed all of

Turkestan, and in 1877 declared war against Turkey. This war was terminated by the Treaty of Berlin, in 1878, by which Russia regained its advantages on the Black Sea and secured Bessarabia. At the same time the Balkan States became organized as governments separate from Turkey. Alexander was assassinated through the influence of Nihilists in 1881 and Alexander III. succeeded him. The important events of his reign include the famine of 1890-91 and the expulsion of many Jews. It witnessed the beginning of the great Trans-Siberian Railroad in 1892. On the death of Alexander, in 1894, he was succeeded by Nicholas II., a young man of 27 years, who soon after married Princess Alix of Hesse. He celebrated his marriage with much pomp and made it the occasion of pardoning 20,000 state prisoners. His reign has been one of remarkable prosperity in commerce and internal improvements. The country became involved in war with Japan in 1904, owing to Russian advances in the Far East, especially in Manchuria. A feeling had become deeply rooted among the common classes of Russians that the nation was invincible. Being defeated in the formidable contest against Japan, the poorer classes rose in a widespread revolution. In the meantime the czar was compelled to grant a constitution and a representative form of government. The legislative assembly, known as the *Duma*, held its first meeting in 1906, but, owing to contentions and extraordinary demands upon the government, it was soon dissolved and other dumas were subsequently elected and dissolved in a similar manner. However, a more satisfactory conclusion was reached in 1908, although the administration still remains largely in boards and councils. See **Russo-Japanese War.**

RUSSIAN REVOLUTION, the movement for political and industrial reform in Russia. This movement may be said to have resulted directly from the disastrous war with Japan, which was not looked upon with favor by a very large part of the Russian people, but the causes may be traced to legislation and conditions dating back several hundred years. Every loss in the war was followed by increased agitation for change, while inefficiency and corruption caused many to lose faith in the czar and the autocratic party. Reformers took advantage of the inability of the government to sustain its sway of absolute reign, and the working classes resorted to strikes with the view of obtaining better wages and improving the conditions of living. Racial and religious riots were frequent, nihilists and anarchists sought to inaugurate a reign of terror, and in many

sections the impression prevailed that the empire was on the point of crumbling into pieces. The movement was not concerted, and cannot be said to have begun at any particular time or place. Many were concerned in a line of action for popular liberty; but they did not act in harmony with each other, though the central object was designed to bring about the emancipation of the masses from autocratic rule.

The first bold stroke was made July 28, 1904, when Von Plehve, minister of the interior, was assassinated. In November of the same year representatives of the *zemstvos*, meaning the district or provincial assemblies, held a meeting at Saint Petersburg and adopted a memorial asking the czar for a more liberal administration and a representative government. This demand was denied in a ukase of the czar, and, when a body of 100,000 people headed by Father Gapon assembled before the winter palace, Jan. 22, 1905, to present a petition to the czar, they were fired upon by troops and about 2,000 unarmed men, women, and children were killed and about 5,000 were wounded. This massacre had the effect of spreading discontent. Riots followed at Moscow, Odessa, Sebastopol, and in the cities of Poland and the Caucasus. Practically all the educated classes took sides with a movement for liberal reforms and a representative government. In February Duke Sergius, uncle of the czar, was assassinated at Moscow. Peasants rose in revolt, Jews were massacred, much of the railroad traffic and telegraph communication was suspended, a contingent of the army and navy mutinied, and the administration of the government became greatly disorganized. Finally, on Oct. 30, the czar signed a decree declaring constitutional government.

During the revolutionary movement revolts occurred in the Baltic provinces and Poland, and an organized movement for autonomy occurred in Finland. The Baltic provinces are populated by Germans and Lithuanians, and these people united and established a republic with Rega as its capital. However, the government dispatched 12,000 Cossacks to the revolting provinces and the czar proclaimed an imperial manifesto, announcing local self-government in that section. Like concessions were made to the Poles and in December a manifesto was issued granting autonomy in Finland. An extraordinary diet convened at Helsingfors Dec. 20 to consider proposals for the budget of 1906-07, provisional taxes, and a loan for railway construction; a bill providing by a new fundamental law a parliament for Finland on the basis of universal suffrage with the establishment of the respon-

sibility of the local authorities to the nation's deputies; bills granting liberty of the press, of meeting, and of unions.

The successful termination of the revolution in Russia may be attributed in a large measure to the statesmanship of M. Witte, who served as premier and formed a cabinet pledged to support reformatory measures. The manifesto granting constitutional government is as follows:

We, Nicholas II., by grace of God Emperor and Autocrat of all the Russias, Grand Duke of Finland, etc., declare to all our faithful subjects that the troubles and agitation in our capitals and numerous other places fill our hearts with excessive pain and sorrow.

The happiness of the Russian sovereign is indissolubly bound up with the happiness of our people and the sorrow of our people is the sorrow of the sovereign.

From the present disorders may arise great national disruption. They menace the integrity and unity of our empire.

The supreme duty imposed upon us by our sovereign office requires us to efface ourself and to use all the force and reason at our command to hasten in securing the unity and coördination of the power of the central government and to assure the success of measures for pacification in all circles of public life, which are essential to the well-being of our people.

We, therefore, direct our government to carry out our inflexible will in the following manner:

First—To extend to the population the immutable foundation of civic liberty, based on the real inviolability of person, freedom of conscience, speech, union, and association.

Second—Without suspending the already ordered elections to the state duma, to invite to participation in the duma, so far as the limited time before the convocation of the duma will permit, those classes of the population now completely deprived of electoral rights, leaving the ultimate development of the principle of the electoral right in general to the newly established legislative order of things.

Third—To establish as an unchangeable rule that no law shall be enforced without the approval of the state duma and that it shall be possible for the elected of the people to exercise real participation in the supervision of the legality of the acts of the authorities appointed by us.

We appeal to all faithful sons of Russia to remember their duty toward the fatherland, to aid in terminating these unprecedented troubles and to apply their forces, in coöperation with us, to the restoration of calm and peace upon our natal soil.

RUSSIAN THISTLE, a plant common to the central part of the United States, found chiefly in the arid region lying between the Mississippi and the Rocky Mountains. Locally it is known as *saltwort* and *tumbleweed*. It thrives best in comparatively dry seasons, has a central stock with many branches, and bears small flowers of a purple color. At maturity the roots loosen and the dry plant is rolled or tumbled by the wind, causing its small seeds to scatter broadcast. In some of the states, especially in South Dakota and Nebraska, it is quite troublesome as a weed in cornfields.

RUSSO-JAPANESE WAR, the armed contest between the military forces of Russia and Japan in 1904-05. War was considered inevitable between the two contending parties several years before activities began. Japan commenced to prepare for the contest as early as 1895, when Russia prevented Japan from acquiring Port Arthur and the Liao-Tung peninsula as a consideration of peace following the Chinese-Japanese War. Subsequently Russia obtained possession of Port Arthur by lease and acquired control of the Chinese Eastern railway. In 1902 it was agreed by Russia that she would evacuate certain ports in Manchuria and aid in reestablishing Chinese authority in the province as well as to restore the railways to the Chinese. Russia failed to carry out these promises and a sharp diplomatic correspondence between the two nations began in the fall of 1903, Japan insisting upon the evacuation of Manchuria and the establishment of certain Japanese claims in Corea. Diplomatic relations were severed early in 1904 and Japan, without waiting for a formal declaration of war, sent warships and troops to Port Arthur and to Chemulpo in Corea.

The first hostilities occurred Feb. 8, 1904, when the Japanese made a torpedo attack upon the Russian battleships and cruisers lying outside the harbor of Port Arthur. This important place was defended by General Stoessel with an army of 45,000 men and the Russian Asiatic fleet. The Russians had planted submarine mines in the harbor of Port Arthur and the Japanese also placed mines, chiefly in the course necessary to be taken by the Russian vessels in emerging from the harbor, one of which was struck April 13 by the Russian battleship *Petropavlovsk*, causing a loss of 525 men and officers and including the artist Vereshtchagin and Admiral Makaroff. Besides suffering several sanguinary naval attacks, Port Arthur was besieged by a Japanese army of 100,000 under General Nogi. The fort capitulated Jan. 2, 1905.

Important battles were fought on the Yalu

early in May, 1904, where General Kuroki with an army of 54,000 defeated 21,000 Russians under General Sassulitch and compelled a retreat in the direction of Liaoyang. Gradually the Russians were forced to fall back and abandon important strategic points, until the final engagement at Mukden, which began Feb. 24 and continued until March 12, 1905, and in which Marshall Oyama with 450,000 men defeated 410,000 Russians under General Kuropatkin. The Russians had ordered the Baltic fleet to Vladivostock in October, 1904, commanded by Admiral Rojestvensky. This great fleet reached the straits of Corea early in the spring, where it was attacked and completely defeated by the Japanese under Admiral Togo. Soon after this naval engagement steps were taken to agree upon terms of peace. President Roosevelt exercised the friendly offices of the United States and a peace conference was appointed at Portsmouth, N. H., the first session being held Aug. 9. During the war Russia had 870,000 men in the field and Japan had not less than 1,200,000. The Russian losses are given at 312,412 and the Japanese, at 210,000.

The following is a compilation of losses in the principal land battles of both armies:

BATTLE.	RUSSIAN.	JAPANESE.	TOTAL.
Yalu.....	3,210	1,045	4,255
Nanshan.....	3,280	4,250	7,530
Vafangow.....	4,890	1,300	6,190
Liaoyang.....	21,875	18,250	40,125
Sha River.....	67,190	16,328	83,518
Port Arthur.....	15,000	46,500	61,500
Heikoutai.....	12,600	8,940	21,540
Mukden.....	100,000	75,000	175,000

The peace treaty concluding the war was signed at Portsmouth, N. H., Sept. 5, 1905, and was ratified by Russia and Japan in October. In the map the southern half of Saghalien is shown shaded, which portion now belongs to Japan, and Corea is also under Japanese control. Russia has relinquished to China all of Manchuria, which is shown shaded horizontally. The Liao-Tung peninsula, including Dalny and Port Arthur, was transferred to Japan. Following is the full text of the treaty:

The Emperor of Japan on one part and the Emperor of All the Russias on the other part, animated by a desire to restore the blessings of peace to their countries, have resolved to conclude a treaty of peace, and have for this purpose named their plenipotentiaries,—that is to say, for his Majesty the Emperor of Japan, Baron Komura Jutarō Jusami, Grand Cordon of the Imperial Order of the Rising Sun, his minister of foreign affairs, and his Excellency Takahira Kogoro, Imperial Order of the Sacred Treasure, his minister to the United States, and

for his Majesty the Emperor of All the Russias, his Excellency Serge Witte, his secretary of state and president of the Committee of Ministers of the Empire of Russia, and his Excellency Baron Roman Rosen, Master of the Imperial Court of Russia, his majesty's ambassador to the United States, who, after having exchanged their full powers, which were found to be in good and due form, have concluded the following articles:

Article I.—There shall henceforth be peace and amity between their Majesties the Emperor

and the Emperor of All the Russias, his Excellency Serge Witte, his secretary of state and president of the Committee of Ministers of the Empire of Russia, and his Excellency Baron Roman Rosen, Master of the Imperial Court of Russia, his majesty's ambassador to the United States, who, after having exchanged their full powers, which were found to be in good and due form, have concluded the following articles:

ment, acknowledging that Japan possesses in Korea paramount political, military, and economical interests, engage neither to obstruct nor interfere with measures for guidance, protection, and control which the imperial government of Japan may find necessary to take in Korea. It is understood that Russian subjects in Korea shall be treated in exactly the same manner as the subjects and citizens of other foreign powers,—that is to say, they shall be placed on the same footing as the subjects and citizens of the most favored nation. It is also agreed, in order to avoid causes of misunderstanding, that the two high contracting parties will abstain on the Russian-Korean frontier from taking any military measure which may menace the security of Russian or Korean territory.

Article III.—Japan and Russia mutually engage:

First.—To evacuate completely and simultaneously Manchuria, except the territory affected by the lease of the Liao-Tung Peninsula, in conformity with the provisions of the additional Article I, annexed to this treaty, and,

Second.—To restore entirely and completely to the exclusive administration of China all the portions of Manchuria now in occupation or under the control of the Japanese or Russian troops, with the exception of the territory above mentioned.

The imperial government of Russia declare that they have not in Manchuria any territorial advantages or preferential or exclusive concessions in the impairment of Chinese sovereignty not inconsistent with the principle of equal opportunity.

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SEAT OF THE RUSSO-JAPANESE WAR.

of Japan and the Emperor of All the Russias and between their respective states and subjects.

Article II.—The Imperial Russian Govern-

ment, acknowledging that Japan possesses in Korea paramount political, military, and economical interests, engage neither to obstruct nor interfere with measures for guidance, protection, and control which the imperial government of Japan may find necessary to take in Korea. It is understood that Russian subjects in Korea shall be treated in exactly the same manner as the subjects and citizens of other foreign powers,—that is to say, they shall be placed on the same footing as the subjects and citizens of the most favored nation. It is also agreed, in order to avoid causes of misunderstanding, that the two high contracting parties will abstain on the Russian-Korean frontier from taking any military measure which may menace the security of Russian or Korean territory.

Article IV.—Japan and Russia reciprocally engage not to obstruct any general measures common to all countries which China may take for the development of the commerce or industry of Manchuria.

Article V.—The Imperial Russian Government transfers and assigns to the imperial government of Japan, with the consent of the government of China, the lease of Port Arthur, Talién, and the adjacent territory and territorial waters, and all rights, privileges, and concessions connected with or forming part of such lease, and they also transfer and assign to the imperial government of Japan all public works and properties in the territory affected by the above-mentioned lease. The two contracting parties mutually engage to obtain the consent of the Chinese Government mentioned in the foregoing stipulation. The imperial government of Japan on their part undertake that the proprietary rights of Russian subjects in the territory above referred to shall be perfectly respected.

Article VI.—The Imperial Russian Government engage to transfer and assign to the imperial government of Japan without compensation and with the consent of the Chinese Government the railway between Chang-Chung-Fu and Kuan-Chang-Tsu and Port Arthur, and all the branches, together with all the rights, privileges, and properties appertaining thereto in that region, as well as all the coal mines in said region belonging to or worked for the benefit of the railway. The two high contracting parties mutually engage to obtain the consent of the government of China mentioned in the foregoing stipulation.

Article VII.—Japan and Russia engage to exploit their respective railways in Manchuria exclusively for commercial and industrial purposes, and in nowise for strategic purposes. It is understood that this restriction does not apply to the railway in the territory affected by the lease of the Liao-Tung Peninsula.

Article VIII.—The imperial governments of Japan and Russia, with the view to promote and facilitate intercourse and traffic, will, as soon as possible, conclude a separate convention for the regulation of their connecting railway services in Manchuria.

Article IX.—The Imperial Russian Government cede to the imperial government of Japan in perpetuity and full sovereignty the southern portion of the island of Saghalien, and all the islands adjacent thereto, and the public works and properties thereon. The fiftieth degree of north latitude is adopted as the northern boundary of the ceded territory. The exact alignment of such territory shall be determined in

accordance with the provisions of the additional Article XI. annexed to this treaty. Japan and Russia mutually agree not to construct in their respective possessions on the island of Saghalien or the adjacent islands, any fortifications or other similar military works. They also respectively engage not to take any military measures which may impede the free navigation of the Strait of La Perouse and the Strait of Tartary.

Article X.—It is reserved to Russian subjects, inhabitant of the territory ceded to Japan, to sell their real property, and retire to their country, but if they prefer to remain in the ceded territory they will be maintained and protected in the full exercise of their industries and rights of property, on condition of submitting to the Japanese laws and jurisdiction. Japan shall have full liberty to withdraw the right of residence in or to deport from such territory any inhabitants who labor under political or administrative disability. She engages, however, that the proprietary rights of such inhabitants shall be fully respected.

Article XI.—Russia engages to arrange with Japan for granting to Japanese subjects rights of fishery along the coasts of the Russian possessions in the Japan, Okhotsk, and Bering seas. It is agreed that the foregoing engagement shall not affect rights already belonging to Russian or foreign subjects in those regions.

Article XII.—The treaty of commerce and navigation between Japan and Russia having been annulled by the war, the imperial governments of Japan and Russia engage to adopt as a basis for their commercial relations pending the conclusion of a new treaty of commerce and navigation the basis of the treaty which was in force previous to the present war, the system of reciprocal treatment on the footing of the most favored nation, in which are included import and export duties, customs formalities, transit and tonnage dues, and the admission and treatment of agents, subjects, and vessels of one country in the territories of the other.

Article XIII.—So soon as possible after the present treaty comes in force all prisoners of war shall be reciprocally restored. The imperial governments of Japan and Russia shall each appoint a special commissioner to take charge of the prisoners. All prisoners in the hands of one government shall be delivered to and received by the commissioner of the other government or by his duly authorized representative in such convenient numbers and such convenient ports of the delivering state as such delivering state shall notify in advance to the commissioner of the receiving state. The governments of Japan and Russia shall present each

other as soon as possible after the delivery of the prisoners is completed with a statement of the direct expenditures respectively incurred by them for the care and maintenance of the prisoners from the date of capture or surrender and up to the time of death or delivery. Russia engages to repay to Japan as soon as possible after the exchange of statement as above provided the difference between the actual amount so expended by Japan and the actual amount similarly disbursed by Russia.

Article XIV.—The present treaty shall be ratified by their Majesties the Emperor of Japan and the Emperor of All the Russias. Such ratification shall be with as little delay as possible, and in any case no later than fifty days from the date of the signature of the treaty, to be announced to the imperial governments of Japan and Russia respectively through the French minister at Tokio and the ambassador of the United States at Saint Petersburg, and from the date of the later of such announcements this treaty shall in all its parts come into full force. The formal exchange of ratifications shall take place at Washington as soon as possible.

Article XV.—The present treaty shall be signed in duplicate in both the English and French languages. The texts are in absolute conformity, but in case of a discrepancy in the interpretation the French text shall prevail upon the details of the evacuation in conformity with the above principles, and shall take by common accord the measures necessary to carry out the evacuation as soon as possible, and in any case no later than the period of eighteen months.

In conformity with the provisions of Articles III. and IX. of the treaty of peace between Japan and Russia of this date, the undersigned plenipotentiaries have concluded the following additional articles:

Sub-Article to Article III.—The imperial governments of Japan and Russia mutually engage to commence the withdrawal of their military forces from the territory of Manchuria simultaneously and immediately after the treaty of peace comes into operation, and within a period of eighteen months after that date the armies of the two countries shall be completely withdrawn from Manchuria, except from the leased territory of the Liao-Tung Peninsula. The forces of the two countries occupying the front positions shall first be withdrawn.

The high contracting parties reserve to themselves the right to maintain guards to protect their respective railway lines in Manchuria. The number of such guards shall not exceed fifteen per kilometer, and within that maximum number the commanders of the Japanese and Rus-

sian armies shall by common accord fix the number of such guards to be employed as small as possible, while having in view the actual requirements.

The commanders of the Japanese and Russian forces in Manchuria shall agree upon the details of the evacuation in conformity with the above principles, and shall take by common accord the measures necessary to carry out the evacuation so soon as possible, and in any case no no later than the period of eighteen months.

Sub-Article to Article IX.—So soon as possible after the present treaty comes into force a commission of delimitation composed of an equal number of members is to be appointed, respectively, by the two high contracting parties, which shall on the spot mark in a permanent manner the exact boundary between the Japanese and Russian possessions on the island of Saghalien. The commission shall be bound so far as topographical considerations permit to follow the fiftieth parallel of north latitude as the boundary line, and in case any deflections from that line at any points are found to be necessary compensation will be made by correlative deflections at other points. It shall also be the duty of said commission to prepare a list and a description of the adjacent islands included in the cession, and, finally, the commission shall prepare and sign maps showing the boundaries of the ceded territory. The work of the commission shall be subject to the approval of the high contracting parties.

RUSSO-TURKESTAN, or **Russian Turkestan**, a large region of Central Asia, comprising the western section of what is generally known as Turkestan. The area is about 411,500 square miles. It is included in the semi-arid belt of the continent. Chains of mountains extend through the southern part, where the country has an Alpine-like aspect, but the western and northern parts are comparatively flat and sandy. Large stretches of desert make up the northern part, but oases and fertile valleys intersperse many of the ridges in the interior. The climate is continental, with dry and hot summers and cold winters. Stock raising is the principal industry. Large interests are vested in agriculture, but irrigation is depended on to a large extent. Rice, wheat, oats, millet, fruit, and vegetables are grown in abundance. The domestic animals consist chiefly of sheep, camels, horses, and goats. Rugs, carpets, clothing, and implements are the principal manufactures. The trade is largely with Russia and is carried principally by caravans and the Trans-Caspian Railroad. Taskand and Namangan are noted as trading centers. See **Turkestan**.

RUSSO-TURKISH WAR, a conflict between Russia and Turkey, due to a movement on the part of Russia to secure an extension of territory to the Mediterranean. Atrocities committed in Bulgaria and other Balkan states caused Russia to declare war against the Ottoman Empire in April, 1877. A treaty had been concluded between the former country and Rumania, in which Russia was made the protector of the Christians in the Balkan Peninsula. A Russian army crossed the Danube at Galatz the latter part of June and another force crossed into Bulgaria about the same time at Simnitza. The Turks under Osman Pasha had taken a strong position at Plevna, which was attacked by the Russians under General Krüdiner, but the latter were driven back with great slaughter. Suleiman Pasha defeated a Russian army under General Gerko, who was advancing upon Adrianople, and Mehemet Ali operated on the Lom River against Crown Prince Alexander.

The center of interest was lodged at Plevna, where Osman Pasha was defeated in an attempt to escape and was compelled to surrender. Several decisive engagements took place later at the Shipka Pass, near Philippopolis, and in Armenia. The Russians began to march upon Constantinople in January, 1878, which compelled the Turks to agree to an armistice. The two nations concluded the Treaty of San Stefano, by which Russia gained large advantages. This caused several nations to fear that an extension of Muscovite power would give Russia precedence, hence the Congress of Berlin was assembled to revise the treaty and undertake to settle the Eastern Question. See **Berlin, Congress of**.

RUST, a disease that affects cereals and many species of grasses. It is due to several parasitic fungi, whose growth is favored by excessive summer heat, by fields illy ventilated, and by excessively rich manures. Wheat rust is probably the best known. It has a complex life history, consisting at first of small fungi of one cell, but later passing through various stages and merging into a form of colored dust. Wheat rust is red or black, that infesting the tobacco plant is brown, and the fungous growth attacking plants of the mustard family is white.

RUST, the coating caused by oxidation on iron and steel, especially under exposure to air and moisture. The term is applied in an extended sense to a film or oxide formed on any metal by corrosion. Bright iron does not rust in an atmosphere which is comparatively dry, but, when it has once formed on the surface, it continues to deepen rapidly, for the

reason that condensation of the liquid contained in the air takes effect more easily on a rust-covered surface than on bright metal. Steel and cast iron are less easily affected by rust than wrought iron, because the latter is nearly pure iron and contains less carbon. The surface may be protected against rusting by japanning and galvanizing, or by coating it with plumbago, oil paint, or zinc. Farmers find it profitable to coat the bright surface of their plows and other implements with varnish, oil, or paint as soon as the season is over to prevent them from rusting. Rust may be removed from the surface by rubbing with an oiled rag or emery paper.

RUTH, Book of, a book of the Old Testament, which is generally placed immediately after the Book of Judges. It gives an account of Ruth, a Moabitess, who was married to Chilion, son of the Hebrews Elimelech and Naomi. After the death of Elimelech and Chilion, Ruth accompanied Naomi to Bethlehem, where she went into the field as a gleaner, but later married her kinsman, the aged Boaz. She became the mother of Obed, and through him the great-grandmother of David and the ancestress of Jesus Christ. The Book of Ruth is canonical and comprises a beautiful idyllic composition.

RUTHENIANS (rū-thē'nĭ-ănz), or **Russiaks**, the name of a Slavic people who inhabit large parts of Galicia, Bukowina, and Hungary. This race of people is allied to the Russians in language and physical features. They are mostly peasants, belong to the Orthodox Greek Church, and are pro-Russian in sympathies. As a political force they have been a disturbing element in Austria-Hungary, where they number about 3,500,000, of whom about 300,000 are in Bukowina and 400,000 in Hungary. These people are sometimes called *Red Russians* and *Little Russians*.

RUTHERFORD (rūth'ēr-fērd), a borough of New Jersey, in Bergen County, eight miles northwest of Jersey City. It is between the Passaic and the Hackensack rivers, on the Erie Railway, and is the residence of many New York business men. The manufactures include clothing, mirrors, cotton and linen goods, and machinery. Electric lighting, sewerage, and a public library are maintained. Population, 1905, 5,218; in 1910, 7,045.

RUTLAND (rūt'land), a city in Vermont, county seat of Rutland County, sixty miles south of Burlington, on the Burlington and Rutland, the Delaware and Hudson, and other railroads. It is finely located on Otter Creek, near Killington Peak of the Green Mountains, and has a large trade in produce and merchan-

dise. The noteworthy buildings include the county courthouse, the public library, the house of correction, the Memorial Hall, the opera house, the high school, and the Federal building. It has systems of waterworks and sanitary sewerage, brick and macadam pavements, and electric street railways. Among the manufactures are sugar evaporators, scales, lumber products, monuments, dairy supplies, buttons, hardware, and machinery. The vicinity was settled in 1770. Rutland was one of the State capitals from 1784 to 1804. Population, 1910, 13,546.

RYE, an important cereal plant. It is native to the Levant, but is cultivated extensively in temperate climates, especially in Western Europe. Rye is nearly allied to wheat, but its nutritive qualities are less, being about as 64 to 71. It is hardier than wheat and is adapted to poorer and lighter soils. In most sections of North America it may be pastured in the early stages of its growth, but this is not advisable in dry regions. It does not grow as far north as barley, but yields well in sections that are too

cold for wheat. In most cases it is sown in the fall and ripens early in the summer, somewhat earlier than wheat. The species are not numerous. Those cultivated most extensively are known as *spring* and *winter* rye, depending whether they are sown in the spring or in autumn.

Rye forms the bread-stuff of a large number of people, especially in



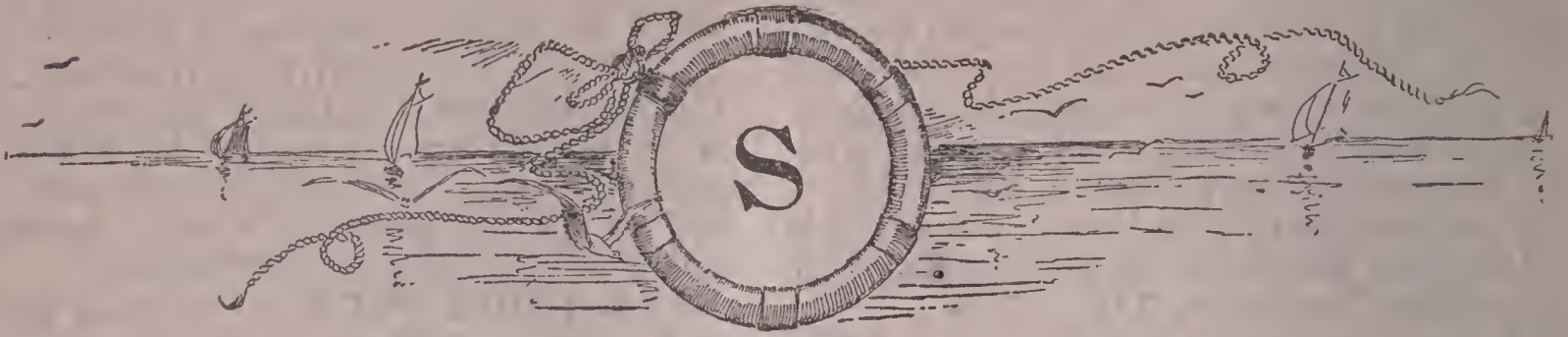
RYE.

Russia, Germany, Holland, Sweden, Norway, and Great Britain. It is used extensively in making

whisky, especially *Hollands*, and the straw is valuable for stuffing mattresses and collars and for use in making brick, baskets, and hats. Both winter and spring rye is grown in the United States, where the annual production is 26,500,000 bushels. New York, Pennsylvania, Wisconsin, Iowa, Illinois, Missouri, Michigan, Minnesota, New Jersey and Kansas are among the leading rye-producing states. Ontario produces more than half of the rye grown in Canada, having an annual yield of about 1,250,000 bushels.

RYE-HOUSE PLOT, a conspiracy planned in England in 1683, by the Whig party, with the view of assassinating Charles II. and the Duke of York, afterwards James II. The scheme was to be executed near a farm called Rye-house as the two returned from the Newmarket races, but they passed the vicinity of the intended attack earlier than was expected, thus frustrating the scheme. Soon after the plot was discovered and Lords Essex, William Russell, Algernon Sidney, and others were placed under arrest. The first mentioned committed suicide in the Tower and both Russell and Sidney were beheaded, though neither of the three were in any way connected with the plot. However, Lieutenant Colonel Walcot, one of the real contrivers of the plot, was apprehended and brought to the block for treason.

RYSWICK (rĭz'wĭk), or **Rijswijk**, a village of Holland, two miles southeast of The Hague. It is celebrated from the peace of Ryswick, which was concluded here on Sept. 20, 1697. This treaty ended the war waged by the allied armies of Germany, Holland, Spain, and England against Louis XIV. of France on account of the claim of the latter to the French throne, which was recognized by the treaty. France, Spain, Holland, and England signed the treaty on Sept. 20, and Germany sanctioned it on Oct. 30.



S

SABBATH

S, the fifteenth consonant and nineteenth letter of the English alphabet, forming a sibilant and representing a hissing sound. The letter is derived from the original Indo-Germanic, but came to us from the Latin through the Greek *sigma*. It is made by placing the front of the tongue against the roof of the mouth above the front teeth, an opening being left just behind the tip, and then emitting the vocalized breath. S has two sounds, known as *sharp* or *hard*, and *soft* or *sonant*. The former is represented in *this*, *thus*, *sin* and the latter represents the sound of *z*, as in *muse*, *music*, *wise*. It is silent in some words, as in *viscount*, *aisle*, and *island*.

SAALE (zä'le), a river of Germany, which rises in the Fichtelgebirge, in Bavaria, and flows into the Elbe above Magdeburg. The length is 226 miles. It is navigable for 103 miles, having been improved by dredging and the construction of several locks.

SAAR (zär), a river in the southern part of Germany, rising in the Vosges Mountains, near the boundary of Alsace. It flows northwest through Lorraine and the Rhine Province, discharging into the Moselle a short distance above Treves. The Saar is 152 miles long. It is navigable to Saarbrücken, a distance of 54 miles. The construction of a system of locks has made it possible for steamers to ascend to Saargemünd.

SAARBRÜCKEN (zär-brük'en), a city of Germany, in the Prussian Rhine Province, on the Saar River, 48 miles northeast of Metz. It is surrounded by a coal-mining region. The features include an old castle, the city hall, the gymnasium, electric street railways, and a statue of Bismarck. Among the manufactures are leather, hardware, tin, Berlin blue, tapestry, machinery, and linen fabrics. The municipality has extensive systems of waterworks and sanitary sewerage. Saarbrücken was made a part of Prussia in 1815. It was captured by the

French in 1870, but they were compelled to abandon it after a few days. Population, 1905, 26,944.

SABBATH (săb'bath), the seventh day of the week, appointed by the Mosaic law for cessation from labor and the worship of God. It was set apart to commemorate the event that God created the world in six days and rested on the seventh. Keeping holy the Sabbath is enjoined by the Fourth Commandment in Exodus, because of God's having rested after the creation, and in Deuteronomy its observance is demanded because of the deliverance of the Hebrews from Egyptian bondage. Any mention of the Sabbath in the New Testament implies the seventh day of the week, but the Christian fathers in general drew a distinction between the Sabbath and the Sunday as early as the first three centuries. They regarded the Jewish Sabbath as obsolete and looked upon Sunday as the divinely instituted Lord's Day, joyous in its character, making memorable the resurrection of Christ. The Council of Laodicea, in 366, made it plain that Christians are to observe Sunday.

The name *Sabbath* is used by most Christians to designate the Lord's day, or Sunday, though Jewish writings and those of Adventists and other Christian sects making use of the name imply that Saturday, or the Sabbath, is meant. The Sabbath was observed with great rigidity in the time of Christ. At that time Jews were not allowed to go from their city a distance greater than 2,000 cubits, about a mile, which came to be called a *Sabbath-day's journey*. Thus, every seventh day was one of rest, while every seventh year was known as the *Sabbatical year*, in which the lands were not cultivated and the crops and fruits produced became the property of all in common. When the Pharisees denounced Christ as a Sabbath breaker because he rendered service

to mankind, he replied: "The Sabbath was made for man, and not man for the Sabbath: therefore the Son of Man is Lord also of the Sabbath."

SABINE (sà-bēn'), a river of the United States, which rises in northeastern Texas and, after a course of 500 miles toward the southeast and south, flows into the Gulf of Mexico. It enters the gulf through Sabine Pass, a bay about eighteen miles long and eight miles wide. The Sabine River forms the principal part of the boundary between Texas and Louisiana. It is a shallow stream and is navigable only for small vessels.

SABINES (sā'bīnz), or **Sabini**, a people of ancient Italy, who occupied a large part of northeastern and middle Italy. Amiternum was their capital and occupied a place near the present town of Aquila. The Sabines were closely allied to the Latins. They were an important nation before Rome was founded and it is thought that they occupied the Quirinal Hill, while Romulus built Rome on the Palatine Hill. The Sabines ceased to exist as an independent nation in 290 B. C., when the Romans incorporated them as a part of Rome. History contains many evidences that the population of Rome included an important Sabine element and that its influences became intermixed with those of Latin origin, both in religious rites and civil institutions. No remains of the Sabine language in the form of inscriptions have been discovered, but coins issued in Rome at an early period give evidence that the Sabine language had a notable influence upon that of the Romans.

SABLE, a flesh-eating mammal of the weasel family. It is about the size of the pine marten, to which it is closely related. The color is brownish in summer, but turns much darker in winter, in which condition the fur is highly esteemed as an article of commerce. The value of a single skin ranges from \$25 to \$75, depending on the fineness and color. In summer the skin is less valuable, owing to the fact that it is characterized more or less with white spots on the head and grayish markings on the neck. The sable is native to the northern part of Europe and Asia. It lives principally in trees, hunting by night and lying concealed during the day. The *pekan* of North America is frequently called the *Hudson Bay sable* and its skin is sometimes used to imitate that of the true *Russian sable*.

SABLE ISLAND, an island in the Atlantic, situated 110 miles east of Nova Scotia. It has a low and sandy surface, is about 25 miles long, and has a breadth of one to five miles. The

island is under the government of Nova Scotia. It has two lighthouses and a hospital for shipwrecked persons. Many disastrous accidents at sea occur in the vicinity. Valuable fisheries prevail. Vegetation consists chiefly of grasses, peas, potatoes, strawberries, and cranberries.

SAC, or **Sauk**. See **Sacs and Foxes**.

SACCHARIN (sāk'kā-rīn), a white crystalline compound derived from coal tar. It was discovered at Johns Hopkins University by Ira Remsen and Charles Fahlberg in 1879. Saccharin is soluble in hot water, ether, and alcohol, and melts at 220°. It is 300 times sweeter than cane sugar, one grain being perceptible in 10,000 grains of distilled water. Manufacturers of confectionery use it to a considerable extent, especially in Germany, and it is also employed in brewing. It is recommended in some diseases, as diabetes, though it is not considered a food. The name *saccharin* in an extended sense is applied to any substance having the quality of sugar, such as honey, cane sugar, glucose, and other saccharin compounds.

SACKETT'S HARBOR (sāk'ets), a village of New York, in Jefferson County, on Black River Bay, eight miles east of Lake Ontario. It is situated at the mouth of the Black River, has a good natural harbor, and is a port of entry. Communication is furnished by steamers and by the New York Central Railroad. The features include the Federal military post, the Madison Barracks, the high school, and Fort Topkins Park. In the War of 1812 it was important as a port and for the building of the frigates *Superior* and *Madison*. The British made two attacks upon the place, but they were defeated with a loss of 150 men. Population, 1905, 1,398.

SACO (sə'kō), a river of New England, which rises in the White Mountains of New Hampshire and flows toward the southeast through Maine. The main branch passes through the noted Crawford Notch of the White Mountains. A number of falls and cataracts in its course afford valuable water power. The falls include one of 42 feet at Saco and one of 72 feet at Hiram. The entire length is 160 miles, but it is navigable only to Saco, which is the head of tide water and of navigation by large vessels.

SACO, a city of Maine, in York County, on the Saco River, twenty miles southwest of Portland, on the Boston and Maine Railroad. The river is crossed within the city by four bridges and supplies water power for industrial purposes. The noteworthy features include the Dyer Library, the Thornton Academy, the York Institute Library, the high school, and Pepperel

Park. Among the manufactures are cotton and woolen goods, boots and shoes, lumber products, and machinery. Old Orchard Beach is a popular summer resort, about three miles from Saco. Saco was settled in 1631 and was first incorporated as Pepperelboro, but was chartered under its present name in 1867. Population, 1900, 6,122; in 1910, 6,583.

SACRAMENT (săk'ra-mənt), the name of certain religious rites in the Christian Church. The term was used by the early writers to denote any mysterious thing or doctrine, but later it became restricted to particular rites, which are believed by some churches to impart to Christians who use them an invisible grace. The Greek, the Armenian, and the Roman Catholic churches hold to the seven sacraments of baptism, confirmation, the eucharist, penance, extreme unction, orders, and marriage. Protestants generally believe only in two sacraments, those of baptism and the Lord's supper, on the ground that the New Testament mentions only these two as having been instituted by Christ. Luther and Melancthon accepted these and inclined toward adding penance as a sacrament. While the Friends reject the doctrine of the sacraments, the Mennonites and Dunkers coordinate washing of the feet as an obligatory ordinance, which they administer with baptism and the Lord's supper.

SACRAMENTO (săk-rä-měn'tō), the largest river in California, which has its source in the northeastern part of the State, where it is called the Pitt River for some distance. The general upper course is toward the southwest, but at Redding it assumes a southerly course. After receiving from the east the Feather River and joining the San Joaquin, it flows into the Pacific Ocean through San Pablo and San Francisco bays. The entire length is 600 miles, including the Pitt River, and about one-half is navigable for small boats, but steamers of large size ascend as far as Sacramento, about 50 miles.

SACRAMENTO, the capital of California, county seat of Sacramento County, 90 miles northeast of San Francisco. It is finely located on the Sacramento River, which is spanned by a bridge, and has transportation facilities by the Southern Pacific and the Central Pacific railways. The streets are regularly platted, crossing each other at right angles, and many of them are paved and lighted with gas and electricity. In the central part of the city is a fine public park, which contains the State capitol, completed in 1869 at a cost of \$2,500,000. Within the park are beautiful flower beds, spacious walks, and many rare species of shrubs

and trees. Other buildings of note include the county courthouse, the post office, the city hall, the Crocker Art Gallery, and several fine bank and office buildings.

Sacramento has a well-organized system of public schools. It is the seat of the Howe's Academy, the Saint Joseph's Academy, and the Christian Brothers' College. The public library contains 30,500 volumes, while the State library has 113,500 volumes. Among the benevolent and charitable institutions are the Protestant Orphan Asylum, the Southern Pacific Hospital, the Marguerite Home for Aged Women, and the City Dispensary. The Roman Catholic cathedral is a fine ecclesiastical structure. Fairs are held annually under the State Agricultural Society, which maintains fine grounds and buildings. It has extensive systems of sanitary sewerage and public waterworks.

The city is located in a fertile farming and fruit-growing region, hence has a large trade in produce and merchandise. The manufactures include flour, saddlery, spirituous liquors, furniture, carriages and wagons, and machinery. The shops of the Southern Pacific Railway employ a large number of workmen and machinists. Communication within the city and to many interurban points is facilitated by electric railways.

The first settlement was made in 1839, when Captain J. A. Sutter built a small fort and named it New Helvetia. Miners and prospectors began to reach the place in 1848, when the name was changed to Sacramento. Floods caused much damage in 1850 and in 1853, but levees have been constructed and the land has been raised to avert such dangers. In 1854 it became the State capital and it was chartered as a city in 1863. Its rapid growth dates from 1854, when the first railroad was completed into the city. Population, 1910, 44,696.

SACRIFICE (săk'rī-fīz), an offering to God, either as a thanksgiving or an atonement. The practice of offering sacrifices has prevailed from remote antiquity and it is not certain how it originated. Some writers contend that it was instituted by God, while others think that it originated in the desire of man to approach the Deity. Some classes look upon sacrifices as a compensation to the gods, hence they contend that their efficacy depends more or less upon the value of the offering, or upon the exertion required by the individual to attain and offer the sacrifice. The offering of a thing of value, as gold or silver, was not looked upon as being of greater efficacy than a blood offering, such as a slaughtered animal, since the latter represented both value and human exertion.

Peace offerings consisted usually of one or more animals, certain parts of which were burnt upon the altar, while the remainder was given to the priest to be eaten by him and his family. Others consisted of those known as *sin offerings*, which included sacrifices of various kinds for the remittance of sins. Among the Jews it was customary to offer the Passover lamb in memory of the deliverance from Egypt. The book of *Leviticus* details the custom of offering sacrifices among the Hebrews. However, this practice extended to the Greeks, Romans, Brahmans, Mexicans, and practically to all primitive and ancient peoples. In many countries it was customary to offer human sacrifices, but in most instances the blood sacrifices were confined to the offer of animals.

SACS AND FOXES, the names of two tribes of American Indians which are closely associated in history. They are of the Algonquin family. The Sacs settled near Green Bay, Wis., on account of being pressed westward by the Iroquois, where they were joined subsequently by the Foxes. Both tribes were courageous as warriors and were noted as enemies of the French. They assisted the English in most of their wars. In 1712 they made an attack upon Detroit, but were compelled to retreat to Lake Saint Clair, where they met defeat. Later they served under Pontiac and during the Revolution supported the English. The Rock River Sacs aided Great Britain in 1812 and the Foxes aided the English in attacking Sandusky.

The Sacs ceded their land in 1816 and became wholly identified with the Foxes, who ceded lands in 1824 and in 1830. In 1832 they fought under Blackhawk to recover a part of their lands, but gave up more of their territory in a treaty with General Scott at the close of the Blackhawk War. Later they removed to central Iowa, and in 1842 most of them were removed to the Osage Reservation, now Oklahoma. A party of 325 Sacs and Foxes purchased land at Tama, Iowa, in 1857, which they still occupy and manage with marked industry and intelligence. Settlements of Sacs and Foxes are also in Kansas, Nebraska, and Oklahoma. The two tribes number about 1,000, many of whom are among the most industrious and successful of their race.

SADDLERY (săd'dlēr-ÿ), the general name applied to saddles and harnesses, such as are offered for sale in a saddler's shop. Saddles were in common use among the Egyptians, but they were a part of the draught harness of the animal that bore the load, instead of being a seat upon the back for the rider. The ancients used a form of saddle or box for the back of

the camel, which served both for riding and to contain merchandise and other commodities. Saddles were first padded, but trees came into use in Rome about the 4th century A. D., and stirrups began to be used in the 7th century. Sidesaddles date from the 12th century and are used largely by women.

Both saddles and harnesses have differed very materially under a variety of circumstances and in different countries. Among the principal parts of a saddle are the *tree*, the *seat*, the *pommel*, the *skirts*, the *stirrups*, and the *girth*. Among the essentials of a modern harness are the *bridle*, either with or without blinders; the *collar*, which fits about the neck and shoulders; the *hames*, which fit to the collar; the *tugs*, forming the attachment between the hames and the load; and the *saddle*, which holds the lines, tugs, and reins in place. Harnesses are either single or double, depending whether they are to be used for a single horse or a team.

SADDUCEES (săd'û-sēz), the name of one of the chief Jewish parties or sects, the other being the *Pharisees*. They rose among the Jews in the 2d century before Christ, taking their name from Zadok, a priest who declared in favor of Solomon. It is certain that they did not become a party as early as the time of Zadok, but it is thought that the early representatives were his descendants. All of them admired his fidelity to the theocratic government and, like all other Jews, admitted that the Mosaic law was given at Sinai by Jehovah in person. The Sadducees rejected the belief that an oral law of Moses had come from God, and would accept nothing beyond the written word, hence they came to hold three particular doctrines.

The principal doctrines of the Sadducees include the belief that all the law of God was given in a written form to Moses, that there is no resurrection of the dead with attendant rewards and punishments in the future world, and that there are neither angels nor spirits. Less numerous than the Pharisees, they included the more wealthy and aristocratic, and at one time almost monopolized the more honored places in the priesthood and the highest dignities. There was a marked decrease in their number in the 1st century, but a revival of their views took place later, and their position is now represented by the Karaites. Most of the information regarding the Sadducees is drawn from Josephus and the New Testament.

SADOWA (să'dō-vä), a village in Bohemia, on the Bistritz River, near Königgrätz. It is important as the scene of a decisive battle on July 3, 1866, in the Austro-Prussian War. The

Austrian army of 220,000 was commanded by General Benedek and the Prussian of 240,000, by King William I. The terrific battle raged from 8 A. M. to 4 P. M., resulting in the defeat of the Austrians with a loss of 21,000 men and 22,000 prisoners, while the Prussians lost only 9,000. This battle is sometimes called Königgrätz, since the village of Sadowa is about eight miles distant.

SAFE, an iron or iron and steel receptacle for protecting valuables against burglars and fire. Documents and possessions of value were protected in ancient times by placing them in iron-bound oaken chests and in the charter rooms of old mansions, but these have given way to fire- and burglar-proof safes of modern construction. The first patent on a fireproof safe was issued in 1801. Subsequently they were greatly improved, both in size and in the style of manufacture, and they are now in almost universal use among business men and others in civilized countries. Safes are commonly made with double-plated sides, the space between being filled with a nonconductor of heat, such as fire clay and chalk, or plaster of Paris and alum. Some manufacturers pack a number of small tubes filled with an alkaline solution in the space between the two parts, these being hermetically sealed, and in case the safe becomes overheated the tubes burst and aid in saving the contents by saturating them.

To be of service for all purposes, a safe must be heavy enough to be proof against being carried away, while the lock and the material used in its construction must contain the elements necessary to prevent burglars from forcing an entrance to secure the contents. The most secure safes have keyless time locks, which are so constructed that the owner may set a mechanical contrivance in the form of a clock, thereby making it impossible to open the safe at any other time than that intended by the person setting the time lock. Electrical arrangements are provided in some cases to give signals in case there is an unlawful interference, and these are attached to the safes in such a manner that they may not be easily seen by intruders. Experience has demonstrated that it is much easier to render a safe fireproof than to make it proof against burglars. Safes are made of any size to meet the needs of those wanting small or large accommodations in the way of space to receive deposits.

Safe-deposit companies are corporations that receive and keep money, stocks, jewelry, bullion, and other valuable property for depositors. This is an American enterprise, the first company being chartered in New York in 1861, but now

there are safe-deposit companies in all the large cities of the world. These companies provide strong, fireproof vaults, which they construct of steel and iron plates welded together, and surround them with strong masonry, thus making them absolutely proof against thieves and fire. Tiers of safes and deposit boxes of all sizes are placed in the interior, making it possible to accommodate patrons with the size and kind of storeroom wanted. The vaults are guarded by armed watchmen both day and night, and a careful record is kept of each depositor. A person renting a safe or box is described minutely in a record book. He receives a private password and is supplied with the only key or keys that fit the lock of the box or safe rented, each being supplied with a different lock. Safe-deposit companies have been the means of saving many thousand dollars' worth of valuable papers and property in cases of fire, and in supplying protection for the valuables of residents and travelers.

SAFETY LAMP, a device for giving light in mines. It is constructed so the flame does not cause an explosion in cases where fire damp prevails. Marsh gas is often freed in many coal mines by cutting into seams and, when mixed with a quantity of air, it assumes a highly explosive form. Besides the danger incident to the explosion, there is further danger from choke damp after the explosion has occurred, for the reason that an explosion always renders a large bulk of air unfit to support life. Sir Humphry Davy, in 1816, invented the first safety lamp, but it has been materially improved upon within recent years. The Davy lamp depends upon the principle that flame does not pass through fine network of wire or gauze and that light does. It is constructed of a cistern to hold the oil, and the wick, issuing from a tube at the top, is covered and fully surrounded by wire gauze. The wires are usually not over one-fiftieth of an inch in diameter, and the apertures must not exceed one-twenty-second of a square inch. When constructed on that plan, the air passes through the apertures, even when charged with fire damp.

An improvement on the Davy lamp consists of a glass cylinder placed inside the wire gauze, thereby guarding against air currents and insuring a more uniform light. There is a perceptible increase in the size of the flame when the lighted lamp comes in contact with the atmosphere mixed with fire damp, and the miner is thereby warned that danger is at hand. Reasonable safety is insured as long as the lamp is in good condition, but it has been found that it is not an absolute protection against danger. The

newer safety lamps are self-extinguishing when brought into an explosive mixture of air and fire damp. However, the most secure devices of this kind yet devised are the miners' lamps which employ electricity.

SAFETY VALVE, a valve, usually circular in form, which is used on steam boilers to furnish protection against taxing them beyond their strength. Such a valve is kept in place either by a spring or by a weight, and is located at the side or in the top of a steam boiler. Most stationary engines have one valve of this kind, while locomotives are supplied with two. The valve is gauged at a certain point, depending upon the strength of the boiler or the pressure desired, and the steam escapes whenever the pressure exceeds the weight with which the valve is held. After the valve has been forced upward and the pressure on the boiler is relieved, it assumes its former place. The standard for determining the size of the safety valve is the grate surface, which should not exceed two square feet of surface in the boiler to one square inch in the safety valve. Care should be exercised so the valve is not fastened or loaded too heavily as compared to the strength of the boiler.

SAFFLOWER (săf'flou-ēr), an annual plant of the *Compositae* family. It has an erect cylindrical stem from one to two feet high, spiny



1. SAFFLOWER. 2. SAFFRON.

leaves, and compact heads of flowers of a deep orange color. The stem is inclined to branch considerably. It is native to India, but has been naturalized in Egypt and the southern part of Europe, where it is cultivated extensively. The safflower is used principally as a dye and for making rouge. The seed yields an oil used extensively by the Asiatics as a laxative in medicine and as a lamp oil. Dyes obtained from this

plant are derived from the leaves, which are picked by hand in dry weather and dried in a kiln. Both red and yellow coloring materials are obtained, but they are not valued highly for dyeing. However, the safflower is of economic value in making rouge, which receives its color from the coloring properties of this plant.

SAFFRON (săf'frün), an autumn flowering species of crocus. It is often called the *autumnal crocus* to distinguish it from a species called spring crocus, which it closely resembles. The flowers of the plant yield the saffron of the market, which is now used largely for coloring confectionery, liquors, medicine, and foodstuffs. It requires about 4,000 flowers to make an ounce of saffron. Formerly saffron was used as a dye material, for perfume, and as a medicine, but it has gone out of use for those purposes, except in parts of Asia. The saffron plant is cultivated extensively for its flowers in France, Spain, Italy, and the western part of Asia.

SAGA (să'gä), meaning *a tale*, the name used to designate a form of literature common to the ancient Scandinavians, particularly those of Iceland. The sagas include many volumes of writings that date from the 12th and the three following centuries. They embrace history, poetry, legends, and writings that blend fiction with authentic narratives. Prior to the 12th century they passed from generation to generation without being committed to writing, hence the mythical and fabulous circumstances connected with many of them are accounted for. The word has the same meaning as the German word *Sage*, and German writers have applied the term to the legendary and traditional literature of their own and other countries. Thus, the *Firthjofs-Saga* is attributed to the Norsemen, the *Ingvars-Saga* to the Swedes, the *Eymunds-Saga* to the Russians, and the *Knytlunga-Saga* to the Danes.

SAGE, an extensive genus of plants of the mint family, which are widely distributed in warm regions, embracing 450 species. Most of these plants are perennials of a shrubby nature. They have greenish gray leaves, yield bluish flowers, and grow to a height of about two feet. The *garden sage*, native to the southeastern part of Europe, is the best known. It is used extensively for flavoring meat, especially for dressing in poultry, and the leaves are employed in making a slightly stimulating tea. The *apple-bearing sage* is native to Crete, where the gallnuts are used in flavoring confectionery.

SAGE GROUSE, the name of a species of grouse native to North America, so named from its habit of feeding upon the sagebrush. The legs and feet are feathered to the toes, the tail

is elongated, and the feathers have a brownish-yellow color. The male is larger than the female and has naked air sacs on each side of the neck. An average cock is about 30 inches long, while the hen ranges from 20 to 24 inches in length. The flesh is highly esteemed as food, but it is frequently tainted by a bitter flavor from the sagebrush, especially if the bird is not drawn as soon as shot. The sage grouse is found on the plains from British America to the northern part of Mexico, but is most abundant in the sagebrush region.

SAGHALIEN (sä-kä-lyēn'), or **Sakhalin**, an island off the eastern coast of Asia, located north of Yezo and separated from the mainland by the Gulf of Tartary. It lies in the Sea of Okhotsk and between it and Yezo is the Strait of Perouse. In the northern part is the Gulf of Amur; east of it, the Bay of Patience; and south of it, the Gulf of Aniva. It is 670 miles long and from 15 to 80 miles wide. The area is 27,500 square miles. The surface is mountainous, with elevation ranging from 3,500 to 5,000 feet, but the coasts are generally fertile. Owing to its extent from north to south, it has a considerable difference in climate. Cold currents from the Sea of Okhotsk affect it noticeably, hence the eastern coast is somewhat colder than the western, which is influenced by the warm currents of the Sea of Japan. The winters are very severe, but the summers are warm. A snowfall of seven feet during the winter is not uncommon and rains are correspondingly abundant.

Saghalien has valuable forests, consisting chiefly of coniferous trees. Fishing is an important occupation, both in the streams and off the coast. Agriculture, coal mining, and lumbering are the principal occupations. The inhabitants consist largely of Ainu stock, but a considerable number are Russian. Fishing is largely in the hands of the Japanese and Chinese. The island was discovered in the 17th century by Gerrit de Bries, a Dutch navigator. It was claimed by Russia as a part of Siberia and became a Russian penal colony in 1869. However, Japan claimed the southern part of the island until 1875, when it was released in exchange for a part of the Kurile Islands. By the Treaty of Portsmouth, which terminated the Russo-Japanese War, in 1905, the southern half was ceded to Japan. The total population of the island is 29,875.

SAGINAW (säg'ī-nā), a city in Michigan, county seat of Saginaw County, on the Saginaw River, 98 miles northwest of Detroit. It is on the Grand Trunk, the Père Marquette, and the Michigan Central railroads. The largest ves-

sels that ply on the lake are able to reach the harbor. Four railroad and five public bridges span the river. The area of the city is about fifteen square miles. It has brick and asphalt pavements, electric street railways, public waterworks, and Hoyt and Riverside parks. The noteworthy buildings include the county courthouse, the Hoyt Library, the Germania Institute, the Federal post office, the Arbiter Hall, the Masonic Temple, the Saint Mary's Hospital, the Saint Vincent's Orphan Home, and the Saginaw Valley Medical College.

Saginaw is important as an industrial and wholesaling center. Among the manufactures are lumber products, flour, furniture, sailing vessels, salt, tobacco products, engines, and machinery. In the vicinity are extensive deposits of salt and bituminous coal, large quantities of which are mined. The town was platted in 1836 and the first charter was granted in 1831. Formerly there were two cities, known as Saginaw and East Saginaw, but they were united by an act of the Legislature in 1890. Population, 1904, 46,610; in 1910, 50,510.

SAGINAW BAY, an inlet from Lake Huron into the State of Michigan, forming the largest and most important bay of the Southern Peninsula. It is sixty miles long and thirty miles wide. Saginaw Bay has several fine harbors and valuable fisheries. It receives the water from the Saginaw River, a stream formed by the Shiawassee and Flint rivers. The Saginaw River is 30 miles long and is navigable for 24 miles by steamers drawing ten feet of water. Its principal tributaries are the Chippewa and Cass rivers.

SAGITTARIUS (säj-īt-tā'rī-ūs), the sign of the zodiac into which the sun enters about Nov. 22. It is so named from the archer and is the ninth of the twelve zodiacal signs. The name is also applied to a constellation, the *Sagittarius*, which corresponds to the sign Capricornus.

SAGO (sä'gō), an article of food obtained from the inner portion of the bark of several species of palm trees. The sago-bearing palms thrive in the East and West Indies, the Bahamas, and New Guinea. They attain a height of from 20 to 35 feet and a diameter of about 20 inches. The trees are cut down at maturity to secure the medullary or inner part, which weighs from 150 to 700 pounds. It is reduced to powder and by a process of treatment is formed into grains about the size of coriander seeds, or is ground into a whitish powder called *sago meal*. The principal constituents are protein, 9 per cent.; water, 12 per cent.; and nitrogen-free extract (mostly starch), 78 per cent. In the countries where sago is produced it is used ex-

tensively as a staple food. Elsewhere it is eaten mainly as a delicate article of diet. It is also employed as a starch for textile fabrics, in adul-



SAGO PALM AND FRUIT.

terating arrowroot, and as an essential ingredient for making soluble cocoas.

SAGUENAY (săg-ĕ-nă'), a river of Canada, in the province of Quebec. It is the outlet of Lake Saint John, but has its source mainly in the Chamouchouan River and other streams that rise 150 miles northwest of the lake. Below the lake it has a length of 130 miles, flowing into the Saint Lawrence about 115 miles below Quebec. Many rapids are in the upper course and a large part is characterized by fine scenery and precipitous cliffs. The town of Tadousac, at the mouth, is noted as a summer resort. It is navigable to Ha Ha Bay for the largest steamers.

SAGUNTUM, or **Saguntus**, anciently an important city of Spain, near the Ebro, on the Canales River, three miles from the Mediterranean. The city was founded by Greek traders, under whose influence it rose to wealth and commercial importance, but is noted in history more particularly for the siege and battle fought here by the Carthaginians under Hannibal in 219 B.C. The siege extended over a period of about one year against an army of 150,000 men. After being sorely pressed by a famine, the city made a most heroic effort to repel the besieging army, but its army was utterly routed and the city was destroyed. This battle was the direct cause of the Second Punic War. The site of Saguntum is now occupied by the town of Murviedro. Near it are the remains of a theater and the ruins of a temple of Bacchus.

SAHARA (să-hă'rá), the extensive desert of North Africa, embracing the largest unproductive region in the world. It may be said to

extend east and west from the Atlantic to the Nile, and from the interior of the Sudan northward to the interior of Tripoli, Algeria, and Morocco, but there are deserts of more or less extent penetrating from it in various directions. The entire area included in the desert is estimated at 3,565,565 square miles, or a region nearly as large as all of Europe. Its surface is constituted of formations differing vastly in composition, and ranges in altitude from 100 feet below to 8,000 feet above sea level. It may be said to comprise a vast undulating expanse, being formed mainly of ranges of hills, dry water courses, evaporated lake beds, extensive sand tracts, and here and there oases bearing a variety of vegetable forms. In the northern part are ranges of mountains extending southward from the chains of the Atlas in Morocco and Algeria, where also are the tracts known as the Gidi and Areg deserts. The most extensive tracts of level surface are in the interior and southern parts, where the sand often drifts very much like snow in a storm, with the difference that it is much more unpleasant and sometimes extremely dangerous. A large part of Egypt and Abyssinia are included in the Libyan desert, which extends westward beyond 20° east of Greenwich.

It was formerly supposed that the Sahara lies almost exclusively below the level of the sea, and that interior Africa could be redeemed for cultivation by conducting the water from the ocean through a vast canal to supply a water surface sufficient for the formation of clouds that would distribute rain in abundance. This view has been disposed of by recent explorations, but it is reasonably certain that low-lying districts between Morocco and the Senegal River, now belonging to Spain, could be redeemed by admitting water from the Atlantic. Many species of wild animals are abundant in the Sahara, among them the hyena, antelope, mountain sheep, baboon, tortoise, ostrich, lion, and many others, all of which find an abundance of material for subsistence in the oases or on the desert tracts producing at least scant supplies of vegetation. Serpents, jerboas, lizards, and allied forms of life are quite common in the regions of burning sands, where a variety of herbage prevails that subsists with little moisture. In the region of great heat and moving sands, as the Gidi Desert, extending through the expanse south of Morocco nearly parallel to the Atlas Mountains, the most characteristic features of the desert are found, such as total absence of water and vegetation, and the presence of intense heat and strong wind.

The Sahara Desert is crossed and traversed

exclusively by caravans, though railroads have been built across short expanses projecting from the desert proper, particularly in the Nile basin and Algeria, and the French have projected a line to run through the regions tributary to the Upper Senegal and Niger rivers. An advantage is found in traveling from oasis to oasis in caravans, because an organized company can better supply itself with the necessary means of subsistence, such as water and food, for long journeys. Besides, these organized companies have greater assurance of overcoming the danger attending the hot winds, or simooms, and attacks by hostile natives. Many of the oases are well watered and, by reason of great fertility, support a considerable trade and, in many cases, one or more towns. The moisture common to oases comes largely from springs and subterranean water courses, but in southern Algeria and elsewhere the productive area has been greatly enlarged by artesian wells, the depth ranging from 10 to 400 feet.

It is estimated that the Sahara has a population of about 2,500,000, which is made up largely of Berbers, Arabs, and Negroes. The inhabitants subsist mainly by the cultivation of cereals and fruits and the rearing of camels and sheep. In some regions they conduct a considerable trade with the caravans that move periodically through the different sections. The most important caravan routes extend from the northern part of the Sudan to the Nile and the seaports of the Mediterranean. Valuable mineral deposits are abundant, especially salt, which is derived largely from the vicinity of Lake Kaffra. Deposits of granite, iron, limestone, and many metals are abundant, but these are practically undeveloped. Salt is produced quite extensively and is transported to ports on the Mediterranean, or is conveyed by caravans and the Niger River to the Atlantic ports.

SAIGON (sī-gōn'), or **Saigun**, the capital of French Cochin China, on the Saigon River, near where the stream enters the South China Sea. It is one of the most important river ports of Southern Asia. Saigon has convenient railroad facilities and canal connections with Mekong. It has a large interior trade in cereals and fruits. A vast commerce is maintained with China and the East Indies, principally in rice. Among the manufactures are earthenware, sailing vessels, clothing, lumber products, tobacco and cigars, textiles, and machinery. It is strongly fortified and contains a number of important government buildings, hospitals, temples, and educational institutions. Since 1862 it has belonged to France. Population, 1907, 62,526.

SAIL, a class of canvas cloth used to attach

to a mast or stay on a vessel. The purpose is to aid in propelling or moving the vessel in the water. Many kinds of material are employed in making sailcloth, but flax and hemp are used most generally. Cotton, jute, linen, and various vegetable fibers are utilized in making certain kinds of sails. Several breadths of canvas are necessary to construct a single sail. They are securely sewed together by a double seam, and a bolt rope is fastened around the edge by means of a strong cord.

The size of the sail depends upon the vessel, since the larger forms require a greater propelling force to move them in the water, hence the size and strength of the sail is proportional to the size of the ship or boat on which it is to be used. It is possible to secure the greatest propelling power when the wind is right astern, but advantage may be gained when it is on either beam by dividing the sail into two parts, the one part acting to cause the vessel to move sideways, and the other having a tendency to propel it forward. Various other combinations are taken advantage of in placing the sails, which make it possible to gain a forward movement with a fairly unfavorable wind, though under such conditions it becomes necessary to have the vessel move in a zigzag course.

The two principal types are square sails and fore-and-aft sails. *Square sails* are four-sided. They are bent to a yard and are normally at right angles to the keel. *Fore-and-aft sails* are attached to a boom, gaff, or stay, and are normally nearly parallel to the keel. The upper edge of a sail is called the *head*; the lower edge, the *foot*; and the sides in most sails are known as *leeches*. The lower corners of a square sail are its *clews*, and the same name is applied to the lower after corner of a fore-and-aft sail. A *tack* is the lower forward corner of a fore-and-aft sail, or the lower weather corner of a square sail, and the *earing* is the upper corner of the latter kind. Sailmaking was an important industry among the ancients and still continues to hold an important place among the industries, although steam is now employed largely in navigation.

SAINT ALBANS (al'banz), a city in Vermont, county seat of Franklin County, 25 miles northeast of Burlington, on the Vermont Central Railroad. The site is two miles from Lake Champlain, on an elevation of 400 feet, within sight of the Green and the Adirondack mountains. The surrounding country is fertile, producing cereals, fruits, and vegetables. Marble quarries are worked in the vicinity. The chief buildings include the county courthouse, the public library, the Villa Barlow Convent, the

public hospital, and the Warner Home for the Destitute. Among the industries are a creamery, cheese factories, bridge works, railroad shops, and iron works. It has an extensive trade in cheese, butter, and marble products. Saint Albans was platted as a village in 1859 and incorporated as a city in 1897. Population, 1900, 6,239; in 1910, 6,381.

SAINT ALBANS, a city of England, in Hertfordshire, about twenty miles northwest of London. It has convenient railroad connections with London and other cities. Among the manufactures are silk and other textiles, earthenware, and machinery. It has a number of machine shops and iron foundries. Saint Albans is noted particularly for the Benedictine Abbey founded here by King Offa of Mercia in 795, in which Cardinal Wolsey served as abbot. The city contains a monument to Lord Bacon and the tomb of Sir John Mandeville, a famous traveler. Two battles were fought at Saint Albans in the War of the Roses, in 1455 and 1461. Population, 1908, 17,286.

SAINT ANDREWS, a town of Scotland, in Fifeshire, 35 miles northeast of Edinburgh. It is a seaport of the North Sea, has railroad facilities, and contains the celebrated University of Saint Andrews. This institution was founded in 1411 and is the oldest university in Scotland. In connection with it are a museum, a botanical garden, and a library of 116,000 volumes. Saint Andrews has a fine cathedral, numerous other churches, and a considerable trade. Population, 1908, 8,682.

SAINT AUGUSTINE (ə-gūs-tēn'), a city in Florida, county seat of Saint John County, Florida, near the Atlantic coast, 35 miles southeast of Jacksonville. It is on the Saint Augustine and South Beach and the Florida East Coast railroads. The site is on the shore of Matanzas Bay and is beautified by semitropical vegetation. Among the features are the sea wall constructed by the Federal government, the Alicia Hospital, the customhouse and post office, the public library, and the ruins of Fort San Marco, now Fort Marion. It has manufactures of tobacco products, utensils, and machinery.

Saint Augustine is the oldest city in the United States. It was founded in 1565, when the Spaniards under Menéndez established it as a center of influence and built a fort here. The streets are narrow in some parts of the city, but within recent years many improvements have been made, and it has become noted as a popular winter watering place. Many remains from the early period of its history have been preserved, including the Ponce de León and the Alcazar hotels, and the former residence of the

Spanish governor, now used for the post office. The surrounding country is dotted with orchards of orange and lemon trees and the climate is remarkably equable and healthful. Population, 1900, 4,272; in 1910, 5,494.

SAINT BERNARD DOG (bēr'nārd), the largest domestic dog, so named from the hospice of Saint Bernard, where this breed of dogs has been maintained through many centuries. Two species are marked by distinct characteristics, one having smooth and the other rough hair. The former are considered of greater power, but representatives of both breeds stand about thirty inches high and weigh 150 pounds. These dogs are muscular, stand erect, and have a massive skull and an intelligent expression. The coat of hair is very dense, the feet are broad and powerful, and the nostrils are somewhat dilated. In color they differ materially, but it is usually black or black and white spotted. These dogs are kept in large numbers in the Alpine passes to rescue travelers who are lost in snowstorms, or aid those belated at night. In some cases they are sent ahead of parties to test the safety of ice bridges or trace indistinct or snow-covered roads, which they are able to do through the keenness of the sense of smell.

SAINT BERNARD PASS, the name generally applied to two passes of the Alps. They are distinguished from each other by the names Great Saint Bernard and Little Saint Bernard. *Great Saint Bernard* is on the east side of Mont Blanc, in the Pennine Alps, between the Canton of Valais, Switzerland, and the department of Piedmont, Italy. It is 8,125 feet high and near its highest part is the famous hospice founded by Saint Bernard de Menthon, in 962, as a refuge of safety for those crossing the Alps. The pass is covered with snow nine months of the year, and the monks of the hospice keep a number of Saint Bernard and Newfoundland dogs to aid in rescuing those in danger or distress from cold. Among the famous armies that traversed this pass were that of the Romans, that of Charlemagne, that of Frederick Barbarossa, and that of Napoleon when invading Italy in 1800. *Little Saint Bernard* is south of Mont Blanc, crossing the Grecian Alps from the Isère valley, in France, to the Dora Baltea valley, in Italy. It is 7,175 feet high. Near its summit is a hospice, which was founded by Saint Bernard de Menthon. It is comparatively easier to cross than the Great Saint Bernard. Some writers assert that Hannibal led his army of invasion into Italy through the Little Saint Bernard Pass, but others think he made the descent by the Great Saint Bernard.

SAINT CATHARINES (kath'ā-rīnz), a

city in Ontario, capital of Lincoln County, 12 miles northwest of Niagara Falls, on the Grand Trunk and Niagara and the Saint Catharines and Toronto railways. It is on the Welland Canal and is noted for its marine hospital and artesian mineral wells. Among the principal buildings are the county courthouse, the high school, the public library, and the townhall. The chief manufactures include cotton and woolen goods, farming implements, flour, and machinery. It is a port of entry and has a growing trade. Population, 9,946.

SAINT CHARLES, a city in Missouri, county seat of Saint Charles County, on the Missouri river, 22 miles northwest of Saint Louis. It is on the Wabash and the Missouri, Kansas and Texas railroads. A splendid railroad bridge 6,535 feet long crosses the river at Saint Charles. The noteworthy buildings include the county courthouse, the Daniel Charles Military College, the Sacred Heart Academy, and the Lindenwood Female College. Among the manufactures are flour, tobacco, cotton and woolen goods, dairy products, and earthenware. The public utilities include pavements, sanitary sewerage, and public waterworks. It was settled in 1769 and was the State capital from 1821 to 1826. Population, 1900, 7,982; in 1910, 9,437.

SAINT CLAIR, a river and lake of North America, which form a part of the boundary between the State of Michigan and the Province of Ontario. The Saint Clair River flows from Lake Huron into Lake Saint Clair. It is about forty miles long and half a mile wide, and is of vast importance in the navigation of the Great Lakes. A railroad tunnel under it extends from Port Huron, Mich., to Sarnia, Ontario, and has a length of 11,550 feet. Lake Saint Clair receives the water from the Saint Clair and Thames rivers, and its surplusage flows through the Detroit River into Lake Erie. It is 30 miles long, is about 25 miles wide, and has an area of 360 square miles. Within it are several islands and it has excellent fisheries. The surface is 575 feet above sea level.

SAINT CLOUD, a city in Minnesota, county seat of Stearns County, sixty miles northwest of Saint Paul, on the Mississippi River. It is on the Great Northern and the Northern Pacific railroads, has an abundance of water power, and is surrounded by a farming and stock-raising region. The chief buildings include the county courthouse, the public library, the State normal school, the State reformatory, the Saint Raphael's Hospital, and the Home for the Aged. The manufactures include lumber products, flour, wagons, farming implements, and machinery. A fine quality of granite is quarried in the

vicinity. It was settled in 1859 and incorporated in 1868. Population, 1905, 9,422; 1910, 10,600.

SAINT CLOUD, a town of France, on the Seine River, six miles west of Paris. It was long noted for the celebrated palace of Saint Cloud, which was used as a summer residence by Napoleon I., Louis XVIII., Charles X., Louis Philippe, and Napoleon III. The palace was destroyed in the siege of Paris in 1870, but the park in which it stood is still one of the finest in the vicinity of Paris. Population, 1908, 6,892.

SAINT CROIX (kroi), a river of North America, forming a part of the boundary between Maine and New Brunswick. It issues from Schoodic or Grand Lake and, after a course of 75 miles toward the southeast, flows into Passamaquoddy Bay. Steamboats ascend to Saint Stephen, a distance of twenty miles. It is sometimes called the Schoodic, or the Passamaquoddy, River.—Saint Croix, a river of Wisconsin. It rises near the southwestern part of Lake Superior, has a southerly course, and flows into the Mississippi 35 miles below Saint Paul. The length is about 200 miles. It has a number of fine falls and forms part of the boundary between Wisconsin and Minnesota.

SAINT CYR (săn sêr), a town in France, two miles west of Versailles, with which it is connected by railway. Louis XIV. founded a school for girls at Saint Cyr, at which Racine's "Ester" and "Athalie" were written expressly for the pupils. The school was suppressed by the Revolution, but Napoleon founded the famous military school at Saint Cyr on its site in 1806, and near it are two of the advance forts of the new enceinte around Paris. Population, 1908, 4,468.

SAINT DENIS (săn de-nê'), a city of France, four miles north of Paris, with which it is connected by railway and rapid transit. It is strongly fortified, has canal connections with the inner harbor of Paris, and contains numerous buildings of historic interest. The famous Abbey of Saint Denis was completed under Philip the Bold and was long the burying place of French kings. Louis XII. caused mausoleums to be built with figures of the princes buried here and monuments were added by all the monarchs up to Henry II. Napoleon founded a school for daughters of the members of the Legion of Honor in the monastery, which still flourishes, and Louis XVIII. improved the museums and added numerous monuments. Saint Denis is at present one of the most beautiful and scenic cities of France. It has many fine buildings and gardens. The principal manufactures include leather, flour, sailing vessels, railway cars, engines, chemicals, textile fabrics, and

machinery. The city was so named from the abbey founded by Dagobert on the burial place of Saint Denis, the apostle of Paris. Population, 1906, 64,790.

SAINT ELIAS (ê-lí'as), **Mount**, an elevated mountain of North America, situated near the boundary between Alaska and British America, elevated 18,100 feet above sea level. It was long thought that Saint Elias is the highest mountain peak of North America, but Mount McKinley is now so regarded, its peak towering 20,464 feet above sea level. Great glaciers move from its perpetually snow-covered sides, and have worn great precipices and chasms in their course to the Pacific. It is an important landmark, for the reason that it is completely isolated from other great peaks. The foothills have forests up to a height of 2,000 feet, but the mountain itself is barren.

SAINT ÉTIENNE (sǎn-tô-tyě'n'), a city of France, in the department of Loire, of which it is the capital. It is situated on the Furens, a tributary of the Loire, about thirty miles southwest of Lyons. The city has railroad connections with other trade emporiums. Many of the streets are well graded and improved with electric lighting, stone and macadam pavements, waterworks, and rapid transit. The churches of Saint Étienne and Notre Dame are noted structures. It has a school of fine arts, several industrial schools, a museum, and a well-organized public school system. The importance of the place as a manufacturing center is due to the water power drawn from the Furens River. Among the products are firearms, cutlery, Bessemer steel, engines, railway cars, earthenware, and machinery. The ribbon trade is counted the largest in the world and it gives employment to 45,000 weavers. It has a growing export trade in merchandise, coal, and clothing. Population, 1906, 146,788.

SAINT FRANCIS (sǎnt frǎn'sis), the name of two rivers in North America, one in the United States and the other in Canada. The former rises in southeastern Missouri, has a general course of 450 miles toward the south, and flows into the Mississippi near Helena, Ark. It forms a part of the boundary between Missouri and Arkansas and is navigable for 150 miles. In several places it expands into long lakes, thought to be due to sinking of the soil as a result of the earthquake in 1811. The Saint Francis River of Canada is one of the important tributaries of the Saint Lawrence. It rises in Saint Francis Lake, in southeastern Quebec, and after a course of 120 miles enters the Saint Lawrence near Lake Saint Peter.

SAINT GALL (sǎn gǎl'), a city of Switzer-

land, capital of a canton of the same name, six miles southwest of Lake Constance. It is connected with other cities of Europe by a railway line and has a considerable trade. The noteworthy buildings include the public library, the cantonal school, the museum of natural history, and the Roman Catholic cathedral. It has public waterworks, well-paved streets, and electric street railways. Among the manufactures are textile fabrics, chemicals, clothing, and machinery. It was so named from a convent founded here in the 7th century. The German name is *Saukt Gallen*. It has been a part of the Swiss Confederation since 1803. Population, 1907, 52,934.

SAINT GEORGE'S CHANNEL, the body of water which connects the Irish Sea with the Atlantic Ocean and separates the southern part of Ireland from Wales. It is about 100 miles long and from 60 to 95 miles wide. The depth ranges from 300 to 500 feet.

SAINT GERMAIN (sǎn zhâr-mǎn'), a town of France, on the Seine River, seven miles west of Paris. It is famous for the Royal Castle that served as a residence for the kings of France until the reign of Louis XIV., who moved the court to Versailles. The place is noted for its many fine monuments, including one erected by George IV. over the remains of James II. of England, who was an exile in the town. It is the seat of a number of monasteries and several convents. A terrace was built along the river front in 1672, and near the town is a splendidly preserved forest of 10,000 acres. The city has railroad advantages and manufactures of various kinds. Near it are fine orchards. Population, 1906, 17,891.

SAINT GOTHARD. See **Gothard, Saint**.

SAINT HELENA (sǎnt hě-lě'nà), an island in the South Atlantic Ocean, 1,200 miles west of Portuguese West Africa. It has precipitous shores and a mountainous surface. The area is 47 square miles. The island is of volcanic origin, forming the summit of a former volcano of a submerged region. Diana's Peak is the highest elevation, being 2,750 feet high. A small portion of the surface is susceptible to cultivation and is utilized in the culture of vegetables and fruits. Whale and other fisheries comprise the principal industry. It had a considerable commerce before the Suez Canal was opened to traffic, but at present the trade is principally in fish, which are exported. The imports are articles of food and clothing.

Saint Helena was discovered by the Portuguese in 1502, but it became a British possession in 1651. The island is noted as the place at which Napoleon was exiled after his final defeat

at Waterloo, in 1815, and he died there in 1821. He made his home with a farmer named Longwood, and his remains were buried there, but the body was removed to France in 1840, and the Longwood Farm was purchased by the French government in 1858. Gen. Piet Cronje was held there in exile by the British for some time after his capture in the Boer War of 1899-1901. Jamestown, the capital, is the only port and is connected with Europe and South Africa by a cable. In 1906 the island had a population of 7,483.

SAINT HELENS (hěl'ěnz), a city of England, in Lancashire, ten miles northeast of Liverpool. It is important as a jobbing and manufacturing center. Extensive deposits of coal are worked in the vicinity. Public markets, a sewerage farm, electric lighting, street pavements, waterworks, and street railways are among the public improvements. Other features include the public library, the townhall, and Victoria Park. The manufactures include glass, chemicals, iron, copper, and lead. It has a large trade in produce and merchandise. Population, 1907, 92,476.

SAINT HYACINTHE (hī'á-sínth), a city of Quebec, capital of Saint Hyacinthe County, 35 miles northeast of Montreal. It is on the Yamaska River and the Grand Trunk, the Canadian Pacific, and other railroads. The chief buildings include the county courthouse, the Saint Hyacinthe College, the city hall, and a monastery of the Dominicans. It has manufactures of hosiery, boots and shoes, leather, woolen goods, and machinery. Electric lighting, waterworks, and pavements are among the public utilities. The inhabitants consist chiefly of French Canadians. Population, 1901, 9,210.

SAINT IGNATIUS COLLEGE (ig-nā'shī-ŭs), an institution of higher learning in Chicago, Ill., under the Jesuit Fathers. It was founded in 1870 and holds high rank among the Roman Catholic institutions. The courses include theology, logic, ethics, astronomy, chemistry, metaphysics, geology, elocution and literature, and ancient and modern languages. It has a library of 32,000 volumes and property valued at \$300,000. The attendance is 600 students.

SAINT JOHN, a river of North America, which rises in eastern Maine. After flowing northeast for some distance, it makes a bold curve and flows toward the southeast, entering the Bay of Fundy. The course is irregular and it has a large number of tributaries, including the Big Machias, Aroostook, Allegash, and Tobique rivers. The entire course is 450 miles, of which 150 miles are navigable. It forms the boundary between Maine and New Brunswick

nearly to Grand Falls, below which it is wholly in the latter. At its mouth is the city of Saint John and about 225 miles up the river are the Grand Falls, 75 feet high. It is navigable for large steamers to Frederickton.

SAINT JOHN, a seaport of New Brunswick, capital of Saint John County, on the Bay of Fundy and the Saint John River. It is on the Canadian Pacific, the New Brunswick South-



ern, and the Intercolonial railways. The harbor is deep and safe, being protected by a breakwater and by Partridge Island, which has a lighthouse and a quarantine hospital. Two bridges, one a cantilever and the other a suspension bridge, span the river. The site rises rapidly from the harbor and is chiefly rocky and undulating, but the streets are wide and regularly platted. It has an extensive trade in lumber, fish, merchandise, and manufactures. Among the principal industries are shipbuilding, fisheries, and the manufacture of clothing, lumber products, and machinery.

A large majority of the business houses are constructed of brick and stone. The noteworthy buildings include the county courthouse, the public library, the Soldiers' Home, the high school, the Roman Catholic cathedral, the Baptist Seminary, the Masonic and the Odd Fellows' halls, the Wiggins Orphan Asylum, and the Provincial Insane Asylum. It has electric street railways, systems of sewerage and waterworks, and stone and macadam pavements. Saint John was settled in 1635 and was long a point of contention between the French and English, but became a British possession by the Treaty of Utrecht in 1713. It was chartered as a city in 1785. Population, 1901, 40,711.

SAINT JOHN OF JERUSALEM, Knights of, an association of a military and re-

ligious character founded at Jerusalem in the Middle Ages. The merchants of Amalfi obtained permission, in 1023, from the Caliph of Egypt to found an institution in Jerusalem for the care of poor and sick pilgrims. The fame of this organization was spread throughout Europe by grateful travelers, who recommended it to those wishing to see the Holy City, and many sent contributions to improve and enlarge its capacity. Although it had a humble beginning, it became a highly successful institution and was the direct cause of founding the Order of Saint John. When Jerusalem was taken by the Crusaders under Godfrey de Bouillon, his soldiers were attended in the Amalfi Hospital of Saint John under the direction of its rector, Peter Gerard. A regularly constituted religious body was formed under the rector, which received the approval of Pope Paschal II. in 1113, and, soon after commanderies were established in many Mediterranean towns to protect pilgrims as they passed to and from Jerusalem, and these in time became known as *Hospitalers*.

The order gradually grew in military and aristocratic power for a century, but in 1289 an Egyptian force was sent to besiege Acre, which was the only remaining Christian seat of influence at that time, but it fell soon after. The knights sailed to Cyprus in 1291 and vainly tried to reestablish a foothold in Palestine, but they were finally compelled to abandon the project and, instead, undertook the conquest of Rhodes, which was taken in 1310 along with a number of other islands. Here they not only established themselves, but greatly improved the islands, constructing edifices, places of worship, and hospitals. They developed the culture of vegetables, cereals, and fruits. For more than 200 years they maintained themselves against repeated attacks of the Turks, but the fall of Constantinople gave the Mohammedans material advantage and Sultan Solyman finally captured Rhodes in 1523.

The homeless knights were provided for by Emperor Charles V., of Germany, ceding to them the islands of Malta and Gozo and the fortress of Tripoli in Africa, but they never regained their former importance. However, the powerful fortress of Malta became the bulwark of Christendom and its name was assumed by the order, which became known as the Knights of Malta. In 1551 the Turks conducted a fruitless attack on the island and made a second attack in 1565. The defense under the grand master, Jean Parsiot de la Valette (1494-1568), forced the besiegers to retire. However, they were weakened by divisions that had existed for several centuries, and the crushing blow

came in 1792, when the directory of France decreed that the order should be abolished, because it had become an asylum for French refugees. Malta was forcibly seized by the French in 1798, since which time the order has been divided by factions. Several branches are still in existence in Europe, including the German and Italian leagues and the Johanniter. The Hospitalers adopted a Maltese cross as their badge. They wore a red coat and had as their motto *pro fide*, to which they added *pro utilitate hominum*, meaning "For the faith and for the service of men."

SAINT JOHN'S, the capital of Newfoundland, in Saint John's County, on the eastern shore of the island, sixty miles north of Cape Race. It is on the Newfoundland Railway and on Freshwater Bay, an inlet from the Atlantic, which furnishes a landlocked harbor. The Narrows, a channel between Pancake Rock and Chain Rock, furnishes a deep entrance into the harbor. Lighthouses of modern construction are located on Cape Spear and Fort Amherst, which comprise two elevations at the Narrows. It has large commercial interests, especially in supplies for fisheries. The manufactures include spirituous liquors, boots and shoes, nails, tobacco, leather, soap, cordage, seines, furniture, and machinery. The export trade in fish and seal oil is extensive.

Saint John's is well built of brick and stone. The noteworthy buildings include the Governor's residence, the House of the Assembly, the Saint John's Athenaeum, the commercial exchange, the customhouse, the county courthouse, the public hospital, and the Roman Catholic cathedral. It is the seat of Anglican, Presbyterian, Methodist, and Roman Catholic colleges. The public utilities include public waterworks, sanitary sewerage, and gas and electric lighting. It was a fishing village as early as 1580. Disastrous fires destroyed much of the city in 1846 and 1892, but it has been rebuilt and greatly improved. Population, 1908, 33,642.

SAINT JOHN'S, a river of Florida, which rises in Brevard County and, after a course of 350 miles toward the north, flows into the Atlantic Ocean fifteen miles northeast of Jacksonville. It courses through a level region containing many orchards and groves, and is fed by springs and the overflow of swamps. For a distance of 200 miles of its lower course it is about a mile in width, and it is navigable for the largest steamers to Enterprise. It abounds in fish, and near it are extensive forests.

SAINT JOHNS, a city of Porto Rico. See **San Juan**.

SAINT JOHNSBURY, a village of Vermont, county seat of Caledonia County, 35 miles northeast of Montpelier. It is on the Passumpsic River and the Boston and Maine and other railroads. It is the seat of Fairbanks Museum and the Saint Johnsbury Academy. Among the chief buildings are the county courthouse, the public library, and several fine schools and churches. It has a large trade in merchandise and produce. The works of the Fairbanks Scale Company are located here. Besides scales of various kinds, it has manufactures of steam hammers, clothing, hardware, and farm machinery. Electric lighting, waterworks, and sewerage systems are maintained. The place was settled in 1786 and incorporated in 1884. Population, 1900, 5,666.

SAINT JOSEPH, a city of Michigan, county seat of Berrien County, sixty miles northeast of Chicago. It is beautifully located on the shore of Lake Michigan, at the mouth of the Saint Joseph River, and has communication by the Père Marquette, the Lake Shore and Michigan Southern, and other railroads. Steamers sail regularly between it and other lake ports. It is visited during the summer as a resort by tourists. The surrounding country has productive farms and extensive peach orchards. Flour, ironware, lumber products, canned fruits, and machinery are among the manufactures. Systems of electric lighting, waterworks, and sewerage are maintained. The Carnegie Library and the county courthouse are the leading buildings. The first settlement in the vicinity was made in 1829. It was incorporated as a village in 1836 and as a city in 1892. Population, 1904, 5,322; in 1910, 5,936.

SAINT JOSEPH, the third city of Missouri, county seat of Buchanan County, on the Missouri River, 65 miles northwest of Kansas City. It has transportation facilities by the Chicago Great Western, the Chicago, Rock Island and Pacific, the Chicago, Burlington and Quincy, the Atchison, Topeka and Santa Fé, the Missouri Pacific, and other railroads. Electric lines furnish urban and interurban communication. It is connected with Elwood, Kan., by a steel bridge.

Saint Joseph occupies an area of ten square miles. The location along the bluffs of the Missouri affords a healthful site and easy facilities for drainage. The river frontage is about three miles. The streets are regularly platted and many are paved, including pavements constructed of vitrified brick, macadam, and asphalt. Krug Park, in the northern part of the city, is a fine public resort. Lake Contrary is located in the southern part. Mount

Mora Cemetery is a fine public burial ground. The chief buildings include the city hall, the county courthouse, the post office, the public high school, and the Carnegie Library. It is the seat of a State hospital for the insane, the State fish hatchery, the Sacred Heart Academy, and the Memorial Home for Aged People. Among the charitable institutions are Saint Joseph's Hospital and Ensworth Hospital. It has two medical colleges and a number of private and parochial schools.

Saint Joseph is noted as a shipping and slaughtering center. It takes high rank in meat packing, wholesaling, and manufacturing. The output of the packing houses has an annual value of \$52,500,000 per year. Articles of clothing, especially shirts and overalls, are made in large quantities. Other manufactures include saddlery, furniture, flour, crackers, confectionery, boots and shoes, woolen goods, and machinery. It has extensive grain elevators and large shipments of cereals, fruits, and live stock.

Indian traders and trappers made settlements in the vicinity of Saint Joseph in 1826. The most important of these was at Roy's Branch, where Joseph Robidoux, a Frenchman, opened a trading post. The Blacksnake Hills, now in the heart of the city, were settled in 1830. The name was changed to Saint Joseph in 1843 and it was made the county seat in 1846. After the discovery of gold in California, it ranked as an important emigrant station. Since the close of the Civil War it has grown very rapidly, and has been improved by extensive systems of waterworks, sewerage, and electric and gas lighting. Population, 1900, 102,979; 1910, 77,403.

SAINT LAWRENCE (sānt la'rɛns), a river of North America, the outlet of the Great Lakes into the Atlantic Ocean through the Gulf of Saint Lawrence. It may be said that it includes as its basin all the vast region tributary to the Great Lakes, which embraces 510,000 square miles, 187,440 square miles being in the United States and 322,560, in Canada. When viewed from this aspect, its source is in the Saint Louis, a river that rises in northern Minnesota and flows into Lake Superior near the city of Superior, Wis. It is known as the Saint Mary's River, or the Narrows, between Lakes Superior and Huron; as the Saint Clair River, between Lakes Huron and Saint Clair; as the Detroit River, between Lakes Saint Clair and Erie; as the Niagara River, between Lakes Erie and Ontario; and from Lake Ontario to the Gulf of Saint Lawrence it is called the Saint Lawrence. From the source of the Saint Louis to the mouth of the Saint Lawrence the distance

is 2,150 miles and from Lake Ontario to the Gulf of Saint Lawrence, 750 miles. As it emerges from Lake Ontario it forms a broad channel that is filled with islands, being known as the Thousand Island Park.

Steamers from the Atlantic formerly ascended the Saint Lawrence only to Montreal, a distance of 600 miles, but now they may navigate the entire lake and river system. Canals are utilized to pass the rapids between Montreal and Lake Ontario, which consist principally of the Lachine, the Cascade, the Coteau, the Cedar, and the Long Sault rapids. Niagara Falls is passed by the Welland Canal and Lake Superior is reached through the Saint Mary's Canal, which passes around the Sault Sainte Marie rapids. The principal tributaries of the Saint Lawrence proper are the Richelieu, Saguenay, Ottawa, Saint Maurice, Chaudiere, and Saint Francis rivers. At its entrance into the Gulf of Saint Lawrence it forms a broad inlet about 100 miles wide, but the general width to Lake Ontario is from one to four miles. Navigation is entirely obstructed by ice during the winter months. The Saint Lawrence forms a part of the boundary between the United States and Canada, separating New York from the Province of Ontario.

SAINT LAWRENCE, Gulf of, an inlet from the Atlantic Ocean, on the northeastern shore of North America. It is partly inclosed by Newfoundland, Nova Scotia, New Brunswick, and Quebec. The Gulf of Saint Lawrence forms a large continuation of the estuary of the Saint Lawrence River, and communicates with the open sea by Cabot Strait, between Nova Scotia and Newfoundland, which has a width of 65 miles. It is also joined to the Atlantic by the Strait of Belle Isle, lying between Labrador and Newfoundland, and by the Gut of Canso, between Nova Scotia and Cape Breton. It has excellent fisheries. The principal islands in the gulf are Prince Edward, Anticosti, Saint Paul's, and Magdalen.

SAINT LOUIS (lōō'is), the largest city of Missouri, metropolis of the Louisiana Purchase, the fourth city of the United States, being exceeded in size by New York, Chicago, and Philadelphia. It is situated on the Mississippi River, about 20 miles below its confluence with the Missouri, and 282 miles southwest of Chicago, Ill. The city is finely located on the west bank of the river, directly opposite East Saint Louis, Ill., with which it is connected by the famous Eads Bridge.

DESCRIPTION. The city limits include an area of nearly seventy square miles and the river frontage is a little over nineteen miles. It

extends west from the river about six miles, stretching over a beautiful and gently rolling tract of land. The site rises gradually from the river to the vicinity of Broadway, one of the leading thoroughfares running in a direction north and south, but paralleling the river. Between Broadway and the river is the original site, where the streets are somewhat narrow and much jobbing and wholesaling is transacted. From Market Street, which divides the city into northern and southern portions, the buildings are numbered north and south, and the buildings of intersecting streets are numbered westward from the river. In general the streets running north and south are designated by number, beginning with First Street near the river, and the streets running east and west are designated by name. In numbering the buildings, each block begins with a new hundred. Washington Avenue and Olive Street are the principal thoroughfares running east and west. Many wholesale and retail stores are located on these streets near the river, while fashionable residences line them at the west end. Lindell, Grand, Chouteau, and Franklin avenues are among the leading thoroughfares. Many of the principal streets and avenues are beautified by parks and additions platted independent of each other.

Much has been done in the way of grading to beautify the city. It has about 425 miles of improved streets, many of which are paved with granite blocks, asphalt, vitrified brick, and macadam. The sewer system comprises 550 miles of mains, and about an equal amount of water mains has been constructed. A large part of the electric wires are below the surface, the conduits for this purpose aggregating about 200 miles. Intercommunication is furnished by a system of electric railways, which has branches extending to East Saint Louis and many other cities and interurban points. Street lighting is furnished by gas and electricity. Practically all of the public utilities are owned and controlled by the municipality.

PARKS. About 2,250 acres are included in the parks and squares. Forest Park, the largest in the city, has an area of 1,375 acres. It is located on the west side, in a beautiful residential district, and a part of it was used in 1904 for the Louisiana Purchase Exposition. In the southwestern part are Tower Grove and the Missouri Botanical Garden, both presented to the city by Henry Shaw. They contain one of the most extensive collections of native and forest plants. The former has many beautiful drives and walks and statues of Columbus, Humboldt, and Shakespeare. The latter is pop-

ularly known as Shaw's Garden and is famous for its arboretum and the recumbent portrait statue of Henry Shaw by Von Mueller. O'Fallon Park, a tract of 160 acres, borders the bluffs of the river on the north side and contains a race course and a zoölogical garden. Carondelet Park, on the south side, is noted for its beautiful scenery. A marble statue of Schiller is in Saint Louis Park, one of Thomas H. Benton is in Lafayette Park, and one of General Grant stands at the southern entrance of the city hall.

BUILDINGS. Saint Louis is substantially built and contains many noteworthy and costly structures of modern design. The newer buildings are almost exclusively of stone, much of which is quarried within the State. The Union Railroad Station is one of the finest railroad depots in the world, costing \$6,750,000 and having a trainshed covering over thirty tracks. The Federal building, erected at a cost of \$8,000,000, is located on Olive Street. It contains the post office, the customhouse, and the United States subtreasury. An entire square is occupied by the city hall, which is a modern structure and cost about \$2,500,000. The county courthouse, on Broadway, is on the classic style and has a dome 198 feet in height. Among the hotels may be mentioned the Southern, the Planters', and the Lindell, all of which are modern and commodious structures. The leading business and office buildings include the Laclede, the Rialto, the Equitable, the Commonwealth Trust, the Commercial, the board of education, and the public library buildings. Few cities are better equipped with ecclesiastical structures. They include the Protestant Episcopal Cathedral, the Shaare Emeth synagogue, the Roman Catholic cathedral, the Second Presbyterian church, the Beaumont Street Baptist church, the Pilgrim Congregational church, and the Union Methodist Episcopal church.

EDUCATION AND CHARITIES. Saint Louis maintains a thorough system of public school education, which includes well-articulated courses from the kindergarten to the high school. Washington University, located near Forest Park, is the leading institution of higher learning. Other institutions of higher learning include the University of Saint Louis (Roman Catholic), the Lutheran Concordia Theological Seminary, the Christian Brothers' College, and the Forest Park University for Women. The charitable and benevolent institutions include the Saint Louis Training School for Nurses, the Missouri School for the Blind, and various institutions for infants and adults. It is the seat of the Beaumont Medical College, the Ken-

rick Theological Seminary, the Saint Louis School of Pharmacy, and the Saint Louis School of Fine Arts.

The public library, aided by Andrew Carnegie, has a fine building and 175,000 volumes. On Broadway and Locust streets is the Mercantile Library, which has a collection of 130,000. This institution is famed for its fine paintings and statuary, including much of interest relating to the Louisiana Purchase and the states formed from it. All phases of club life are represented by strong organizations, such as the Mercantile, the Columbia, the German Turner, and the Saint Louis. The Olympic, the Columbia, and the Grand Opera are the principal theaters.

COMMERCE AND INDUSTRY. Saint Louis is located at an advantageous point on the Mississippi, which furnishes direct steamboat transportation to the Gulf of Mexico and many points on the Ohio and Missouri rivers. As a railway center it may be said to rank next to Chicago, being on direct lines of many trunk railroads. Twenty-four lines enter the city. Among the principal railroads are the Illinois Central, the Wabash, the Chicago, Burlington and Quincy, the Chicago and Alton, the Louisville and Nashville, the Missouri, Kansas and Texas, the Saint Louis, Iron Mountain and Southern, the Saint Louis and San Francisco, the Pennsylvania Lines, the Baltimore and Ohio Southwestern, and the Chicago, Rock Island and Pacific. The railways passing toward the east either cross the Eads Bridge, which is within the heart of public intercourse, or the Merchants' Bridge, which has connection with the Union Station system of terminals partly by an elevated line. Trains going from the Union Station to the Eads Bridge pass through a tunnel under the city. Cupples Station, a group of business buildings, is located so as to handle a large share of the wholesale trade and much of the freight with facility.

In manufacturing Saint Louis holds a high rank. The annual output of its factories has a value of \$350,000,000. Nearly all lines of manufacturing are represented and the products find a market in all parts of the country and many foreign lands. Malt and spirituous liquors, flour and grist, boots and shoes, brick and pottery, wagons and carriages, iron and steel products, furniture, millinery, glassware, railroad cars, and machinery are the leading manufactures. As a market for grain, cotton, live stock, coal, hides, and fruits it holds a very high rank. Its stock yards and grain elevators are among the largest in the Mississippi Valley.

Vast numbers of hogs, cattle, and sheep are handled at the packing houses.

HISTORY. The first permanent settlement on the site of Saint Louis was made by Pierre Laclède Liguist, in 1764, who had conducted a company of French trading merchants to develop that region of the Louisiana Territory. However, the title became vested in Spain and the town was occupied by Spanish troops in 1771, but the territory of Louisiana was ceded back to France in 1800. In 1803 the United States purchased Louisiana from Napoleon, but Saint Louis continued a trading point until its steady growth began in 1830. The Revolution of 1848 in Germany caused a large number of German immigrants to come to Saint Louis, and from that time the city has enjoyed a remarkable growth in wealth and population. The German element was devotedly loyal to the Union in 1861 and under General Lyon captured Camp Jackson. A very large per cent. of the people are German or of German descent, which is evidenced by numerous well-organized musical societies maintained in the city. A destructive cyclone visited the city in 1896, destroying property valued at about \$25,000,000, but the damaged parts were rapidly rebuilt by the construction of newer and more valuable buildings. Forest Park and the campus of Washington University, in the western part, furnished the site of the Louisiana Purchase Exposition in 1904. The following table gives an exhibit of the population at various periods:

YEAR.	POPULATION.	YEAR.	POPULATION.
1799.....	929	1866.....	204,327
1810.....	1,400	1870.....	310,864
1820.....	4,928	1880.....	350,518
1830.....	5,862	1890.....	451,780
1840.....	16,469	1900.....	575,238
1850.....	74,439	1910.....	687,029
1856.....	125,200		

SAINT LOUIS, a city in West Africa, capital of Senegal, about 12 miles from the Atlantic Ocean and 100 miles northeast of Cape Verde. It is situated on an island at the mouth of the Senegal River and has railway communication with the interior. The streets are regularly platted and well improved, but the climate is unfavorable to Europeans. The noteworthy buildings include the customhouse, the post office, and a missionary school. It has considerable trade in grain and fruits, but the harbor is not suitable for large vessels. The town was founded in 1626 and the inhabitants consist chiefly of French and natives. Population, 1906, 25,086.

SAINT LOUIS, University of, an institution of higher learning at Saint Louis, Mo., under control of the Jesuit Fathers. The

courses include medicine, commerce, philosophy, sciences, divinity, and military science. The property is valued at \$1,250,000. It has a library of 25,000 volumes. The faculty consists of 135 instructors. It is attended by about 1,000 students.

SAINT LUCIA (lōō'shà), an island of the West Indies, situated 25 miles north of Saint Vincent. It has an area of 230 square miles. The surface is mountainous and contains a number of active volcanic peaks. Sugar, coffee, spices, logwood, and fruits are the principal products. The island was discovered in 1502 and became French territory, but has been a British possession since 1803. The inhabitants consist mostly of Negroes. Castries is the capital and principal port. Population, 1906, 54,073.

SAINT MARK, Cathedral of, a noted ecclesiastical structure at Venice, Italy. It is situated at the east side of the Square of Saint Mark's, or the Piazza, and is reputed one of the finest structures of its kind in Europe. The building is 250 feet long and 170 feet wide and is decorated by several fine porches. Emperor Nero is said to have received as a present the famous four bronze horses that were set above the central porch, but later they were taken to Constantinople, whence they were brought to Venice. The roof is decorated with numerous cupolas and arches and the interior is finished with beautiful and costly mosaics. Within the cathedral are many artistic treasures, such as church plates and jeweled bookbindings. Work on the original building was begun in 830, but it was destroyed and was again rebuilt in 976. A fire destroyed the second church and a new structure in the Byzantine style was erected in the 12th century. Additions in the Gothic were made in the 15th century. It was attached to the palace of the doge of Venice and remained a place for national worship for many years, but was converted into a cathedral in 1807.

SAINT MARYS, a city of Ohio, in Auglaize County, on the Miami and Erie Canal, 22 miles southwest of Lima. It has transportation facilities by the Ohio Central and the Lake Erie and Western railways, and is surrounded by a farming and fruit-growing country. Near the city is Saint Marys Reservoir, from which water is drawn to supply the Miami and Erie Canal. Among the chief buildings are the high school, the city hall, and many churches. The manufactures include flour, hardware, woolen goods, and machinery. It has considerable trade in farm produce and merchandise. The first settlement on its site was made in 1795,

and it has been incorporated since 1820. Population, 1901, 5,359; in 1910, 5,732.

SAINT MARY'S RIVER, the channel separating the Upper Peninsula of Michigan from Ontario and connecting lakes Superior and Huron. It is about sixty miles long, flowing in a southeasterly direction, and is divided into two main channels by a number of large islands. The Sault Sainte Marie, or Saint Mary's Falls, are a short distance below Lake Superior. They have rapids that fall twenty feet in the course of about one mile. Two ship canals are maintained to avoid the rapids, one on the American and one on the Canadian side. The tonnage of the traffic passing through these canals is enormous, exceeding that of the Suez Canal.

SAINT MAURICE (sǎn mō-rēs'), a river in the Province of Quebec. It rises in Lake Oskelanaio. At first it has an eastward, but later a southward, course, and joins the Saint Lawrence at Three Rivers, about midway between Montreal and Quebec. It flows through a heavily timbered country, and about 22 miles above its mouth are falls with a descent of 160 feet. The entire length is 300 miles. Among the principal tributaries are the Ribbon, the Vermilion, the Croche, and the Bastonnais.

SAINT PAUL, the capital of Minnesota, county seat of Ramsey County, on the Mississippi River, immediately east of Minneapolis. It is at the head of navigation, 410 miles northwest of Chicago, Ill., and has communication by extensive trunk railway systems. These include lines of the Chicago Great Western, the Northern Pacific, the Wisconsin Central, the Great Northern, the Chicago and Northwestern, the Minneapolis and Saint Louis, the Chicago, Burlington and Quincy, the Chicago, Milwaukee and Saint Paul, the Illinois Central, and other railroads. An extensive system of electric railways has lines to all parts of the city and furnishes direct connections with Minneapolis, Lake Minnetonka, Fort Snelling, Stillwater, and other points.

DESCRIPTION. The city is finely situated on a gently rolling tract of land, which embraces an area of about 60 square miles. In most places the ground rises gradually from the river, and the general altitude is from 100 to 200 feet above the Mississippi and about 800 feet above sea level. The larger part of the city is located on the north side of the river, which has a general direction toward the northeast at this place, but makes a bold curve near the Union depot, whence it flows toward the southeast. The portion lying on the south side is known as South Saint Paul, which is connected with the north side by numerous wagon and

railroad bridges. Another bridge spans the river at Fort Snelling and several bridges furnish connection with Minneapolis. The streets are regularly platted, crossing each other at right angle in most parts of the city, though some of the thoroughfares near the river are somewhat irregular. Many of the streets are well paved with granite blocks, vitrified brick, asphalt, and macadam. They are well lighted with gas and electricity, are carefully drained of surface water, and contain extensive systems of sewerage and water mains.

PARKS. Como Park, which includes Lake Como, is located in the northwestern part of the city. It has an area of 415 acres and contains many rare shrubs, trees, and flowering plants. Indian Mounds Park, on the bank of the Mississippi, has several bluffs 200 feet high. Lake Phelan, in the northeastern part, is a beautiful sheet of water and is noted for its fisheries. In the western part of the city, along the gorge of the Mississippi, is a finely wooded tract and a short distance west are Fort Snelling and Minnehaha Falls. The parks that belong to Saint Paul proper, both large and small, include about 1,000 acres. They are connected by driveways and boulevards of great beauty, passing in places along the river, over elevations, and to the lakes. In the northwestern part, due west of Como Park, are the State Fair Grounds and the State University Farm.

BUILDINGS. On a lofty eminence, within the heart of the city, is the State capitol building. It is constructed largely of Georgia marble with the foundation and steps of Minnesota granite, and is rated one of the finest structures of its kind in America. The magnificent dome is visible as the city is approached from almost any direction. The building was erected at a cost of \$4,500,000. Opposite Rice Park is the post office, constructed of a gray stone. The city hall and county courthouse occupy an entire square on Fourth and Wabasha streets. Near the river is the Union Station, which is entered by all the trains. The larger office and business buildings include the Pioneer Press, the Endicott, the Manhattan, the Globe, the Germania, the German-American Bank, and the New York Life. Other buildings of note include the Ryan Hotel, the Capital Bank, and the Newspaper Row.

EDUCATIONAL. As an educational center it takes high rank, having a system of well-organized public schools and many institutions of higher learning. The institutions in or near the city include Macalester College, Saint Paul Seminary, the College of Saint Thomas, the

Lutheran Concordia College, and the Hamline University. Many private and parochial schools are maintained. Magdalen Hospital, an orphan asylum, and many educational and scientific institutions are well patronized. Three libraries are maintained. These include the State Historical Library with 75,000, the City Library with 60,000, and the State Law Library with 32,000 volumes. The Agricultural College of the State University, near Saint Anthony Park, is located on a farm of 243 acres.

INDUSTRIES. The city owes its prosperity largely to navigation on the Mississippi and the numerous railroads that center here. Its railroad yards, terminals, and shops are among the largest in the Union. It has extensive stock yards, located at South Saint Paul, and takes high rank as a slaughtering and meat-packing center. Many large flouring mills and grain elevators are operated. It has an extensive trade in farm produce, live stock, merchandise, and food stuffs. Furniture, hardware, earthenware, clothing, cigars, crackers, and machinery are produced in large quantities. The wholesaling and jobbing district is located near the Union Station, and along the banks of the Mississippi are most of the railroad shops and manufactories. The banks of the Mississippi have been partly diked to insure the manufacturing districts against overflow.

HISTORY. The site of Saint Paul was first settled in 1838 by a Canadian, who built a log cabin. In 1839 the first white child was born here and the town site was platted in 1847. The Indians had a village on the site known as *Imnijiska*, meaning White Rock, and for some time it was known as Saint Peter, which was formerly the name of the Minnesota River. It was made the territorial capital in 1851 and a railroad line was built from it to Saint Anthony Falls, a distance of ten miles west, in 1862. Saint Paul and Minneapolis have been building toward each other with much rapidity, in fact the two cities are continuous, and are commonly spoken of as the *Twin Cities*. Nearly one-third of the inhabitants are of foreign birth, the larger part being Germans, Swedes, and Irish, in the order named. Population, 1910, 214,744.

SAINT PAUL DE LOANDA. See **Loanda**.

SAINT PETER, a city in Minnesota, county seat of Nicollet County, on the Minnesota River, 75 miles southwest of Minneapolis. It is on the Chicago and Northwestern Railroad and is surrounded by a fertile farming country. The noteworthy buildings include the county courthouse, the high school, the public library, the State hospital for the insane, and the Gustavus Adolphus College (Lutheran). Among

the manufactures are flour, earthenware, furniture, machinery, and clothing. It has electric lighting, public waterworks, and sanitary sewerage. The place was settled in 1854, incorporated in 1858, and chartered as a city in 1891. Population, 1905, 4,514.

SAINT PETERSBURG, the capital and largest city of Russia, at the eastern end of the Gulf of Finland, where the gulf is entered by the Neva River. This stream divides into numerous branches, thus forming a large number of islands, which are occupied by the city and connected by many bridges. Much of the city is built on flat ground, which was formerly marshy, and portions of it are still liable to overflow when the sea level is raised by high winds blowing from the west. A systematic plan of continually building the city further toward the sea and redeeming tracts covered by water has been pursued for many years, thus adding to the extent of the city and improving its means of access by vessels. Improvements have been made by the construction of concrete and granite embankment, and many of the channels have been greatly deepened by dredging.

DESCRIPTION. The streets are broad and regularly platted, intersecting each other at right angles. They have adequate lighting by gas and electricity and are traversed by an extensive network of electric street railways, but much of intercommunication is by cabs and carriages. The sewerage and waterworks systems are managed by the municipal government. The pavements are chiefly of granite blocks, but asphalt and macadam constitute the street improvements in the outlying and residential sections. The architecture is largely of pale yellow stone, much of which is both artistic and substantial. Nevsky Prospekt, the most fashionable street, is 130 feet wide and about four miles long. Senate Square, in the heart of the city, contains the famous equestrian statue of Peter the Great, erected in 1782. The Alexander Column, constructed of red granite, is in Palace Square.

The fortress of Saints Peter and Paul is located on a small island, which is connected with the mainland by the Troitsky Bridge. It contains the Cathedral of Saints Peter and Paul, where the czars and many persons belonging to the royal families are buried. The commercial exchange is located on one of the islands and near it are several educational institutions. Peterburgsky Island, one of the finest in the city, contains many beautiful residences, while others are utilized as public parks and resorts. Retail trading is carried on chiefly by

a system of markets and these are managed by the municipality. These markets do not only handle food stuffs, but likewise conduct a large trade in clothing and foot wear.

Saint Petersburg is sometimes called the city of palaces from the large number of edifices of that character. Among them is the famous Winter Palace, a residence of the emperor, with a capacity for accommodating 6,000 persons; the Hermitage Palace, containing a library of 125,000 volumes and 2,500 paintings by famous artists; and the Annitchkoff Palace of the czarevitch. Other important buildings include the Cathedral of Saint Isaac, the churches of Saint Peter and Saint Paul, the government buildings, the stock exchange, the Marble Palace, the buildings of the Holy Synod, and numerous hospitals and national institutions. The Academy of Science, founded by Peter the Great in 1725, has a library of 160,000 volumes. Other institutions of higher learning include the Institute of Technology, the University of Saint Petersburg, and a number of high schools, academies, and theological seminaries. The Imperial Library is noted as one of the most valuable in Europe and has 1,300,000 volumes. It has many benevolent institutions, scientific and educational associations, public parks, museums, botanical and zoölogical gardens, and theaters.

INDUSTRIES. Saint Petersburg has a vast interior and foreign trade. The former is facilitated by a large number of canals and railroads that center in the city. It has a commodious harbor, extensive wharfage, and connection with all important foreign ports by numerous steamship lines. Formerly much of the foreign business was transacted at Cronstadt, a strongly fortified island town west of the city, but now a deep canal facilitates the entrance of the largest sea vessels to the well-improved harbor of the city. About 3,250 ships leave the port annually. The export and import business aggregates annually about \$145,000,000. It is one of the most important wholesale and industrial cities of Russia. The manufactures include, leather, cotton and woolen goods, clothing, gobelin tapestry, spirituous liquors, glass, sugar, tobacco products, porcelain and glass, farming implements, hardware, clothing, and machinery. It has a large trade in corn, fish, rye, wheat, live stock, lumber, and coal.

HISTORY. A settlement was founded at the mouth of the Neva by the Swedes in 1300, but it was soon after destroyed. The region was occupied by Peter the Great in 1703, in which year he began to build the fortress of Saints Peter and Paul. As a means of establishing the

influence of Russia among the powers of the Baltic and to become freed from the adverse influences at Moscow, he removed the capital from the latter city to Saint Petersburg in 1712. Many peasants were required by an imperial order to take up their residence in the new city, which began to grow rapidly. Under the successors of Peter it was greatly improved and embellished. Catharine II. promoted the construction of a network of canals inland and drained large tracts of marshy land surrounding the city. She not only built beautiful palaces for the royal family, but constructed a number as a mark of appreciation for her favorites. Compared to other great cities of Europe, it ranks as one of the newest, but must be reckoned among the finest and wealthiest in the world. About 90 per cent. of the inhabitants are Russians and the remainder consists principally of Germans, Poles, and Lithuanians. Population, 1908, 1,518,640.

SAINT PETER'S CHURCH. See *Peter's, Saint.*

SAINT PIERRE (sǎn pyâr'), an island near the mouth of the Gulf of Saint Lawrence, off the coast of Newfoundland. It and the island of Miquelon, in the Gulf of Saint Lawrence, constitute a colony of France. The surface is somewhat rocky and more or less barren. This possession is valuable only for its fisheries and as a station for vessels. It is the only remnant of territory in the northern part of North America which belongs to France. The colony has an area of 91 square miles. Saint Pierre, on the island of the same name, is the capital. The colony has a population of 12,350.

SAINT QUENTIN (sǎn kǎn-tǎn'), a city of France, in the department of Aisne, on the Somme River, 92 miles northeast of Paris. It has extensive railroad facilities and is on the Saint Quentin Canal, which unites the Somme and the Scheldt rivers. Among the noteworthy buildings are the Church of Saint Quentin, the townhall, the public library, and the Hotel de Ville. Among the manufactures are cotton and woolen goods, embroidery, billiard balls, engines, hardware, and machinery. The surrounding country contains many manufacturing towns and is a productive fruit and dairying region. The Spanish captured Saint Quentin in 1557. On Jan. 19, 1871, it surrendered to the German army, which was commanded by General von Goeben. The French army was under the command of General Faidherbe, the latter losing 10,000 prisoners and many dead and wounded. Population, 1906, 52,778.

SAINT SOPHIA. See *Sophia, Church of Saint.*

SAINT THOMAS, the name of two islands, one off the west shore of Africa and the other in the West Indies. The island of Saint Thomas off the west coast of Africa is in the Gulf of Guinea and is a Portuguese possession. It has an area of 355 square miles and produces coffee, sugar, cocoa, vanilla, and tropical fruits. In 1909 it had population 38,463. The island of Saint Thomas in the West Indies belongs to Denmark and is situated 35 miles northeast of Porto Rico. It is 13 miles long from east to west, has an area of 23 square miles, and contains a population of 15,790. Charlotte Amalie, on the south shore, is the capital. The island produces sugar, tobacco, and fruits.

SAINT THOMAS, a city of Ontario, capital of Elgin County, on Kettle Creek, sixteen miles south of London. It is on the Grand Trunk, the Michigan Central, and the Canadian Pacific railroads. The surrounding country is a fertile farming district. Among the principal buildings are the high school, the county courthouse, the public library, and many fine churches. The manufactures include leather, flour, farming implements, railroad cars, and machinery. It has a large trade in grain and merchandise. Population, 1901, 11,485.

SAINT VINCENT (sănt vîn'sant), an island in the West Indies, belonging to the Windward group, 100 miles west of Barbadoes. It has an area of 145 square miles. The soil is generally fertile and the surface is undulating, but a range of volcanic mountains trends from north to south. The most active volcano is in the northwestern part, called La Soufrière, whose extensive crater is about 3,000 feet above sea level. Among the principal exports are molasses, sugar, rum, spices, cocoa, and fruits. Columbus discovered Saint Vincent in 1498. It has been alternately neutral, French, and British, but since 1783 it has constituted a British possession. Kingston is the capital. Population, 1906, 47,055.

SAINT VINCENT, Cape, the southwestern extremity of Portugal, forming an extensive promontory in the Atlantic. Several important naval battles have been fought in its vicinity. In the first, on June 16, 1693, the English under Admiral Rooke were defeated by the French with the loss of twelve men-of-war and eighty merchantmen. Another battle of importance occurred here on Feb. 14, 1797, in which the English under Sir John Jervis defeated the combined fleet of Spain and France and thus prevented a French invasion of England.

SAINT VITUS'S DANCE, or **Chorea**, a disease of the nerves of motion, causing the ex-

tremities and other parts of the body to move involuntarily. It is most common among persons from the age of ten to twenty years and is more frequent in females than in males. The early symptoms include a feeling of languor, a furred tongue, and disorder of the stomach. Usually the patient becomes subject to a sense of awkwardness while in the presence of strangers, owing to sudden muscular contortions. Gradually the muscles cease to be under full control of the will, except by a violent and painful volition. In many cases the hands move suddenly in an opposite direction from the one intended, while the face may be distorted by the spasmodic action of the muscles. All actions of the body become very uncertain. Rest, wholesome exercise, a careful diet, and medical treatment are essential.

SAIS (să'ēs), anciently a city of Egypt, on the Canoptic branch of the Nile delta. It is celebrated as the seat of many palaces and temples and because it gave its name to the 24th and 26th dynasties of Egypt. Few ruins are left to indicate its former importance, but those remaining, considered in the light of history, make it certain that it contained a vast sepulcher of Osiris, within whose walls were the tombs of many kings. The 26th dynasty made it the capital of Egypt, but when the political center was removed to Memphis it began to decline. Solon and Pythagoras were among the Grecians to visit Sais. Plato was an instructor in its colleges. Close trade relations were maintained between Sais and Athens. Schiller made the legend of the mysterious veiled statue in the temple of Neith the subject of a ballad.

SAKI (să'kê), a slightly intoxicating beverage manufactured in Japan, which forms the common stimulating drink of the Japanese. It is made from rice and is drunk warm, producing a speedy but transient intoxication.

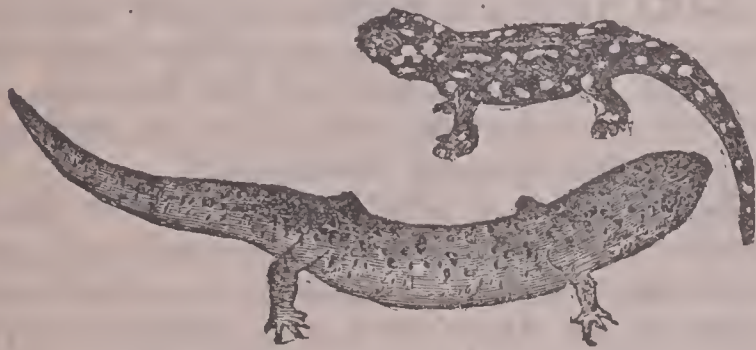
SALADO (să-lă'thō), a river of South America, in Argentina. Its source is near the southern boundary of Bolivia, on the eastern slope of the Andes, and, after flowing toward the southeast, a distance of 950 miles, it joins the Paraná at Santa Fe. The Salado flows through a fertile region and is navigable about one-third of its course.

SALAMANCA (săl-ă-măn'kă), a village of New York, in Cattaraugus County, sixty miles south of Buffalo. It is on the Allegheny River and the Erie, the Pennsylvania, the Buffalo, Rochester and Pittsburg, and other railroads. The surrounding country is agricultural. It has manufactures of cotton goods, gloves, furniture, and machinery. The chief buildings include the

public library, the high school, and a number of churches. The vicinity was first settled in 1616 and the village was incorporated in 1878. Population, 1905, 5,435; in 1910, 5,792.

SALAMANCA (säl-ä-män'kä), a city of Spain, capital of the province of Salamanca, on the Tormes River, 115 miles northwest of Madrid. Once renowned for its splendid edifices and institutions, it has declined under successive wars and a lack of industry, but within recent years the city has gained materially in population. A railroad line connects it with Valladolid and other places of importance. It has manufactures of clothing, leather, chemicals, and earthenware. Among the most noted buildings are a cathedral in the Romanesque style dating from 1102, numerous other churches, several Jesuit colleges, and its great university. The university was in the height of its prosperity from the 15th to the 17th centuries and at one time had 15,000 students, but at present there are not over 1,250. The great square, designed for bullfights, was long an attraction for the sportive world and has a capacity for 20,000 spectators. Salamanca is mentioned in history as having been captured by the Carthaginians under Hannibal in 222 B. C., but later the Romans expelled the intruders and made it the center of military influence in that part of Spain. It was the scene of a battle on July 22, 1812, in which the French under Marshal Marmot were defeated by the Anglo-Portuguese under the Duke of Wellington. Population, 1908, 26,218.

SALAMANDER (säl'ä-män-dēr), a class of animals allied to newts, which closely resemble the lizards. Many species have been de-



RED AND SPOTTED SALAMANDERS.

scribed. All have an elongated body, a long tail, and four legs. The young are brought forth in water, where they at first breathe by gills, but later they take mostly to land and breathe by well-developed lungs. Their food consists of snails, slugs, worms, and insects. The *spotted salamander* is a representative type. It has peculiar spots on its back and is a sluggish and stupid animal. It is common to the warm and temperate parts of Africa, Asia, and

Europe, where it attains a length of about seven inches. The *black salamander* is somewhat smaller and is peculiar for exuding a milky humor from the pores of the back and sides when alarmed, as a protection against small animals. Allied species are native to the temperate and warm parts of America, but they are more frequently spoken of as newts and efts. These animals were formerly thought to possess a body so cold as to be invulnerable to fire and other forms of heat, but this view has long since been dispersed, except among the illy informed of some parts of Asia.

SALAMIS (säl'ä-mīs), or **Kuluri**, a Grecian island in the Gulf of Aegina, eight miles west of Athens. It has an area of 36 square miles. The surface is rocky and mountainous, but produces grapes, cotton, olives, and mulberry trees. Ambelaki, the chief town, occupies the site of the ancient town of Salamis. Population, 1908, 6,145.

SALAMIS, Battle of, a celebrated naval engagement between the Greeks and Persians in 480 B. C. It occurred off the island of Salamis, near Athens, which is now generally called Kuluri. The battle was fought shortly after the historic battle of Thermopylae. Xerxes commanded the Persian fleet of 1,200 triremes and a large number of smaller vessels, and the combined fleet of the Grecians numbered only 365 triremes. Two main divisions made up the Grecian army, those of the Corinthians and the Athenians. The former were commanded by Adimantus and the latter by Themistocles, but the entire Grecian force was directed by the Spartan Eurybiades. Overconfidence of the Persians and the unwieldy number of their vessels made it possible for the Grecians to charge them with great success and to protect their coast against further Persian attacks.

SAL AMMONIAC (säl äm-mō'nī-äk), the chloride of ammonium, obtained from the refuse matter of gas works. It is found native in volcanic regions and may be produced in small quantities by adding hydrochloric acid to a solution of ammonia. Sal ammoniac is soluble in water, has a specific gravity of 1.45, and is bitter to the taste. It is used in medicine, in galvanizing iron, and in calico printing.

SALAYER (sä-lī'ēr), the name of a group of islands in the Malay Archipelago, situated a short distance south of Celebes. Salayer Island, the largest of the group, has an area of 250 square miles, while the entire area is 295 square miles. The islets included are Hog, Boncratta, and Kalaura. The group is of coral limestone formation and has a fertile soil. Tobacco, cotton, potatoes, indigo, fruits, horses, and ebony

are the principal products. The inhabitants are chiefly Malays of the Mohammedan faith. Population, 1907, 65,840.

SALEM (sā'lem), a port city of Massachusetts, county seat of Essex County, on Massachusetts Bay, fifteen miles northeast of Boston. It is on the Boston and Maine Railroad and has regular communication by steamboats and electric railways. The harbor is comparatively shallow, but has been put in a condition of improvement that renders it quite safe and convenient. It has two fine parks, the Willows and Washington Park, and is well improved by grading, paving, sewerage, waterworks, and gas and electric lighting. The noteworthy buildings include the county courthouse, the customhouse, the city hall, the State normal school, the public library, the Bertram Home for Aged Men, and the Salem Hospital. It is the seat of the Peabody Academy of Science, the Salem Athenaeum, and the Essex Institute. The manufactures include boots and shoes, cotton and woolen goods, cordage, white lead, leather, earthenware, hardware, and machinery.

Salem is a Mecca for tourists throughout the year, owing to its early history. It was founded in 1626 and the church erected by Roger Williams in 1634 may still be seen immediately back of Plummer Hall. The famous crusade against witchcraft occurred in 1692, which resulted in hanging nineteen persons on Gallows Hill and the death of another by pressure. Salem is the birthplace of Nathaniel Hawthorne, who wrote the preface to "The Scarlet Letter" in the customhouse. It was incorporated as a city in 1836. Population, 1905, 37,586; in 1910, 43,697.

SALEM, a city in New Jersey, county seat of Salem County, 38 miles southwest of Philadelphia, Pa. It is near the confluence of the Delaware and Salem rivers, on the West Jersey and Seashore Railroad, and has regular steamboat communication. The surrounding country is devoted to farming and fruit growing. Glass, oilcloth, hardware, wall paper, flour, machinery, and canned fruits are the chief manufactures. It has waterworks, electric lighting, and a sanitary sewer system. The region was settled by Swedes in 1641 and became a stronghold of Quakers under John Fenwick in 1675. It was incorporated as a village in 1695 and as a city in 1858. Population, 1905, 6,443; in 1910, 6,614.

SALEM, a city of Ohio, in Columbiana County, seventy miles west of Pittsburg, Pa. Communication is furnished by the Pennsylvania and the Pittsburg, Lisbon and Western railroads. It is surrounded by a fertile agricultural country, which contains deposits of bituminous coal. The chief buildings include the high school,

the public library, and many churches. Among the manufactures are hardware, flour, pumps, and machinery. It is improved by electric lighting, waterworks, and pavements. The place was settled in 1807 and incorporated as a city in 1887. Population, 1900, 7,582; in 1910, 8,943.

SALEM, the capital of Oregon, county seat of Marion County, on the Willamette River, 52 miles south of Portland. It is on the Southern Pacific Railroad and is surrounded by a fertile agricultural and dairying country. Much has been done to improve and beautify the site, which rises gradually from the margin of the river. The noteworthy buildings are the State capitol, the county courthouse, the Federal building, the city hall, the opera house, the high school, the State prison, the State insane asylum, and the State school for the deaf. It is the seat of the Willamette University, the Friends' Institute, the Academy of the Sacred Heart, and the Indian Training School. This city is well improved by electric lighting, waterworks, sewerage, and grading. Among the manufactures are linseed oil, leather, woolen goods, clothing, flour, furniture, tobacco, machinery, canned and dried fruits, and earthenware. The first settlement was made at Salem in 1834, but it was not platted until 1844, and it became the State capital in 1860. Population, 1910, 14,094.

SALEM, a city of India, in the Madras presidency, about 125 miles southwest of Madras, with which it is connected by railways. It is the capital of a government of the same name. It has a number of noteworthy temples, government buildings, and educational institutions. Among the manufactures are carpets, clothing, hardware, earthenware, and machinery. Modern improvements, such as telephones, pavements, electric lights, and waterworks, have been constructed. The surrounding districts produce large quantities of rice, pulse, and fruits. Population, 1906, 72,812.

SALERNO (sā-lēr'nō), a seaport city of southern Italy, on the Gulf of Salerno, 32 miles southeast of Naples, with which it is connected by a railroad. It is surrounded by a stone wall of Gothic structure, but has an unimportant harbor and few modern conveniences. The streets are mostly narrow and in a poor state of repair. It has a number of excellent buildings, including a beautiful Gothic cathedral erected by the Normans, several baths, and a number of celebrated sepulchers. The famous University of Salerno was founded in 1150, but was abolished in 1817. Salerno has improved materially since its railroad line was built and has manufactures of silk and cotton textiles, earthenware, and utensils. The province of Salerno, of which

the city of Salerno is the capital, is noted for its production of fruits and wine. Population, 1906, 43,871.

SALFORD (səl'fōrd), a town in England. See **Manchester**.

SALIC LAW (səl'ik), the code of laws established by the Salian Franks. The name is applied particularly to one chapter of these laws, that in which succession to certain lands is limited to male heirs to the exclusion of females, chiefly because the possession of those lands implied certain military duties. The Salic Law was applied in France to the succession of the crown in the 14th century, thus excluding females from the throne.

SALICYLIC ACID (səl-ī-sil'ik), an organic acid found in many plants, but the best quality is obtained from wintergreen, in which it forms an essential oil. It is a compound of carbon, hydrogen, and oxygen and is obtained by distilling the flowers of some plants and the bark of others. It is found in combination with the volatile oil of betula in the bark of the sweet birch, in the flowers of the meadowsweet, and in the whortleberry. The taste is sweetish-sour and the properties are antiseptic and antiputrefactive. For commercial purposes it is manufactured either from the oil of wintergreen or from carbolic acid, but the latter is the most important product. It is used in the manufacture of certain dyestuffs, for the preservation of articles of food, and in some cases as a medicine. The foods preserved by this product include milk, eggs, fruits, and pickled vegetables. Antiseptic properties are not possessed by the salts of salicylic acid, but its sodium salt is used for medicine, especially in cases of acute rheumatism.

SALINA (sə-lī'nā), a city in Kansas, county seat of Saline County, on the Smoky Hill River, 38 miles northeast of Ellsworth. It is on the Missouri Pacific, the Union Pacific, the Atchison, Topeka and Santa Fé, and the Chicago, Rock Island and Pacific railroads. Gypsum quarries and salt springs are found in the vicinity. The surrounding country is fertile, producing cereals, grasses, and fruits. Among the principal buildings are the county courthouse, the public library, the Federal building, the Kansas Wesleyan University, and the Salina Normal University. The manufactures include flour, brooms, vehicles, ironware, and machinery. The city has electric lights and other municipal facilities. It has a growing trade in live stock and cereals. The place was settled in 1860 and incorporated in 1870. Population, 1910, 9,688.

SALISBURY (səlz'bēr-ī), or **New Sarum**, a city of England, in Wiltshire, on the Avon River, eighty miles southwest of London. It

has convenient railroad facilities, manufactures of cutlery and clothing, and several public schools. A splendid cathedral, completed in 1258, is its chief building. It is 473 feet long and 111 feet wide, and has a spire 400 feet high. Salisbury has a fine bishop's palace and the Blackmore Museum, the latter containing antiquities collected in America. Among the manufactures are cutlery and clothing. Population, 1907, 18,866.

SALISBURY, a city in North Carolina, county seat of Rowan County, on the Southern Railroad, 115 miles west of Raleigh. It is surrounded by a fertile region, which produces cereals, tobacco, cotton, and fruits. The features include the county courthouse, the State normal school, the Livingstone College, the National Cemetery, and many churches. It has extensive shops of the Southern Railroad. Among the manufactures are cigars, flour, ironware, railroad cars, and machinery. It was incorporated in 1770. A Confederate military prison was located here at the time of the Civil War. Population, 1900, 6,277; in 1910, 7,153.

SALIVA (sə-lī'vā), the thin, colorless liquid secreted in the mouth by the salivary glands, which serves to keep the mouth in a moist condition and aids mastication by mixing with the food. Three pairs of salivary glands secrete saliva, known as the parotid, submaxillary, and sublingual. The *parotid glands* are seated on the sides of the face, between the ear and the lower jaw; the *submaxillary*, beneath the horizontal part of the lower jaw; and the *sublingual*, beneath the tongue. They consist of numerous lobes and lobules, which are connected by vessels, ducts, and areolar tissue. The product secreted is conducted to the mouth by ducts. The amount varies, but the usual quantity is about three pounds per day, and in health it is always sufficient to keep the mouth moist. It contains but a small proportion of solids. Besides serving to moisten the food, it assists in mastication and swallowing, and its peculiar organic principle, called *ptyalin*, acting upon the starch of the food, begins the process of changing it into glucose or grape sugar. Some mammals are destitute of salivary glands, and so also are some reptiles and most fishes.

SALLEE (sə-lē'), or **Sla**, a seaport town of Morocco, on the Atlantic coast, at the mouth of the Bu-Regreb, 100 miles west of Fez. It occupies a site on the north side of the river, opposite the town of Rabat, and has manufactures of carpets, textiles, and utensils. Its importance is due to a considerable export trade in wool and fruits. It was long a haunt for pirates, but piracy was stopped by European powers in

the early part of the last century, although Rabat was bombarded by the French in 1851. Sallee has a population of 12,125, of which about 3,000 are Jewish traders.

SALMON (săm'ŭn), the common name of a class of food fishes which belongs to the genus *Salmo*. They are common to both salt and fresh waters and are particularly abundant in the North Atlantic. A number of well-marked species have been described, all of which are among the most important marketable fishes, but those of the North Atlantic are most widely distributed, ranging north of New York in America and north of Spain in Europe. The usual length of the common salmon is from three to four feet and the general weight ranges from 15 to 30 pounds, but specimens weighing 50 and even 75 pounds are not rare. The color of the adult fish is a steel-blue on the back and head, variegated with grayish or blackish spots, and merging into silvery-white beneath. The flesh has a delicate reddish-orange color. It feeds on animal matter, particularly on minnows, small fish, and herring, but its food varies somewhat with the locality which it frequents. The salmon cannot be said to belong exclusively to either the marine or the fresh-water fishes, but its natural home is near the mouths and estuaries of the larger rivers. However, there are marine species that inhabit the deeper parts of the ocean and a species occurs landlocked in certain lakes in Maine, New York, and New Brunswick.

It is thought that the salmon obeys a natural instinct in migrating from the sea to spawn in the rivers. This migration occurs annually in



SALMON.

1, Salmon Trout; 2, Columbia River Salmon.

the autumn, and, after remaining for some weeks in the stream, both male and female return to the sea. This migratory instinct is so great that rapids and waterfalls are no material obstacle against its advance toward the heads of rivers.

Salmon have been seen to leap a height of sixteen feet and, failing to surmount the difficulty, successive trials have been observed. They possess a peculiar ability to suspend themselves and move upward in the falling water by a switch of the tail. The eggs are deposited in furrows made by the female in the gravel lying at the bed of the river, where they are covered by sand moved by means of the tail. Many of the eggs are carried away by the running water or eaten by trout and wild fowl, but these losses are compensated for by the immense fertility of the fish, many hundreds of eggs being deposited by a single female. The eggs hatch in a period ranging from 70 to 140 days. The young fish in its embryo state resembles a tadpole, being only about five-eighths of an inch in length and having a portion of the egg suspended below its body, which serves as food for several weeks. By the seventh week it has grown sufficiently to assume the form of a small fish an inch in length, and it begins to swim about in search of food.

The young salmon before its migration seaward is called a *parr*. In that stage it ranges from three to eight inches in length. When from one to two years old, it begins to assume a brilliant silvery hue and the fins become darker. It is now called a *smolt*, or *salmon fry*, gathers in groups of from 40 to 75, and begins to move slowly toward the sea. On reaching brackish water, the salmon remain at rest for a short time, but soon take to the sea, where their life is unknown. It has been observed that their growth in the open sea is remarkably rapid. A molt weighing two ounces has been found to attain a weight of from six to ten pounds within a few months. After remaining about three months in the open sea, they return to fresh water weighing from four to six pounds and are known as *grilse*, or *salmon peel*. They are capable of depositing eggs when in the *grilse* state and usually spawn shortly after reaching fresh water, but return soon after to the open sea to develop into the adult salmon. After a second stay in the ocean, ranging usually a period of several months, the salmon return to the fresh water, generally seeking the place of their birth. It is while they move from the sea to the spawning grounds that they are caught in large numbers.

Many methods are used to catch salmon, including by seines, gill nets, and various trap contrivances. *Gill nets* contain meshes large enough to admit the head of the fish beyond the gills, but are not large enough for the fish to

pass through, and when trying to escape they are held fast by the gills. *Seines* are drawn through the water, but in many places the *pound net* has taken their place. It is a net that may be set in the water, the fish being guided into it as they move up stream by a straight stretch of upright nets. Fish traps are stationary structures into which the fish are guided and caught. It is not difficult to understand that these devices may be used effectually, since in many streams the salmon force their way to the upper waters in such large numbers that the streams become almost choked. The Columbia, Sacramento, and Frazer rivers are among the most prolific sources of salmon in America, the catch in the Columbia River alone being about 1,500,000 salmon annually. Salmon fisheries of vast value were added to the United States by the purchase of Alaska.

The annual catch of salmon on the entire Pacific coast of the United States and the Dominion of Canada is valued at about \$12,500,000. There is danger that the supply will be exhausted in the course of time unless the rivers are replenished by the fish commissions. Salmon fisheries of importance are found in the Elbe, Tay, and many other rivers of Europe north of Spain. The salmon common to the North Atlantic is generally known as *salmon salar*, and differs from the species found in the waters of Northwestern America. The salmon of North America include species known as *dog salmon*, *quinnat* or *kung salmon*, *silver salmon*, *blueback salmon*, *humpback salmon*, and *salmon trout* or *steelhead*. The salmon is eaten fresh and in a cured state, but in many regions the canned salmon are consumed most extensively.

SALMON TROUT. See **Trout.**

SALOL (säl'öl), a white crystalline powder used as a medicine, frequently called *salicylate of phenol*. It is tasteless and odorless, is insoluble in water, but is soluble in ether, alcohol, and chloroform. It does not dissolve when taken into the stomach, but is dissolved in the duodenum by the alkaline pancreatic juice. As a medicine it is useful in treating rheumatism. It is prescribed as an intestinal antiseptic in cholera and other disorders of the alimentary canal.

SALON (sá-lôn'), the name of an annual exhibition of works of art in Paris, France, in the months of May and June. It is held in the Palais de l'Industrie and is open to living artists of all nationalities. The exhibits consist of engravings, etchings, paintings, pastels, sculpture, and water colors. When the works of art are received at the Salon, they are examined by a jury of experts to determine whether they are worthy of being exhibited. The same jury determines the distribution of medals and the *Prix de*

Rome, which is held in high esteem. This institution dates from 1607, when exhibitions began to be made at the Palais Royal, but two years later it was transferred to the Salon of Carre of the Louvre. It was transferred to its present quarters in 1855.

SALONICA (sä-lō-nē'kà), or **Saloniki**, a seaport of Europe, in Turkey, on the Gulf of Salonica. It occupies a beautiful site at the head of the gulf, which furnishes a safe and commodious harbor, but the streets are in a poor state of repair and many of them are crooked and narrow. Salonica has railroad connections with cities lying toward the north, which, together with its extensive steamboat lines, give the city an important interior and foreign trade. The trade is chiefly in cotton and woolen fabrics, grain, timber, tobacco, sponges, carpets, live stock, and fruits. Among the manufactures are cotton textiles, woolen and silk goods, clothing, utensils, leather, carpets, and machinery. The principal buildings include a number of mosques, the Christian churches of Saint George, Saint Sophia, and Saint Demetrius, and a number of government offices. Among its ancient buildings is the citadel, situated on a rocky eminence, and in it are the remains of a triumphal arch dating from the time of Marcus Aurelius. Remains of a Grecian hippodrome and Roman triumphal arches have been described by several writers.

Salonica was first known as Therma and is mentioned under that name in connection with the invasion of Greece by Xerxes. Cassander rebuilt it in 315 B. C. and named it Thessalonica, from which the present name was derived. It was the scene of many important military maneuvers throughout the early history of Europe. In 409 the Saracens conquered it after an extended siege. It was possessed by the Normans in 1185 and taken by the Turks in 1430. At present the inhabitants consist of Spaniards, Jews, Greeks, Turks, and Albanians. Population, 1908, 151,282.

SALT, in chemistry, an acid whose hydrogen has been partly or wholly replaced by metal, as sodium chloride; or a compound formed by the union of an acid and a base, as nitrate of silver. The term is applied in a plural form to compounds that can suffer rapid double decomposition with another soluble substance. This is the case when mixing together solutions of nitrate of silver and chloride of sodium, which at once decompose each other and form nitrate of silver and chloride of sodium. The term is often applied to various compounds, such as acetate of ethyl, chloride of ethyl, and even to such fats as stearin and glycerin. In popular usage,

the term salts refers to *Epsom salts*, a saline purgative.

SALT, or **Chloride of Sodium**, a widely distributed compound, which has been used for seasoning and as a preserver of food from time immemorial. It is an essential ingredient of food for most animals and supplies the chief source of soda and chlorine. Hence, it enters extensively into the market and forms an important product for many uses in chemical and industrial arts. About 3 per cent. by weight of the ocean is made up of it, and vast beds of salt occur in strata of all geological periods from the Silurian up. Extensive deposits of salt are found widely distributed in all the continents. Wild animals obtain it at salt licks, to which they tread trails or paths. Traces of trails may be seen in many sections of North America, especially in the arid regions, most of which were made by elks and bisons. The salt of the market is obtained by evaporating or freezing water taken from the ocean, or by mining in beds of rock salt. In many regions it is obtained from the waters of saline lakes, springs, and wells. Brine springs result from rock salt dissolving under the influence of subterranean streams, notable instances of this occurring in Kansas, Oklahoma, and other sections of the United States. Michigan has remarkable deposits of salt, particularly in the vicinity of Saginaw Bay, where millions of bushels are produced annually.

Vast deposits of salt occur in the Avery Island region of Louisiana. Here the salt strata are reached at a depth of 250 feet below the surface. It is estimated that these deposits have a thickness of about 2,000 feet. Vast deposits of salt occur in Nevada and California, where valuable strata of rock salt, brine springs, and saline marshes are abundant. The most celebrated salt deposits of Europe are in Prussia, where mines have been worked continuously since the 12th century. Other notable deposits occur in the Crimea, Caucasus, China, Persia, the Sahara Desert, and various parts of Australia. In many arid countries, as in parts of Australia, Asia, and the western sections of North and South America, salt lakes are abundant. In the rainy seasons the lake basins are supplied with an abundance of water, but during the dry times vast deposits of salt form near the shore by the evaporation of the water.

The United States exceeds every other country in the world in the production of salt. At present the annual output is about 3,150,700 tons. It represents a value of \$8,150,000. Much of it is exported to Canada, Mexico, Central America, and the Hawaiian Islands. Canada has vast de-

posits of salt, especially in the vicinity of Goderich, Ontario, but the annual output does not exceed 80,000 barrels. Besides serving as a preserver and seasoner of food, salt is used as a general mordant, for glazing coarse pottery, in giving hardness to soaps, and for imparting clearness to glass.

SALTILLO (sál-tēl'yô), a city of Mexico, capital of the state of Coahuila, 65 miles southwest of Monterey. It occupies a fine site in the fertile valley of the Rio Tigre, has well-paved streets and several public buildings, and is a railroad center of considerable importance. Among the manufactures are cotton and woolen goods, clothing, and machinery. It was founded in 1586. Near it was fought the Battle of Buena Vista, in 1847. Population, 1906, 27,180.

SALT LAKE CITY, the capital of Utah, county seat of Salt Lake County, near the Jordan River, ten miles southeast of Great Salt Lake. It has transportation facilities by the Union Pacific, the Utah Central, the Rio Grande Western, and other railroads.

DESCRIPTION. The city is beautifully situated at the western base of the Wasatch Mountains and has a general altitude of 4,250 feet above sea level. It is regularly platted, the streets crossing each other at right angles, and the thoroughfares are wide and well graded. Many of the streets are well paved with stone, asphalt, and macadam and a small stream of water runs next to the curb of most of the paved streets. Extensive systems of electric lighting, waterworks, and electric railways are maintained. Electric power is developed by a cataract in a mountain some distance from the city, both for lighting and industrial enterprises. The street railways reach all parts of the city and many suburban and interurban points. In the vicinity of Salt Lake are hot sulphur springs, and bathing resorts are maintained on the shores of Great Salt Lake. The most popular bathing places are at Saltair and Garfield Beach, both of which are finely improved and attract large numbers of visitors and tourists.

BUILDINGS. Temple Block, near the heart of the city, contains the celebrated Mormon Temple, the Tabernacle, and the Assembly Hall. This tract consists of about ten acres, and here the Mormon Church has its official seat and headquarters. The Mormon Temple, which is the most beautiful and costly building in the city, was completed in 1892. It was formally dedicated on April 6, 1893, that being the 63d anniversary of the Mormon Church. Forty years were required to complete the structure and the total cost, estimated in value of material and labor at the time, was \$12,000,000. It is of

granite, 187 feet long and 99 feet wide, and each end has three lofty towers, the highest of which is 223 feet above the foundation. The highest spire is surmounted by a statue of the angel Maroni, which is 12 feet in height and finished with gold-leafed plating. The Tabernacle is elliptical in form, 250 feet long and 150 feet wide, and has accommodations for 10,000 persons. It has self-supporting arches in the roof, which is 70 feet high, and is noted for its superb acoustic properties. The great organ in this structure is considered one of the finest in America. Several other buildings connected with the Mormon Church are of interest, including the tithing storehouses, the former residences of Brigham Young, and the Latter Day Saints' College. A monument surmounted by a statue of Brigham Young stands in front of the Temple Block.

Among the principal public buildings are those of the city and county, the Exposition Building, the Salt Lake Theater, and the Holy Cross and the Saint Mark's hospitals. The University of Utah, a coeducational institution, is maintained by State support. It is situated on the site of Fort Douglas, which was granted by Congress in 1893. The city has a State normal school and many private institutions, including Gordon Academy, All Hallows' College, Rowland Hall, and Salt Lake Collegiate Institute. All of the leading Christian denominations are well represented by organizations and many fine church buildings are maintained. The public library contains 25,000 volumes and other collections of books are in the educational institutions and in the State law library, which has 15,000 volumes.

INDUSTRIES. The city has extensive interests in jobbing and wholesaling and is the most important commercial city between Denver and the Pacific coast. Several smelters and mineral mills are operated. It is the headquarters of a number of large mining companies that operate in the vicinity. It has a large trade in live stock and farm products, although irrigation is necessary to maintain the productiveness of the country. Among the leading manufactures are saddlery, boots and shoes, malt and spirituous liquors, pipe tobacco and cigars, furniture, machinery, and railway cars.

HISTORY. Brigham Young founded Salt Lake City in 1847, at which time the region was far from settlements and was noted as an arid and waste country. Under the persevering influence and industry of the early settlers the region was transformed into a district of fertility and wealth, and the city ranks among the most beautiful and prosperous in the United States. The organization as a city dates from 1851. After

gold and silver were discovered in the vicinity, a large number of non-Mormons settled here, and this class now constitutes about one-third of the inhabitants. Population, 1910, 92,777.

SALTON SEA, an extensive body of water in the southwestern part of California, located a short distance northwest from the Gulf of California. The basin is about 200 feet below sea level and the water covers an area of 500 square miles, located within what is known as Imperial Valley. It is thought that the basin was once occupied by the water of the Gulf of California, but in recent times it has been quite dry. In the summer of 1891 the Colorado River became unusually high, causing an overflow to find its way into the basin. American capitalists undertook to irrigate the district by waters from the river in 1900, and the river, from which there is considerable fall, cut the irrigating canal to the extent that the waters became uncontrollable. In 1905 a large section of country was inundated and the Salton Sea was over 70 feet deep in some places. Many millions of dollars' worth of property were destroyed by this flood, which was finally stopped in 1907. Large deposits of salt abound in the basin, hence the fresh water of the river became salty in the basin.

SALTPETER (səlt-pē'tēr), or **Nitre**, a white crystalline substance, which has a saline taste. It is obtained by leaching from certain soils, in which it is produced by the process of nitrification, a method of oxidation in which nitrogenous vegetable and animal matter, in the presence of air, moisture, and some alkaline basic substances, is converted into nitrates. Native deposits of saltpeter occur in India, Persia, and other countries of Asia, but the commercial supply is now prepared largely from the deposits of nitrate of soda found in Chile and Peru. In preparing it a double decomposition is effected between nitrate of soda and either potassium chloride or potassium carbonate. Solutions of the two substances are mixed in a boiling state and the sodium chloride or carbonate is formed. Being much less soluble in boiling water than the saltpeter, or potassium nitrate, it may be readily separated. Saltpeter crystallizes in six-sided prisms. It is used with common salt and sugar in curing meat, as an oxidizing agent, in glass making, in metallurgical operations, in the manufacture of gunpowder, and in pyrotechnics. It has an important place in pharmacy. Native nitrate of soda is valuable as a fertilizing manure, for which purpose largely quantities are shipped from Chile and other South American ports.

SALTS, the name of many compounds formed by the action of acids upon bases, in

which one atom of a univalent element is substituted for one atom of hydrogen. These salts include potassium nitrate, sodium chloride, and silver chloride. Other salts are formed by the substitution of one atom of a bivalent base-forming element for two atoms of hydrogen, such as zinc chloride and barium nitrate. The list includes a large number of acid salts, such as sulphate of iron or green vitriol, which is formed by the union of sulphuric acid and iron.

The name *smelling salts* is applied to a preparation of carbonate of ammonia with fragrant volatile oils. Products of this kind are used to diffuse sweet scents, or to restore persons who suffer from faintness. They rely for their pungency upon ammonia, while the agreeable scents are derived from various oils, such as the oils of cloves, lemon, bergamot, and lavender. Fancy bottles are manufactured to contain these products and they are usually ornamented with silver and gold decorations.

SALVADOR (säl-vä-dör'), **Republic of**, the smallest of the Central American states, which is situated southwest of Honduras. It is 140 miles long from east to west and has an area of 8,135 square miles. Much of the surface is gently undulating, but there are ranges of volcanic mountains traversing through the central part, with peaks ranging from 3,500 to 9,000 feet above sea level.

DESCRIPTION. The Pacific coast is a generally level plain, from which valleys extend along the streams to the boundary of Honduras and Guatemala, and a considerable valley region extends through the northern part. The western boundary is formed by the Santiago River and along the southeastern coast is the Gulf of Fonseca, a large inlet from the Pacific. A large part of the general drainage is toward the south. The chief river is the Lempa, which is navigable a short distance, and the principal inlet is Jiquilisco Bay. The soil is remarkable for its fertility.

INDUSTRIES. The climate and rainfall are favorable to the production of cereals, grasses, fruits, and vegetables. Agriculture is the chief industry, but comparatively large interests are vested in mining. Among the chief products are sugar, coffee, indigo, tobacco, balsam, maize, cotton, and timber. The mineral deposits include gold, silver, iron, copper, mercury, and coal. Cattle, horses, mules, and sheep are reared in abundance. The manufacturing industries are in a primitive state, but the country has the elements that permit development, since the natural resources supply an abundance of material to render manufacturing enterprises profitable. Among the leading manufactures are flour, indigo, sugar,

balsam, and rum. A majority of the trade is with Great Britain and the United States.

GOVERNMENT. Salvador is divided into fourteen departments and the government is modeled after that of the United States. The president is elected for a term of four years and has the assistance of a cabinet of four departments. Legislative authority is vested in a congress of seventy representatives, elected by popular vote for terms of one year, and the judicial power is vested in a supreme court and a system of inferior courts. The standing army numbers about 4,250, but it is not well equipped, and the national militia is placed at 18,000 men and officers. The navy is not of material importance, including only a few ships and gunboats. Education is free and attendance at school is nominally obligatory. Besides the elementary schools, there are high schools in the towns and cities, two normal schools, and a national university with faculties of law, medicine, sciences, and engineering.

GENERAL. In 1909 the country had 280 miles of railroads. Some of the highways are well built and several canals are maintained. Spanish is the spoken and official language. Roman Catholicism is the state religion, but other denominations are tolerated. Salvador is the capital and largest city. Other cities include Santa Ana, San Miguel, Nueva San Salvador, San Vicente, and Sonsonate. A large proportion of the inhabitants are natives and mixed races, 234,648 of the former and 772,200 of the latter. Population, 1905, 1,068,692.

HISTORY. Salvador was long known as Cuscatlan. It was conquered for Spain by Pedro de Alvarado in 1525. It became independent from that country in 1821, when it joined the Mexican confederation, but became an independent republic in 1853. The present constitution was adopted in 1864, but it has since been revised several times. Salvador is the most densely populated republic of Central America, but its material progress has been retarded considerably by local dissensions and revolutions. The people have generally opposed the proposition to form a union of the Central American states.

SALVATION ARMY, an organization formed in England by William Booth in 1865, whose mission is the salvation of mankind by spreading the Gospel. In this work he was assisted by his wife, both of whom had formerly been members of the Methodist New Connection. After conducting a mission in the eastern part of London, at which many depraved persons were changed into earnest converts, the mission was reorganized and called the Salvation Army, and by this name it has been known since 1878.

Military phrases were generally adopted, the leader being called a *general*; evangelists, *officers* of different grades; and candidates, *cadets*. The uniforms differ according to the customs of a country, but are quite similar in the United States, Australia, and the countries of Europe, while in parts of Asia red or white garments are most prevalent. Everywhere the army prepares a map on which the country is represented in districts and each section is placed under the charge of a *major*. This officer is assisted by one or more corps under a *captain*, who is assisted by *lieutenants*.

The army was equally applauded and opposed from the first, but in its quiet way it has won a large following, everywhere practicing self-denial and coming in touch with the common people. Both men and women wear characteristic uniforms, the latter being distinguished principally by poke bonnets with red trimmings, and in this manner parade the streets with banners, drums, timbrels, and songs. Crowds are induced to assemble at convenient places, and after a brief service the parade is conducted by the leader to the church or hall, where the services are continued. Members are pledged to temperance, unselfish lives, and belief in the Bible, and each is encouraged to give glad obedience and lead a spiritual, enthusiastic, Christian life. No distinction is recognized between the sexes as to rank, duty, or opportunity; and all persons are welcome to membership with a spirit of good cheer and devotion.

The army made its first appearance in France in 1880 and in the same year began its crusade in Canada and the United States. Ballington Booth took charge of the American branch in 1883, but in 1896 organized a separate society known as *The Volunteers*. Booth-Tucker is at present the commander of the Salvation Army in North America. The army has 775 stations on this continent, 3,250 officers, 25,000 active workers, and about 425,000 members. It maintains 150 relief stations and a number of educational institutions. The total membership in the world is growing rapidly and the work is conducted in about 35 different languages. The *War Cry* is its principal publication. It is issued in England, but there are editions in French, German, and Swedish in New York City. Other periodicals include *The Young Soldier*, *Conqueror*, *Harbor Lights*, and *Social News*. General Booth published his "In Darkest England and the Way Out" in 1890, with which he laid the foundation for providing means to establish places of work for the homeless.

SALWIN (säl-wën') or **Salween**, a river of Asia, rises in Central Tibet and, after a general

course of 800 miles toward the east and south, flows into the Gulf of Martaban, an inlet from the Indian Ocean. Several lakes are in the upper course, but in some places it flows through steep cliffs, and the valley has much fertility. Rapids obstruct navigation, but steamboats ascend as far as Moulmein, to which place large quantities of teak and other timber are floated. The basin of the Salwin includes 62,750 square miles.

SALZBURG (zälts'böörg), a city of Austria-Hungary, in the province of Salzburg, on the Salzach River, 62 miles southeast of Munich, Germany. It occupies a beautiful site on both sides of the river, which is crossed by several bridges. It has railroad conveniences and communication by electric railways. Among the buildings of note is the Castle of Hohen-Salzburg, a fine structure dating from the 11th century. During the Middle Ages it was the seat of archbishops, who held the rank of princes of the German Empire. Salzburg has a fine cathedral, numerous hospitals and educational institutions, and a statue of Mozart, who was born here. The manufactures include musical instruments, clothing, pottery, and machinery. The surrounding country is highly fertile and the city is one of the most beautiful in Europe. It has belonged to Austria since 1814. Population, 1906, 36,493.

SÁMAR (sä'mär), an island of the Philippines, situated southeast of Luzón, from which it is separated by the Saint Bernardino Strait. It has an area of 5,800 square miles. The coast line is indented by many gulfs and bays and the surface is more or less mountainous. The soil is remarkable for its productive fertility. It has vast forests of valuable timber and mineral deposits of considerable value. Horses, cattle, and swine are reared in abundance. Among the principal products are timber, palm oil, rice, tobacco, hemp, cocoa, and fruits. Catbalogan, population 6,072, is the capital. Population, 1908, 198,836.

SAMARA (sä-mä'rá), a city of southeastern Russia, capital of the government of Samara, at the confluence of the Samara and Volga rivers. It has an important river and railroad trade with Russian and foreign cities. Among the manufactures are soap, leather, machinery, clothing, and spirituous liquors. The noteworthy buildings include a government house and many fine schools. It is one of the chief grain markets on the Volga and has a large trade in live stock, fish, tallow, and salt. Electric railways, pavements, and waterworks are among the improvements. It was founded as a fort in 1586. Population, 1906, 98,645.

SAMARANG (sä-má-räng'), a sea-

port of Java, on the northern shore, 380 miles southeast of Batavia. It is the third city of the island in population and commercial importance. The city has a good harbor, which has been improved by the construction of docks and wharves. It is the seat of a growing trade in coffee, tobacco, rice, sugar, indigo, and fruits. A railroad line has been built inland. The inhabitants consist largely of Malays, Arabians, and Chinese, but it has a fair proportion of European business and professional men, who maintain churches, schools, and several institutions of higher learning. The part of the city occupied by the Europeans has well-improved streets and modern facilities. Population, 1906, 93,244.

SAMARIA (sā-mā'ri-à), an ancient city of Palestine, the capital of Israel from the time of Omri to the fall of the kingdom. It occupied a steep hill, called Shomeron, in the center of Palestine, and was so named because the hill forming the site resembled a watch mountain. We read in the I Kings, xvi., 23-24, "And he (Omri) bought the hill Samaria of Shemer for two talents of silver, and built on the hill, and called the name of the city which he built, after the name of Shemer, owner of the hill, Samaria." It is thought the purchase was made in 925 B. C., when Samaria became the seat of government. It was unsuccessfully besieged by the Syrians in 872 B. C., but Shalmaneser, King of Assyria, captured it in 721 B. C., after a siege of three years. About that time Sargon succeeded Shalmaneser and carried the Hebrews into Babylonian captivity, while their own lands were occupied by colonists from Assyria.

From the Jews remaining in Samaria and the Assyrian colonists descended the Samaritans, a powerful religious sect. Though embracing the religion of Israel, they were refused permission to aid in rebuilding the temple at Jerusalem, and accordingly built a rival temple on Mount Gerizim in 409 B. C. Henceforth the two classes were at enmity with each other, which ultimately ended in a war and the destruction of Samaria under John Hyrcanus, a Jewish leader, in 109 B. C. It was made a Roman colony in the 3d century, but declined after the Mohammedan conquest, and on its site is the small village of Sebustieh. The Samaritans still exist as a religious sect, but differ from the Jews in that they reject the traditions and hold only to the Pentateuch, of which they possess their own version.

SAMARITANS. See **Samaria**.

SAMARKAND (sām-ār-kānt'), or **Samarcand**, a city of Asiatic Russia, in western Turkestan, 128 miles east of Bokhara. It is situated on the Transcaspian Railroad and is surrounded by a fertile plain. Among the note-

worthy buildings are several dating from the early historic period. They include three sacred colleges, situated in the center of the city, and the palace of the emirs of Bokhara, which has been converted into a hospital by the Russians. It has a considerable trade in cereals, salt, live stock, and fruits. The manufactures include woolen and silk textiles, pottery, clothing, leather, utensils, and machinery. Samarkand was captured by Alexander the Great while on his march to Southern Asia. It became a sacred Moslem city after it was captured by the Arabs in 712 A. D., and in the 14th century it was made the capital of the great empire of Tamerlane, when it had a population of 150,000. The Russians annexed it in 1868. They have garrisoned it and greatly improved its streets and enlarged its trade. Population, 1908, 61,384.

SAMNITES, the name of several tribes who occupied a part of ancient Rome, where they dwelt as contemporaries of the Sabines. They were a confederation of tribes, organized more perfectly than the Sabines, from whom they appear to have descended. Later they came in contact with the Romans in the northern part of Campania and were finally defeated in 272 B. C. Ultimately they were absorbed by the Romans, whose language and customs they adopted.

SAMOAN ISLANDS (sā-mō'an) or **Navigators' Islands**, an island group in the Pacific Ocean, east of the northern part of Australia and 4,200 miles southwest of San Francisco, Cal. It embraces twelve islands, but only three are of particular importance. These are Upolu, Savaii, and Tutuila, the last named belonging to the United States and the remainder of the group to Germany. The area of the group is 1,700 square miles. These islands are of volcanic origin, but in some regions are characterized by coral additions and reefs. Their surface is diversified by hills and mountains, but in the main it is remarkably fertile, with an abundance of wood and luxuriant vegetation. No native fauna prevails in the islands, the only indigenous animal being a species of bat. The principal productions are cotton, coffee, sugar, tobacco, coconuts, copra, and many kinds of fruits. Cattle, horses, swine, sheep, and poultry have been imported within recent years and are now raised successfully. The islands are of importance for their location on the direct route between the Panama Canal and the East Indies.

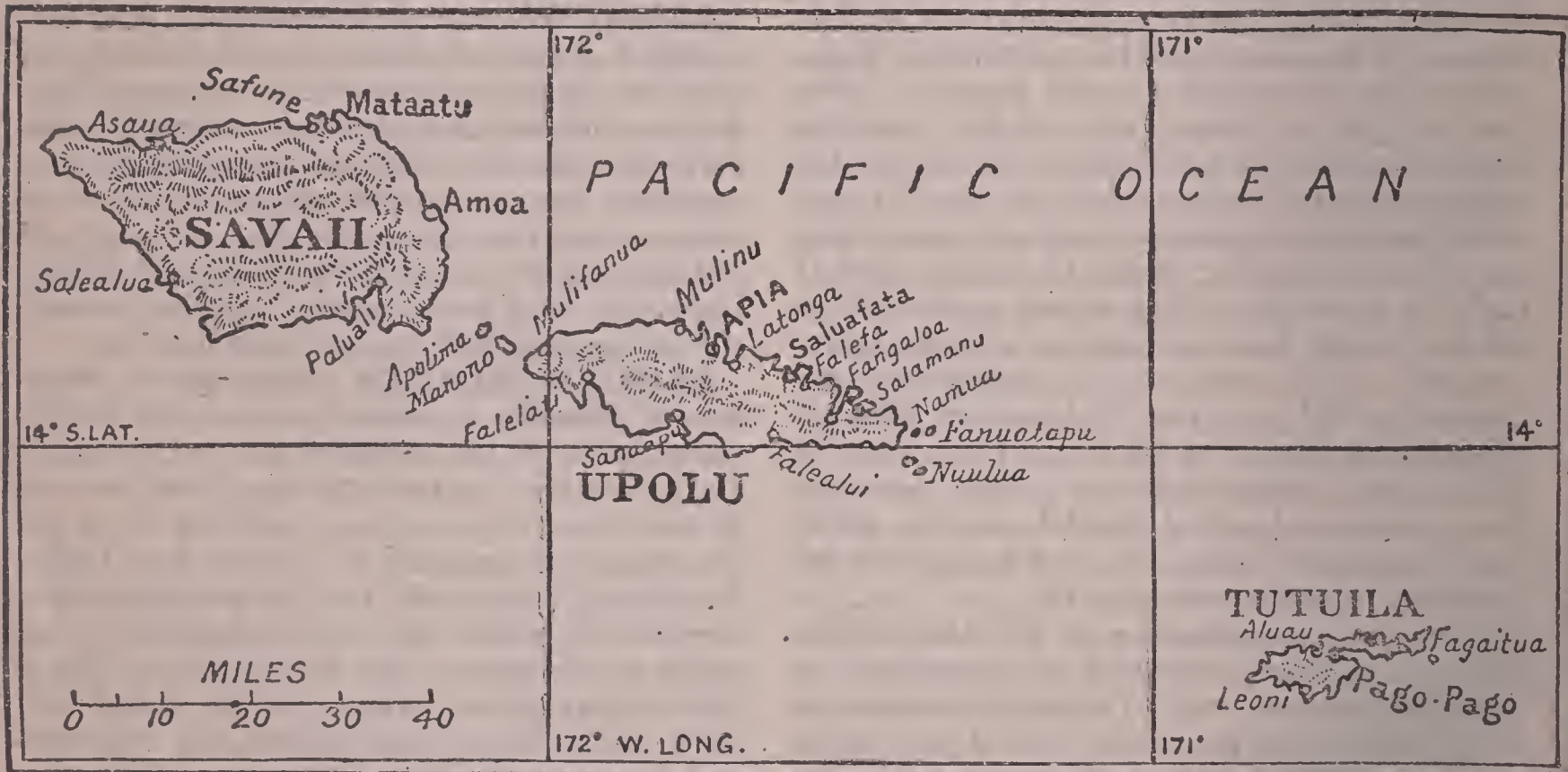
The natives of the Samoan Islands are of the brown Polynesian race and were long governed by a native king. They engage principally in fishing and fruit culture. In 1889 an agreement was effected whereby the islands became neutral

under a protectorate of Germany, the United States, and Great Britain. After complications in regard to the election of a king, a different treaty was made and all but Tutuila passed to the possession of Germany. This treaty was ratified by the United States in 1900. Tutuila has an area of 54 square miles and on its shore is the fine harbor of Pago-Pago. Savaii is the largest island of the group, having an area of 658 square miles. Upolu has an area of 340 square miles. The latter contains the town of Apia, with a population of 1,950. It is the capital of the German possessions. Regular steamship communications are maintained with American, Australian, and Asiatic ports. Population, 1905, 38,954.

SAMOS (sā'mös), an island off the coast of Asia Minor, in the Aegean Sea, 45 miles south-

it was the predominating influence of the archipelago. It became a Roman province in 84 B. C., when its capital was made a free city. Samos was conquered by the Turks in 1550 and did not rebel against Turkish rule until in 1821. Though that war established the independence of Greece, Samos remained a Turkish possession, but since 1832 its government has been administered under a Greek prince, tributary to the Sublime Porte. Chora is the chief town. In 1908 the island had a population of 51,608.

SAMOTHRACE (sä-mō-thräs'), or **Thracian Samos**, an island in the northern part of the Aegean Sea, belonging to Turkey. It is the most elevated island of the Grecian Archipelago. The area is 65 square miles. The highest peak, Mount Saoce, is 5,245 feet above sea level. This mountain may be seen from the Plains of Troy.



SAMOA, OR THE SAMOAN ISLANDS.

west of Smyrna. It has an area of 180 square miles and forms a principality of Turkey. The surface is diversified by a range of mountains, of which Mount Kerkis is the culminating peak, 4,730 feet high. It has an abundance of timber, a fine climate, fertile soil, and adequate rainfall. The principal products include corn, olive oil, raisins, wine, skins, and fruits. It has valuable deposits of iron, lead, marble, and other minerals. Among the manufactures are leather, spirituous liquors, utensils, clothing, carpets, pottery, and textile fabrics.

Anciently Samos was one of the most famous Grecian islands and formed an influential member of the Ionic confederation. It possessed a powerful navy and under Polycrates, in 532 B. C.,

From its summit Poseidon watched the decisive contest in the Trojan War. It has no harbor of importance, but has a considerable area of fertile soil, and is celebrated in history as the scene of sacred worship to the Cabeiri. The inhabitants aided Xerxes in the Battle of Salamis. Population, 2,375.

SAN ANTONIO (sän än-tō'nī-ō), a city of Texas, county seat of Bexar County, on the San Antonio River, 80 miles southwest of Austin. It has transportation facilities by the Missouri, Kansas and Texas, the Southern Pacific, the International and Great Northern, and other railroads. The location is healthful and the climate is favorable, having an elevation of about 650 feet above sea level. The streets are regularly

platted, but some of the older thoroughfares are narrow. Vitrified brick, asphalt, and macadam have been used largely in constructing pavements. The streets are well lighted with gas and electricity and an extensive system of electric railways furnishes communication with urban and suburban points. Many afflicted with pulmonary diseases find the city and its vicinity favorable as a resort, and it has hot wells with distinctive curing properties.

Fort Sam Houston, located near the city, is an important army post of the United States and covers about 250 acres. Breckenridge Park, a semitropical woodland of 200 acres, borders on the San Antonio River, which flows through the city and is joined within the limits by San Pedro Creek. On the latter is San Pedro Park, a tract of 40 acres. Among the principal buildings are the county courthouse, the city hall, the Carnegie Library, and the Federal building. The educational institutions include the Santa Anna Female College, the Saint Louis College, the Saint Mary's Hall, and the Peacock's School for Boys. It has many hospitals and charitable institutions, including the Southwestern Insane Asylum, the Santa Rosa Hospital, and the Physicians' and Surgeons' Hospital. San Fernando Cathedral and Saint Mark's Cathedral are among the ecclesiastical buildings. The business and office buildings include the Southern Hotel, the Alamo National Bank, the Menger Hotel, and the Hicks Building. Many fine public and parochial schools are maintained.

San Antonio has a large wholesale trade. It is important as a shipping point of live stock, cereals, and fruits. The manufactures include malt liquors, ironware, flour and grist, cement and earthenware, machinery, tobacco products, and clothing. An abundance of fine water is obtained from artesian wells. The sewer system has about 80 miles of mains.

San Antonio was settled by Spaniards in the latter part of the 17th century. The mission of San Antonio de Valero was founded in 1718. A colony from the Canary Islands came to the vicinity in 1831 and Texan patriots took possession of it in 1835. The following year occurred the storming of the Alamo, where the entire garrison was massacred by the Mexicans under Santa Ana. American pioneers came in large numbers after the decisive Battle of San Jacinto and many Germans settled in the vicinity after the annexation of Texas. In 1861 it was occupied by Confederate forces. The rapid growth began in 1878, when the first railroad was built into the city. Population, 1900, 53,321; in 1910, 96,614.

SAN BERNARDINO (bĕr-nār-dĕ'nō), a

city of California, county seat of San Bernardino County, 62 miles east of Los Angeles. It is on the Southern Pacific and the Atchison, Topeka and Santa Fé railroads and has urban and interurban communication by electric lines. The surrounding country is devoted to farming, fruit growing, and mining. In the vicinity are mineral baths, hence it is visited by a large number of tourists. The principal buildings include the county courthouse, the public library, the State hospital for the insane, a business college, and several fine schools and churches. Among the industries are machine shops, foundries, grain elevators, and railroad shops. It has a large trade in hay, fruits, and merchandise. A company of Mormons settled in the vicinity in 1851. It was incorporated in 1854, but declined on account of a removal of the Mormons, and it was rechartered as a city in 1863. Population, 1900, 6,150; in 1910, 12,779.

SAN CRISTÓBAL (krĕs-tō'vāl), a town of Mexico, in the state of Chiapas, about 135 miles south of the Gulf of Campeche. It is located on a plain fully 6,500 feet above the sea, and in the vicinity are ruins of ancient buildings constructed by the Indians. The principal structures include a cathedral and a number of educational institutions, such as a seminary and several academies. It has manufactures of earthenware, textiles, clothing, and utensils. Population, 1907, 15,380.

SAND, the particles of granular stone that are coarser than dust and finer than gravel. It results from the gradual disintegration of rocks under the action of water, but also from other causes, such as the detachment of particles from boulders and pebbles under the movement of particles due to frost, wind, or water. The color of sand corresponds to that of the minerals in the rock from which it is derived. In many places vast deposits of sand form under the action of water, as along the sea coast in consequence of wave action and in streams from the effect of running water. Extensive strata of sand were formed in different geological periods, occurring at various depths and ranging in thickness from a few inches to many hundreds of feet. In many places are deposits which originate from the action of wind, as in desert regions, where the dry sand is carried and deposited in drifts or sheets. Frequently such drifts are carried into the sea, as on the western coast of North Africa. In some regions, as in Poland, the sand deposits were formed largely by the action of glaciers, while on the coasts of many islands and continents vast dunes were formed. Similar sand deposits are still forming under the action of sea waves and currents. Sea sand often

contains minute fragments of shells, particles of sponges, and other remains of animal matters. Siliceous sands serve many important purposes, including the manufacture of glass and the preparation of mortar. They are used in making molds for casting, preparing filters, and improving dense clay soils for cultivation. Deposits of valuable minerals occur in many placers, such as gold, copper, tin, diamond, iron, etc.

SANDALWOOD (săn'dal-wōd), the wood of any one of several trees of the sandalwood family. These trees are native to the East Indies and other islands of the tropical regions of the Pacific. Sandalwood trees are greatly branched evergreen trees, with opposite leaves and compact and fine-grained wood. They are peculiar for yielding a highly fragrant wood, from which perfume is derived, but it is used more largely for the manufacture of ornamental products, such as desks, glove boxes, and other light articles. A large number of species have been described, including the white, yellow, and red sandalwood. Most species do not grow to more than a foot in diameter. The *Indian sandalwood* trees attain a height of thirty feet and mature in twenty to thirty years. A thick, viscid oil is expressed from the seeds. It is used by the poorer classes of India for illuminating purposes. Only the heartwood is employed for sandalwood oil, from which perfume is made, but it is also used for incense and in painting sacred figures. Several species of trees native to the Hawaiian Islands yield a sandalwood which is remarkable for its fragrance and the presence of a valuable oil.

SAND BLAST, an apparatus for propelling a jet of sand, which is utilized in engraving and cutting glass. The sand is blown by means of air or steam with great force from a tube. When the stream is directed against the article to be cut or engraved, it acts with remarkable rapidity, and as soon as the stream is turned off the article acted upon is left in a clean condition for the inspection of the workmen. The sand blast was invented by B. C. Tilghman, of Philadelphia, and is now employed largely in engraving goblets, glass household utensils, and glass globes for lamps and gas-burners. The apparatus may be used in engraving patterns on marble and metals, a paper or lace figure being placed on the surface to protect the parts that are to remain untouched.

SAND BUR, the name of a weed common to sandy regions of the Temperate zones. It is a small plant, very similar to the shorter native grasses, and locally is called *burgrass*. Small spiny burs develop in large numbers and mature early in autumn. They are injurious to live

stock, especially sheep, since they become attached to the hair and wool.

SANDERLING (săn'dēr-ling), a class of wading birds of the snipe family, which are widely diffused in the Northern Hemisphere. birds of this species breed in the Arctic regions, both in America and Europe, and on the approach of winter move southward as far as Brazil and Africa. Their plumage is a reddish tinge with dark markings in the spring and an ash-gray in the winter. They are about eight inches in length, with an alar extent of thirteen inches. The nests are built under bushes, or amid weeds with a slight lining of dry grass, in which two to four



SANDERLING.

eggs are laid. They have a plaintive voice similar to the small sandpipers. Sanderlings feed on worms, small crustaceans, and tender plants. They are esteemed as a food.

SANDHURST (săn'dhûrst), or **Bendigo**, a city of Australia, in the State of Victoria, capital of Bendigo County, 98 miles northwest of Melbourne. It has railroad communication, being on the line between Melbourne and Sydney, and is surrounded by a farming and gold-mining country. The streets are beautifully platted and improved with parkings and pavements. The features include the public park, the county courthouse, the public library, the city hospital, the botanical garden, and the Mechanics' Institute. Among the manufactures are machinery, earthenware, leather, clothing, spirituous liquors, vehicles, and furniture. The surrounding country is noted for its fine farms and orchards. About 5,500 miners are employed in the gold fields. The place was founded in 1851 and was chartered as a city in 1871. Population, 1906, 48,565.

SAN DIEGO (săn dē-ā'gō), a seaport city in southern California, county seat of San Diego County, on the Pacific coast. It is on the National City and Otay and the Atchison, Topeka and Santa Fé railroads and has regular communication by steamships. The harbor, situated on San Diego Bay, is deep and landlocked. In the surrounding country are extensive orchards of tropical fruits, including oranges, olives, date palms, figs, and grapes. Two tracts of land in the vicinity are reserved by the Fed-

eral government, one for a coaling station and the other as a fortification, the latter being known as Fort Rosecrans. It has a large export and wholesaling trade in fruit and produce. Among the manufactures are tobacco products, boilers, hardware, machinery, carriages, canned fruit, flavoring extracts, wine, and leather.

San Diego has a healthful climate and is known as a summer resort. North of the city is the old town of San Diego, which is noted as the oldest in California, and a lake of boiling mud half a mile long is a short distance from the new city. Coronado Beach, a popular summer resort, is opposite San Diego, on the south side of San Diego Bay. It has the Hotel del Coronado, an ostrich farm, and a botanical garden. Among the noteworthy buildings in San Diego are the county courthouse, the Carnegie Library, the State normal school, the Hospital of the Good Samaritan, and the Academy of Our Lady of Peace. It has many fine hotels and business blocks. Near San Diego is a fine monument to Richard A. Proctor. San Diego County is remarkable for its fertility, and ranks as the chief honey-producing region of the State. The place was occupied for the United States in 1846 by Commodore Stockton, from whom Fort Stockton was named. The present charter was granted in 1889. Population, 1900, 17,700; in 1910, 39,578.

SAN DOMINGO (sän-dō-mèn'gō), or **Santo Domingo**, the capital of the San Domingo Republic, on the south shore of the island of Hayti. It is located at the mouth of the Ozama River, where it was founded by Bartholomew Columbus in 1496, and is the oldest European city in America. The streets are broad and regularly platted, intersecting each other at right angles. The harbor is spacious, has good anchorage, and is the scene of considerable trade in tobacco, fruits, cotton, and sugar. Among the principal buildings is a cathedral dating from 1510, in which the remains of Columbus were preserved from 1536 until 1794, when they were removed to Havana. Other buildings of importance include the capitol and a university. It has several hospitals, schools, and churches. San Domingo is the seat of a bishop's see and an arsenal. Population, 1906, 21,148.

SAN DOMINGO, or **Dominican Republic**, a government comprising the eastern part of the island of Hayti, the western part being the Republic of Hayti. It includes the larger but less populous portion of the island. The area is 18,045 square miles. Three principal mountain chains traverse San Domingo. The largest chain trends through the central part, while one lies along the northern coast, and the other

chain extends from the Hayti Republic into the southwestern region. The surface is generally fertile and includes great plains and savannas, the most extensive lying in the southern part and between the central and northern mountain ranges. Among the principal rivers are the Rio de Yaque and the Youna. The coast plains are extensive, except in the northern part, and are drained by numerous small streams. The climate is generally favorable and healthful. However, the natural resources have not yet been developed to a material extent. It has considerable deposits of gold, iron, copper, salt, coal, and other minerals. Valuable forests of logwood, mahogany, pine, satinwood, fustic, and lignum vitae are abundant.

Agriculture is the principal occupation. Fully 15,500 square miles of the surface are fit for cultivation. The principal products are sugar cane, coffee, rice, molasses, tobacco, cotton, beeswax, and fruits. It yields an abundance of fish products and domestic animals, the latter including mules, horses, cattle, and poultry. About 280 miles of railroads are open to traffic, most of which are owned or controlled by the government or by foreigners. As a general rule the highways are in a poor condition, but some of the leading thoroughfares have been well graded and macadamized. Foreign commerce is not material. The principal exports are tobacco, coffee, timber, sugar, and fruits. Among the leading imports are manufactured articles, earthenware, and clothing. Germany and the United States have the larger share of the foreign commerce.

The government is under a constitution that vests the chief administrative authority in a president. The chief executive is chosen by an electoral college for a term of four years and has the assistance of a departmental cabinet. Legislative power is vested in a congress of 24 deputies who are elected by indirect vote, in the ratio of two for each province, for the term of four years. Chief judicial authority is exercised by a supreme court of justice. The judges of the supreme court are appointed by the president, and under them is a system of courts of first instance and local justices. Spanish is the prevailing language. It has a system of public education, comprising primary and secondary schools. These schools are supplemented by a normal school and several institutions of higher learning. Attendance upon the elementary schools is free and nominally compulsory. Roman Catholicism is the state church, but other denominations are tolerated under certain restrictions. The inhabitants embrace a comparatively large per cent.

of whites, but they are chiefly mulattoes, mestizos, and Negroes. San Domingo is the capital and Puerto Plata is the chief port city.

At the time Columbus discovered the island of Hayti, in 1492, it had a larger population than at present, but many of the aborigines perished under Spanish control. A formidable revolt against the Spanish took place in the 17th century, which resulted in the western part of the island being ceded to France in 1697, but the eastern part, now mainly forming the San Domingo Republic, remained a Spanish possession. A Negro revolt against France, in 1791, soon brought the entire island under the control of Toussaint L'Ouverture (q. v.), who made it an independent republic. Soon after he fell into the hands of French captors, but Dessalines drove the French out in 1803. However, he was assassinated in 1806. Insurrections and revolutions occurred at various times, but France recognized the republic in 1825, and Spain finally evacuated the island in 1865. Since then the two republics have existed with more or less change and uncertainty, disturbances being due largely to dissatisfied and restless elements made up of people of mixed blood. Among the latest disturbances in the San Domingo Republic was a revolution in 1898, which terminated in the assassination of the president on July 26, 1899. Population, 1909, 592,486.

SANDPAPER, the commercial name of a stout paper covered with sharp sand or ground glass, which is embedded in glue. It is used for smoothing or polishing ivory, wood, bone, and other materials. The paper employed in making this product is usually of a stiff brown kind, which is covered with glue, and afterward the sand is sifted upon the glue before it is fully dry. Sandpaper is made of various sizes and different grades. The coarser material is used for less delicate work, while the finer is made of very small grains of sand and used for polishing or smoothing surfaces of a delicate kind. Emery paper differs from sandpaper in that emery is used in the former instead of sand.

SANDPIPER (sănd'pī-pēr), an extensive group of wading birds of the snipe family. They are found in large numbers in swampy regions, on the shores of the sea, and on the banks of rivers, lakes, and ponds. They are migratory, moving far northward in the spring. Several species migrate as far as Greenland, Spitzbergen, and Nova Zembla. The common species include the dunlin, red, little stint, purple, wood, ruff, green, and summer sandpipers. These birds are found in all parts of the world where water is abundant. They have long legs, a long slender bill, and a short

tail, and are quite active and graceful. They run and fly with rapidity, and spend much time wading in shallow water in search of food, which consists of insects, mollusks, worms, and the tender parts of plants. The *purple sandpiper* is the most common American species. In all species the summer plumage is different than that of winter, and they are prized for their flesh, which is both tender and well flavored.



SANDPIPER.

The voice is unmusical and may be heard for some distance as the bird flies through the air or runs along in the shallow water.

SANDSTONE, a class of rocks formed of particles of quartz sand cemented together with silica. Many kinds of sandstone occur in nature, varying in composition from grains of quartz scarcely visible to the naked eye to coarse formations composed of pebbles and gravel. The color differs according to the sand forming them, usually varying from gray to reddish-brown, but in many cases there is a mixture of different colors, due to the presence of particles of mica, feldspar, granite, flint, and other substances. A marked difference is observable in the consistency. Some are quite soft and porous, while others are very hard and durable. Sandstone of fine grain and uniform color is usually preferred for building purposes, while the coarser-grained species are useful in making millstones for grinding cereals. The latter kind is used for whetstones and grindstones. Vast formations of sandstone are met with in deposits of different geological ages, most of which are stratified horizontally, but in some cases they are in an inclined or vertical position. Many buildings in New York City are of the dark-brown sandstone secured in New Jersey. Deposits of sandstone of value in building occur in many sections of Canada and the United States.

SANDUSKY (săn-dūs'kī), a city of Ohio, county seat of Erie County, on Sandusky Bay, near Lake Erie, 55 miles west of Cleveland. Communication is furnished by steamships on the Great Lakes and by the Baltimore and Ohio, the Lake Erie and Western, the Lake Shore and Michigan Southern, and other railroads. It is beautifully situated at the mouth of the Sandusky River and has an excellent harbor. It

has extensive wharves, and a large lake trade in limestone, salt, fish, wool, lime, coal, flour, cereals, and live stock. The streets are beautifully paved and intersect each other at right angles. Gas and electric lights, street railways, waterworks, and an extensive sewerage system are among the improvements. The manufactures include engines, boilers, railroad cars, machinery, spirituous liquors, edged tools, lumber products, and farming implements. Shipbuilding is an important industry.

Much of the architecture is substantial, being of brick and stone, the latter being obtained from quarries in the vicinity. The noteworthy buildings include the county courthouse, the public library, the high school, the Federal building, the county infirmary, and many fine churches. It is the seat of the Ohio Soldiers' and Sailors' Home and of the State fish hatchery. Popular summer resorts are maintained at Cedar Point and Put-in-Bay. It is one of the largest freshwater fish markets in the United States. The place was settled in 1817 and incorporated as a city in 1845. Population, 1910, 19,989.

SANDWICH ISLANDS (sānd'wich). See **Hawaiian Islands**.

SANDY HILL, a village of New York, in Washington County, forty miles north of Troy. It is on the Hudson River and the Delaware and Hudson Railroad. In the vicinity are lumber mills and stone quarries. The manufactures include paper, machinery, wall paper, and lumber products. It has waterworks, electric lighting, and a number of schools and churches. Population, 1905, 5,321.

SANDY HOOK, a peninsula extending from Monmouth County, New Jersey, to the entrance of New York harbor. It is a low and sandy point of land about nine miles long. At its northern end is the Sandy Hook lighthouse, ninety feet high, and immediately south of it are fortifications for defending the entrance to New York harbor. In connection with the government fortifications is a proving ground, at which armor plate and ordnance are tested.

SAN FRANCISCO (sān frān-sīs'kō), the largest city on the Pacific coast of North America, in the State of California, coextensive with San Francisco County. It is situated on a peninsula lying between the Pacific and the Bay of San Francisco and on the opposite shore of the bay, due east, is the city of Oakland. San Francisco Bay is about 46 miles long from north to south, from six to ten miles wide, and north of it is San Pablo Bay, a body of water about ten miles long, which receives the discharge from the Sacramento and San Joaquin

rivers through Suisun Bay. The Golden Gate, a strait five miles long and a mile wide, connects San Francisco Bay with the Pacific. Among the islands near the city are Goat, Alcatraz, and Angel islands, and in San Pablo Bay is Mare Island, which is used as a navy yard by the United States government. The shores of the bays near San Francisco are generally formed of precipitous cliffs, particularly those of the Golden Gate, and the whole region is one of remarkably picturesque scenery. Sand dunes extend along the ocean and they merge into a series of hills, which culminate in Mount San Bruno, in San Mateo County.

COMMUNICATION. The city has steamboat connections with the principal ports of the world and its harbor in San Francisco Bay takes rank with the finest in America. This harbor has an area of 450 square miles. Railroad transportation is chiefly by the Southern Pacific and connecting lines, but only one of the roads enters the city, while freight and passengers are carried by ferries and steamers from Oakland, Alameda, West Berkeley, Sausalito, and other points. An extensive system of electric railways furnishes intercommunication, and cable lines are operated in the undulating and hilly sections. Many of the towns and cities in the vicinity, though organized as separate corporations, may be considered suburban, and have been built up largely through easy communication by steamers and railway lines.

STREETS. In the older part of the city, near the water front, the streets are narrow, but they are of ample width in the newer and greater part of the municipality. The ferry depot, on the bay, is at the head of Market Street, which is the chief thoroughfare and extends in a southwesterly direction. North of it the streets are platted according to the cardinal points, but toward the south is the older part, in which the streets are more or less irregular. About 800 miles of streets have been improved for travel, a large part having been paved with bituminous rock, basaltic rock, cobblestones, and asphalt. The city is generally well lighted with gas and electricity and has extensive systems of waterworks and sewerage. Market Street contains the largest office buildings and department stores, but shopping is extensive on Post, Kearny, Geary, Sutter, and Grand avenues, and considerable shopping is carried on at Union Square and on Stockton Street. North of Market are the larger number of residences, while the district south has many wholesaling and manufacturing enterprises. The most fashionable quarters are on Nob Hill, which is about 300 feet above sea level and

overlooks the bay and city. Pacific Heights is somewhat higher and Twin Peaks, the highest summits, are 900 feet above the sea.



ENVIRONS OF SAN FRANCISCO.

PARKS. Golden Gate Park, the most beautiful in the city, extends from the western part to the ocean. It contains about 1,100 acres, about one-third of which is in greensward and the remainder is covered with beautiful flowers and trees, many of which are semitropical. Within this park is a zoölogical collection, a museum, an aviary, and numerous statues. The Presidio, a military reservation of the government, is located in the northern part, where Fort Winfield Scott overlooks the entrance to the Golden Gate. Fort Miley, Fort Barry, and Fort Baker likewise defend the entrance to San Francisco Bay. Many small parks are located at convenient places in the city. Laurel Hill Cemetery, Calvary Cemetery, and the City Cemetery are in the northern part. The beach along the ocean is much used for bathing and at its northern end is the Cliff House. Near the latter are the noted Seal Rocks, where sea lions are frequently seen in large numbers. The chief memorials include a monument to Francis Scott Key, in Golden Gate Park; a bronze group representing the development of California, near the City Hall; and a column to commemorate the naval achievements during the war with Spain, in Union Square.

BUILDINGS. The architecture of the city is largely of modern construction, in which the steel frame and granite are prominent. Structures of this class began to be erected in 1890, when the *Chronicle* building was completed. This is a ten-story fireproof structure and withstood the earthquake of 1906. Other large buildings include the post office, the city hall,

the county courthouse, the government mint, the subtresury, and numerous office and business blocks. Among the institutions that are

housed in fine buildings are the Hopkins Art Institute, the Memorial Museum, the public library, the Mechanics' Institute, the Cooper Medical College, the College of Christian Brothers, the San Francisco State Normal School, and Saint Ignatius College. The city has many fine ecclesiastical structures, including the Roman Catholic cathedral. Besides the public library of 115,000 volumes may be mentioned the Mercantile Library of 75,000 volumes and the Sutro Library of 200,000 volumes. Many ward schools and private and parochial institutions of learning are maintained.

The city has a large number of clubs and educational associations. Among the theaters are the Columbia, the Alcazar, the California, and the Grand Opera House. The Palace, the Saint Francis, and the Occidental are the leading hotels.

INDUSTRIES. San Francisco is a distinctively commercial and manufacturing city. It has a large wholesale and jobbing business, both inland and coastwise. Large quantities of coffee, tea, and sugar are imported. It is an extensive exporter of wine and brandy, wheat, salmon, fruits, lumber, and live stock. In value the exports somewhat exceed the imports, the total foreign trade averaging about \$90,500,000 per year. As a manufacturing city, San Francisco holds tenth rank in the United States. The larger interests are vested in slaughtering, meat packing, sugar refining, and shipbuilding. Among the general manufactures are canned fruit, clothing, flour and grist, boots and shoes, leather, earthenware, cordage, machinery, furniture, glass, saddlery, and tobacco products. Among the large vessels constructed in its yards are the *Oregon* and the *Olympia*, two large battleships of the United States.

HISTORY. Franciscan friars discovered San Francisco Bay in 1718, but a permanent settlement was not made until 1776, when the mission of San Francisco de Asisi was founded. In the same year a military post was established by the Spaniards. The village of Yerba Buena took its place in 1835. At the beginning of the Mexican War, in 1846, the region was taken possession of by the United States and the

name was changed to San Francisco the following year. From that time to the present the history of the city reads like a fairy tale. Many incidents of special interest are connected with the events occasioned by the discovery of gold in 1848, when people from all parts of the world gathered here and made it the center of remarkable enterprise. Destructive fires did great damage in 1849 and in 1851. The catastrophes were attended by more or less lawlessness, resulting from the coming together of large numbers who were attracted by the reports that fortunes could be made in a few days. However, these primitive conditions were soon overcome by the organization of vigilant committees, which summarily hung or imprisoned the lawless leaders.

In 1906 the city was visited by a destructive earthquake. It occurred at 5:16 o'clock on the morning of April 18, when much damage was done to many buildings and the main supply pipe of the waterworks was broken. Falling timbers and other materials caused fires to break out in many places, and a lack of water made it impossible to control the flames. For four days the fires continued, in which about 500 blocks were laid waste. Official records place the loss of lives at 427 and the loss of property at \$500,000,000. From this wreck of matter a new and more substantial city has risen, equipped with excellent systems of sewers and waterworks, and beautified by larger and more substantial architectural structures.

The inhabitants include a large number of foreign birth, of which the most numerous are the Germans, Irish, Chinese, English, and Italians, in the order named. Other nationalities include Greeks, Maltese, and Spaniards. The Chinese, though confined to their own quarters, are not as numerous as they were in 1890, when they numbered 25,833, which is about twice the present number. Population, 1910, 416,912.

SAN FRANCISCO. See **São Francisco.**

SAN GERMÁN (sän hēr-män'), a city of Porto Rico, in the province of Mayaguez, about eight miles southeast of the city of Mayaguez. It is situated near the Rio Grande and has large commercial and manufacturing interests. In the vicinity are valuable forests and plantations. The first settlement was made here by the Spanish in 1543. Population, 1908, 4,368.

SANGIR ISLANDS (sän-gēr'), an island group of Malaysia, situated between Celebes and the Philippines. The area is 408 square miles. It is a possession of Holland. The group comprises many small islands, of which Great Sangir is the largest, having a length of thirty miles and an average width of ten miles. The

islands are of volcanic origin and contain a number of active volcanoes, of which Abu, on Great Sangir, is the most important. This volcano was in a state of active eruption in 1856, when 2,850 persons perished. Most of the islands are inhabited and have a fertile soil, producing cocoa palms, fruits, hemp, timber, rice, sago, and tobacco. Population, 1906, 114,876.

SANHEDRIM (sän'hē-drīm), a council and tribunal of the Jews. It is thought to date from the time of the Maccabees and probably was established under John Hyrcanus. Some writers trace its origin to the seventy elders appointed by Moses, but this view is not supported by the early Greek writers. In the later period there were several sanhedrims, of which the Great Sanhedrim was the supreme authority. It was composed of 71 priests, scribes, and elders of the people. At the time of the Romans it was presided over by the high priest. The members sat in a crescent, the high priest occupying a seat in the middle higher than the rest. He was supported on the right by the father of the council, called the *Ab-beth-din*, and on the left by a learned referee. It originally had power of life and death, but this it ultimately lost. Herod was summoned before the sanhedrim in 47 B. C. for putting people to death, and Jesus was condemned by it for claiming to be the Messiah. It ended in 425 A. D., when Theodosius put the last president to death. The lesser sanhedrims, or provincial courts, of which there was one in each large town, were composed of 23 members appointed by the Great Sanhedrim in the city of Jerusalem.

SANITARY SCIENCE (sän'ī-tā-rÿ), the branch of study relating to the preservation of health and prevention of disease, both as to communities and individuals. This science is not only concerned with the mission of teaching the correct mode of life to individuals, but in an enlarged sense embraces the study of the methods of preventing disease and preserving bodily functions by means of supplying the most serviceable and wholesome dwellings, food, and clothing that may be obtained. It is essential that dwellings and public buildings be constructed in conformity with plans so devised that the most wholesome means of obtaining ample light and ventilation may be secured, and that the drainage be adequate to the highest needs. With this end in view many cities have placed the supervision of buildings in a state of construction under a competent director, especially with the design that sewerage, drainage, light, and water connections be provided for properly. Within late years growing concern has been manifested in the matter of over-

crowded dwellings in cities, in which diseases of an epidemic character often originate, with a view to guard against unwholesome gases generating from the waste of organic and other refuse matters.

Legislators, both in the nation and in the states, have directed their attention with a view of providing safeguards against impure and unwholesome food, which in many cases is put on the market to enhance profits, but which result in injury to health and life. As a general rule it is recommended that all dwellings be provided with ample bathing facilities and an adequate supply of pure water, thus enabling the occupants to take such baths as are needed to insure ample cleanliness, and to flush closets for the purpose of removing waste and impurities with speed and effect. Plenty of outdoor exercise is recommended as a prolific source of physical strength. The practice of virtues and freedom from anxiety have a wholesome influence in promoting and preserving health. In many countries it is necessary to secure the approval of the government board of health of plans for new water-supply and sewer systems that are proposed in the large cities. However, in general, the states of the United States and the provinces of Canada extend to cities the power to regulate the sanitation within their territory. This has resulted in marked improvements in the larger cities, where public supervision is operating to overcome to a large extent the conditions that are injurious to health.

In 1861 the United States Sanitary Commission was organized by New England women for the relief and comfort of Union soldiers during the Civil War, in the camp and field. This organization was designed to supplement the army medical bureau. It rendered very efficient service in improving the clothing, ventilation, cookery, and drainage. This work is regarded one of the most perfect exemplifications of charity, and it may be said that much of the suffering and bitterness incident to war were dissipated by the prompt work of the association. Besides distributing many supplies to the soldiers and sailors, it established hospitals and homes at recruiting points, and provided hospital steamers and cars for wounded and sick soldiers. The affairs were managed by a board of 25 commissioners, of which Henry Bellows, of New York, was president. The commission received, from its organization to the surrender of its charter, money amounting to about \$6,000,000 and goods valued at about \$15,000,000, all of which it distributed at points most in need of assistance. See **Hygiene**.

SAN JACINTO (sán jā-sin'tō), **Battle of**, the closing battle of the war for independence of Texas, which took place near the town of San Jacinto, Tex., April 21, 1836. The Texan army of 783 men under General Houston was attacked by 1,536 Mexicans under Santa Anna and, after a desperate struggle of an hour, in which the Mexicans lost about 600 men, the latter surrendered. The independence of Texas was favored by the United States government, and many of Houston's soldiers had been openly enlisted in New Orleans.

SAN JOAQUIN (sán wā-kēn'), a river of California, which rises in the Sierra Nevada Mountains and, after a general course of 350 miles toward the northwest, joins the Sacramento at its entrance into Suisun Bay. It receives the water from Tulare Lake by the Kings River. Another tributary, the Merced, drains the famous Yosemite Valley. The San Joaquin valley is a large part of the fertile region of central California and produces vast quantities of cereals, grasses, and fruits.

SAN JOSÉ (hō-zā'), a city of California, county seat of Santa Clara County, fifty miles southeast of San Francisco. It is on the Central Pacific and the Southern Pacific railroads. The site is on a plateau between the Coyote and Guadalupe rivers, two small streams flowing into San Francisco Bay, which is about six miles from San José. It has a beautiful climate and is surrounded by a fertile fruit and farming country. The manufactures include leather, flour, canned fruits, wine, woolen goods, lumber products, and machinery.

Among the principal buildings are the county courthouse, the public library, the post office building, the high school, the State asylum for the insane, the State normal school, and the Academy of Notre Dame. Near it is the Lick Observatory. It is the seat of the University of the Pacific, a Methodist Episcopal institution. The city has gas and electric lighting, sanitary sewerage, public waterworks, and electric street railroads. It was founded in 1777 and a mission was established here in 1797. A small military force captured it for the United States in 1846. From 1849 to 1851 it was the capital of California. Population, 1910, 28,946.

SAN JOSÉ, the capital of Costa Rica, Central America, situated near the center of the state, on an elevated and fertile plain 3,775 feet above sea level. It is connected by railway with the coasts of the Caribbean Sea and Pacific Ocean, Limón being the terminus on the former and Punta Arenas on the latter. The principal buildings include a cathedral, the bishop's palace, the government buildings, and a university.

Most of the streets are narrow, but within recent years notable improvements have been made and its trade has been enlarged materially. The city has a public school system, a medical college, a museum, and a number of parks. San José has been the capital of Costa Rica since 1823, in which year it was removed from Cartago. Population, 30,130.

SAN JUAN (hōō-ān'), the capital of Porto Rico, situated on a peninsula on the north side of the Gulf of San Juan. It has one of the finest harbors in the West Indies, and is the seat of an extensive trade in native products and imports. Railroad connections afford adequate communication with the interior. It has many important steamship and submerged telegraph lines. The streets are improved by electric lighting, stone and macadam pavements, and rapid transit. Among the manufactures are sugar, tobacco products, clothing, soap, spirituous liquors, utensils, and machinery. The noteworthy buildings include the city hall, the government building, the theater, the public library, the military hospital, the cathedral, and the Jesuit College. A statue of Ponce de León is located on the Plaza de Santiago. Morro Castle, built in 1584, is situated on a promontory in the western part of the city. The city was founded in 1521 by Ponce de León. It was bombarded by the Dutch in 1625 and in 1898 it became a possession of the United States. Population, 1908, 38,804.

SAN JUAN, a river of Central America, which is important because of its location on the route of the proposed Nicaragua Canal. It is the outlet of Lake Nicaragua and flows toward the south and east for about two-thirds of its length, when it makes a bold turn toward the northeast and enters the Caribbean Sea a short distance south of Greytown. The entire length is about 115 miles, but only about one-half of its lower course is serviceable in the canal. In 1529 Diego Machuca sailed down the river from Nicaragua Lake, this being the first time that it was navigated.

SAN JUAN ISLANDS, an archipelago in the Gulf of Georgia, lying between the mainland and Vancouver Island. They constitute San Juan County, in the State of Washington. The principal islands are San Juan and Orcas. Friday Harbor is the chief town and county seat. They were a source of dispute between the United States and Canada for some time after concluding the treaty of 1846. The United States contended that the boundary extends through the middle of the Canal de Haro, which separates the islands from Vancouver Island, while Great Britain maintained that the

boundary is through Rosario Strait. In 1871 the controversy was referred to the Emperor of Germany, who rendered a decision in favor of the United States.

SAN LUIS POTOSI (sän löō-ēs' pō-tō-sē'), a city of Mexico, capital of a state of the same name, 360 miles northwest of the City of Mexico. The site is on a fertile tableland 6,375 feet above sea level. It has a number of government buildings, a cathedral, a university, and a statue of Plaza Hidalgo. The city is one of the most modern of Mexico, having electric lights, telephones, rapid transit, improved streets, and several libraries. The manufactures include cotton and woolen goods, boots and shoes, clothing, lumber products, and machinery. In the vicinity are productive gold and silver mines and large smelting works are located here. It was founded in 1586, but its prosperity is due largely to the mines and railroad traffic developed in the last century. Population, 1908, 64,120.

SAN MARINO (mä-rē'nō), an independent republic in Europe, situated on the eastern slope of the Apennines, about forty miles southeast of Ravenna, Italy. It is entirely encircled by provinces formerly belonging to the papal states, but which are now included in Italy. The area is 38 square miles. It is a hilly district, the highest point, Monte Titano, being 2,650 feet above the sea. The climate is healthful, but the country is somewhat windy and subject to frequent rains. Farming, fruit culture, and stock breeding are the principal occupations. San Marino is the capital. It is reached only by a wagon road and has narrow streets. A museum, several government buildings, and five churches are among the noteworthy structures.

The government is by a grand council of sixty members, of whom twenty are nobles; twenty, burgesses; and twenty, rural landowners, who are selected by the grand council and serve for life. The executive authority is vested in two captain regents, who are chosen by the grand council and each holds office for six months. The army consists of 950 men. San Marino was recognized as an independent republic by the Pope in 1631, and ever since its independence has been guarded with remarkable zeal by the inhabitants. In 1862 it placed itself under the protection of Italy. Population, 1906, 11,439.

SAN SALVADOR (säl-và-dōr'), a city of Central America, capital of the republic of Salvador, located 105 miles southeast of Guatemala. It is situated in the center of a rich farming country and has a large inland trade, but its architecture is mostly of wood and

brick. The most noted buildings include the national palace, a normal school, a university, a cathedral, and the national theater. Near the city is the extinct volcano of San Salvador, height 8,365 feet. It has a large trade in grain, sugar, tobacco, and indigo. The Spaniards founded the city in 1528. In 1854 it had many splendid buildings, but on April 6 of that year a destructive earthquake completely destroyed it. Soon after it was rebuilt. Several of the new buildings are fine structures. Population, 1908, 59,568.

SANS-CULOTTE (sǎnz-kũ-lõt'), a word meaning without breeches. It was applied in France by the court party at the outbreak of the Revolution to the advocates of democratic principles. This designation first arose from the circumstance that the Revolutionists adopted the use of trousers or pantaloons instead of the knee breeches then in fashion, and was applied in a spirit of reproach. The advocates of democracy soon turned the term to good use, applying it to themselves as patriots, and it was long a distinction between them and the court party, but toward the close of the convention fell into disuse.

SANSKRIT (sǎn'skrît), the oldest of the Aryan or Indo-European languages. It bears the same relation to the Aryan languages that Latin does to the Romance tongues. Sanskrit is still cultivated as a classical language and is the sacred language of the Brahmans. There is a resemblance between it and the Greek in that both are highly inflected. However, it holds a higher rank of value to philologists, since philology did not assume the importance of a science until Sanskrit became known to the Europeans. The word Sanskrit is applied only to the symmetrically formed language preserved in the classical and sacred writings of the Hindus, the word meaning *carefully constructed*. In this sense it stands opposed to *Prakrit*; that is, natural or common, the Sanskrit dialect spoken by the unlearned people, such as women and servants, in the Sanskrit dramas. The Prakrit is a branch of the southern division of Aryan languages and is the source of the vernaculars of modern India. It is thought that the Sanskrit never attained a wide use among the common people, but in its purity constituted the written and spoken form among the educated classes.

The Sanskrit alphabet has 14 vowels and diphthongs and 33 consonants, but to these are added several secondary characters. Among the peculiarities in Sanskrit grammar are its limited use of prepositions to govern nouns, but instead they occur as prefixes of verbs. Three genders are recognized, the masculine, feminine,

and common; and three numbers, the singular, dual, and plural. The eight cases include nominative, accusative, instrumental, dative, ablative, locative, genitive, and vocative. Writers recognize a peculiar resemblance between it and the Greek, both languages being highly inflected, and there is a similarity in the forms of the verbs. Two distinct periods are recognized in the history of Sanskrit. The first epoch represents the use of the language as contained in the Vedic hymns, and the other embraces its use in the epic writings, the laws, and other later literature.

Literature. Sanskrit literature is made up of a large number of writings, the most important of which are of a religious character. It may be said that the literature begins with the *Vedas* and dates probably from 2000 to 1500 B. C. Four collections are included in the Vedic writings, which are looked upon as the source from which all sacred writings of the Hindus were drawn. These collections include the large work called *Rig-Veda*, the collection of verses known as *Sama-Veda*, the verses or sacrifices known as *Yujur-Veda*, and the edition known as *Atharva-Veda*. A later work or treatise relating to religious practice is called *Puranas*. The law literature is of next importance, including a treatise on religious and civil law known as *Dharma-Shastra*, which embraces additions relating to education, marriage, funeral rites, and the duties of teachers and officers. In the writings classed as epics are a number of interesting works, but the most important include the *Rāmāyana* and the *Mahābhārata*. The latter is a work of 220,000 lines and may be said to be the production of writers who flourished in different periods. It contains epic and lyric poems, mythical history, and philosophical investigations. The *Rāmāyana* embraces an account of Rama, a prince of Oude, whose heroic conquest of the Deccan and Ceylon is recounted.

The dramatic writings of the Hindus are inferior, when considered on a comparative basis with their works in other lines, which is partly due to the use of Prakrit when representing females and the lower characters, while the highest form of Sanskrit is employed in presenting the higher male characters. These writings are rich in fables, including the earlier collection known as *Panchatantra* and the later group of writings known as *Hitopadesha*. Many of these fables became current in the literature of all the Eastern peoples, and even reached a wide use among the people of Europe in the Middle Ages. Their works in history, music, anatomy, medicine, and architecture take a more or less important rank. It is particularly note-

worthy that their writings in astronomy and arithmetic are of a high character, and include a treatise on the solar year, which they divided into 365 days. Their astronomer, Aryabhata, affirmed the revolution of the earth on its axis, gave the true theory of the causes of solar and lunar eclipses, and observed the motion of the equinoxes and solstices.

In lexicography the Aryans had a number of works that embrace commentaries on words and trace many of them from their roots. Precision of language was a peculiar characteristic of their writers, which is evidenced by numerous works on grammar and prosody. The oldest work on Sanskrit grammar dates from the 3d century B. C., and is assigned to a writer named Panini. Many literary productions and treatises in the Sanskrit emanated from Buddhist and Brahman writers of recent date, though these writers employed modern forms of the language. It is made certain by inscriptions that Sanskrit in its purity ceased to be a spoken tongue at least 200 years before the Christian era.

SANTA ANA (săn'tă ä'nă), a city of Central America, in Salvador, near the Santa Ana River, capital of the department of Santa Ana. It has railroad connection with Acajutla, its seaport on the Pacific Ocean. The surrounding country is fertile, yielding cereals, grasses, vegetables, and fruits. Santa Ana is one of the most important cities of Salvador. In its vicinity are silver, copper, iron, and zinc mines. It has a large trade in sugar, cereals, and fruits. Among the principal buildings are the cathedral, the railroad station, the government house, and several fine schools. The volcano of Santa Ana is ten miles southwest of the city; height, 6,625 feet. Population, 1906, 48,215.

SANTA BARBARA (săn'tă bär'bä-rä), a city in California, county seat of Santa Barbara County, on the Pacific coast, ninety miles northwest of Los Angeles. It is on the Southern Pacific and the California Northwestern railroads. The surrounding country produces grain, fruit, vegetables, and flowers. It is frequently called the "Newport of the Pacific," owing to its fine climate and picturesque location. The noteworthy buildings include the Potter Hotel, the public library, the county courthouse, the Anthony's College, the Blake Sanatorium, and the Saint Vincent's School. Among the manufactures are flour, beet sugar, canned fruits, earthenware, and machinery. It is lighted by gas and electricity, has street pavements, waterworks, and other municipal facilities. A mission was founded on the site of Santa Barbara, in 1780. It was incorporated as a city in 1874. Population, 1910, 11,659.

SANTA CLAUS (săn'tă kləz), the name of a friend of children, who, according to fólklóre, brings presents on Christmas eve. He is usually represented as an aged but jolly man who drives over the roads in a sleigh drawn by reindeer, and descends chimneys to fill with gifts the stockings hung up to receive them. It is said that he sometimes leaves a birch rod in the stocking of a naughty child. The name Santa Claus was derived from Saint Nicholas, the patron saint of children, and is of German origin, but the legend was first brought to America by Dutch settlers of New York. The feast was celebrated originally on Dec. 6 and that day is still observed in some parts of Germany, but it is now held generally on Christmas.

SANTA CRUZ (krōos), a city of California, county seat of Santa Cruz County, on Monterey Bay, 72 miles southeast of San Francisco. It is on the Southern Pacific Railroad, at the mouth of the San Lorenzo River, and has steamship communication. The surrounding country is noted for the production of cereals, live stock, and fruits. In the vicinity are deposits of bitumen. Among the features are the county courthouse, the public high school, the city library, the public park, and the School of the Holy Cross. The chief manufactures include canned fruits, gunpowder, leather, paper, flour, lime, lumber products, and machinery. It has a fine beach for bathing, public waterworks, and systems of public lighting and sewerage. Franciscan monks founded a mission here in 1782. It was incorporated in 1874. Population, 1900, 5,659; in 1910, 11,146.

SANTA CRUZ, the capital and chief port of the Canary Islands, on the northeast coast of Teneriffe. The harbor is the best in the Canary group, being protected by two moles, and furnishes safe anchorage for a large number of ships. The streets are broad and regularly platted, but most of the buildings have flat roofs. It has a large import and export trade and manufactures of wine, cochineal, and utensils. The city is defended by several forts. Population, 1908, 15,867.

SANTA CRUZ, a city of Bolivia, capital of the department of Santa Cruz, about 165 miles northeast of Sucre. It is situated in the valley of the Mamore River and is surrounded by a fertile country. In the vicinity are vast forests. Many of the buildings are of timber, but some are of stone and brick. It has a growing inland trade. Population, 1906, 15,988.

SANTA FÉ (fâ), the capital of New Mexico, county seat of Santa Fé County, on the western slopes of the Rocky Mountains, about

twenty miles east of the Rio Grande. Communication is furnished by the Denver and Rio Grande and the Atchison, Topeka and Santa Fé railroads. It occupies a fine site 6,825 feet above sea level, within sight of the foothills of the Rocky Mountains, and has a pleasant and healthful climate. The former town of low houses and narrow streets has given way to a new city with modern facilities. It has an extensive and growing trade and in its vicinity are valuable mines of gold, silver, zinc, lead, and copper. The climate is arid, thus making irrigation necessary for successful cultivation, but this means has been taken advantage of and many fine farms, orchards, and gardens are the result.

Santa Fé has a fine public school system and is the seat of the University of New Mexico, the Saint Michael's College, and the Romona School for Indian Girls. Other noteworthy buildings include the Federal building, the capitol, the penitentiary, the Cathedral of San Francisco, the Church of San Miguel, and the Loretto Convent. It has electric lighting, waterworks and sanitary sewerage.

The region was first visited by the Spaniards in 1542, when it contained an Indian town. Santa Fé was founded in 1605 and is one of the oldest cities in America. It became the capital of New Mexico in 1640, but was captured and burned by the Indians in 1680 and was recaptured in 1694. An American army under General Kearny occupied it in 1846. In 1851 it became the capital of New Mexico. It was held by the Confederates for a short time in 1862. The place was chartered as a city in 1890. Population, 1900, 5,603; in 1910, 5,072.

SANTA FÉ, a city of Argentina, capital of the province of Santa Fé, 230 miles northwest of Buenos Ayres. It occupies a low site at the junction of the Salado and Paraná rivers. The surrounding country produces fruits and cereals. It has an important railroad and river trade in timber, hides, and cereals. Shipbuilding is the principal industry. Among the manufactures are tile, macaroni, oil, clothing, and machinery. It has a Catholic cathedral, a Jesuits' college, and several schools. The place was founded in 1573. Population, 1907, 33,845.

SANTA MAURA. See *Leucadia*.

SANTANDER (sän-tän-dâr'), a seaport city of northern Spain, capital of the province of Santander, on the Bay of Biscay. It has an excellent harbor, extensive steamboat and railroad facilities, and is the center of a large trade in cereals, fruits, live stock, and merchandise. Among the manufactures are sailcloth, chemicals, tobacco products, cured fish,

leather, sugar, clothing, and machinery. The city is well built and is improved by numerous municipal facilities. It has waterworks, electric lighting, a cathedral, several parks, and a number of schools. Population, 1906, 54,954.

SANTA ROSA (rō'zà), a city in California, county seat of Sonoma County, 52 miles north of San Francisco, on the California Northwestern and the Southern Pacific railroads. It occupies a fine site on Santa Rosa Creek, has wide and well-graded streets, and is the center of a large trade in roses and nursery stock. The surrounding country produces fruits, cereals, and dairy products. Among the noteworthy buildings are the county courthouse, the public library, the Pacific Methodist College, the Ursuline Academy, and the Santa Rosa College for Ladies. The manufactures include wine, leather, canned fruit, cigars, flour, and machinery. It has systems of public waterworks, sewerage, and electric lighting. The place was settled in 1850 and incorporated in 1854. Population, 1900, 6,673; 1910, 7,817.

SANTIAGO (sän-tê-ä'gō), the capital and largest city of Chile, in the province of Santiago, 90 miles southeast of Valparaiso. It occupies a fine site on the Mapocho River, which is elevated about 1,650 feet above sea level, but its buildings are mostly low, owing to occasional disturbances by earthquakes. The streets are regularly platted, intersecting each other at right angles. In the center of the city is the Plaza Independencia, a large square adorned with beautiful plants and a fine fountain. Around the square are the most important buildings, including a cathedral, the government building, and an archbishop's palace. Other structures of note include the mint, the cathedral, the opera house, the Exposition Palace, the University of Santiago, the national institute of secondary education, a musical conservatory, and a military school. The university has a fine museum, a library, and botanical gardens. It is attended by 1,000 students. The national library, founded in 1813, contains 75,000 volumes, including many valuable works relating to America. It has many academies, convents, and scientific and educational associations.

Santiago is surrounded by a district which has fine orchards of figs and other fruits and contains deposits of gold, silver, lead, and other minerals. Among the manufactures are wines, clothing, earthenware, furniture, machinery, and tobacco products. The city has railroad connections with other trade emporiums. It is lighted by gas and electricity and has electric street railways, waterworks, pavements, sewerage, and a fine public park. The larger part

of the trade is in the hands of foreigners and the commerce is largely through Valparaiso, its port on the Pacific. Pedro de Valdivia founded Santiago in 1541. In 1906 it was visited by a destructive earthquake, which caused much loss of life and destroyed property valued at \$10,000,000. Population, 1908, 278,462.

SANTIAGO, Battle of, a naval engagement of the Spanish-American War, which occurred on July 3, 1898, off the coast of Cuba. The American squadron was under command of Sampson and Schley, who had confined the Spanish squadron, commanded by Cervera, in the harbor of Santiago de Cuba. Lieutenant Hobson had previously sunk the collier *Mer-rimac* in the narrow channel to the harbor and the American army was completing the investment of the city. Cervera made a bold dash to escape on the morning of July 3, but was immediately attacked and pursued by the Americans under Schley. The fighting continued most of the day, but the Spanish lost 510 men killed and wounded and all of their vessels. One American was killed and ten were wounded.

SANTIAGO DE CUBA (kōō'vā), a seaport city of Cuba, on the Bay of Santiago de Cuba, capital of a province of the same name, in the southeastern part of the island. It has steamboat and railroad facilities and a well-defended harbor, which is accessible by the largest vessels. The city occupies a fine site on a hillside 150 feet above the bay. It has paved streets, electric and gas lighting, waterworks, rapid transit, and other municipal improvements. The noteworthy buildings include the government palace, the military hospital, the opera house, the cathedral, and the Hospital de Cardidad. Calle de Christina, extending along the water front, is the chief street. Nearly all the larger buildings face the Plaza de Armas, which contains beautiful trees and subtropical plants.

The city has a large trade and many industries. Among the manufactures are sugar, soap, leather, tobacco and cigars, spirituous liquors, lumber products, and machinery. In the vicinity are extensive copper mines and numerous orchards, vineyards, and tobacco and sugar plantations. It was founded in 1514 and is the oldest town of Cuba. For many years it was the capital city. On July 3, 1898, the American fleet destroyed the Spanish squadron near Santiago. The city was defended by a Spanish force under General Toral, but capitulated and was occupied by American troops on July 17 of the same year. Population, 1906, 45,478.

SANTO DOMINGO. See **San Domingo.**

SANTOS (sän'tōsh), a seaport city of Brazil, in the state of São Paulo, 25 miles south of the city of São Paulo, with which it is connected by a railway. The streets are well graded and paved, mostly with macadam, and it has a number of fine parks and boulevards. It has a spacious harbor and a large trade in coffee, wheat, sugar, and fruits. As a coffee-exporting port it takes rank among the most important in the world. Electric and gas lighting, waterworks, and a public library are among the utilities. It has manufactures of clothing, utensils, tobacco products, and machinery. The place was founded in 1539. Population, 1906, 41,084.

SÃO FRANCISCO (soun frän-sēsh'kōō), a river of eastern Brazil, which rises in the province of Minas Geraes. It has a general north-easterly course to Quebrobo, where it assumes a course toward the southeast and flows into the Atlantic. It flows through a large part of the Brazilian Highlands and in its upper regions are the celebrated Brazilian diamond fields. The entire length is 1,750 miles. It is navigable for large vessels to the Falls of Paulo Affonso, a distance of 140 miles from its mouth. These falls are 275 feet high and may be classed among the most remarkable of America. The river is navigable for 900 miles above the falls.

SAÔNE (sōn), a river in the eastern part of France, the largest tributary of the Rhone. It rises in the department of Vosges and joins the Rhone at Lyons, after a course of 290 miles. The chief tributaries are the Ognon and the Doubs. Canals connect it with the Moselle, the Loire, the Rhine, and the Seine. It is navigable for a distance of 190 miles.

SAO PAULO (soun pou'lōō), a city of Brazil, capital of a state of the same name, 250 miles southwest of Rio de Janeiro. It occupies a fine site on a plain near the source of the Rio Tiete, a tributary of the Rio Paranaíba. The surrounding country is noted for its fertility and has fine forests and deposits of precious metals and gems. It has a large trade in coffee, live stock, tobacco, sugar, rice, millet, and dairy products. The manufactures include furniture, cotton and woolen goods, leather, vehicles, soap, utensils, and machinery. Among the important buildings are the Ypiranga Palace, the government house, the cathedral, the Jesuit College, and many parochial schools. The state of São Paulo is colonized largely by Europeans, including many Germans and Italians. The city was founded by Jesuits in 1552. Population, 1907, 102,436.

SAP, the liquid found in growing plants, which serves functions in plant life as important

as blood does in animals. In it take place the changes necessary for vegetable growth. It is formed by the roots as crude sap from materials taken up from the soil. After passing from cell to cell by a process known as *endosmose*, it ascends to the leaves. There it undergoes chemical changes through the influence of light, especially the absorption of carbon dioxide from the air, and the formation of sap elements. It now takes the name of *elaborated sap* and descends mainly through the bark, forming on its downward course the new growth to build up the plant. The ascent is with great rapidity in a zig-zag course, but it is most copious in the spring, while at the beginning of winter it ceases entirely. The movement of sap in trees is one of the early signs of the return of spring in temperate and cold zones. Many plants yield sap that is of value in medicine and the industries, such as the maple, the beet, and the sugar cane, which furnish the world's supply of sugar.

SAPAJOU (săp'ă-jōō), or **Sajou**, the name given to a group of monkeys native to America, which includes the largest and most intelligent species. They have a prehensile tail, the under surface of which is naked. The color is light brown, but the forehead is white. They live in bands, frequently from 40 to 50, and are able to leap long distances in passing from tree to tree. The largest are 45 inches long, including the tail, which is 20 inches. Their food consists of fruits, insects, and the tender shoots of plants.

SAPPHIRE (săf'ir), a precious stone of the corundum kind, next in value and hardness to the diamond. The ruby is a reddish-colored stone of the same kind, while the sapphire is a transparent species of a blue color, but there are sapphires of variegated colors. The topaz is a yellow sapphire, the amethyst is a violet, and the emerald is a green. Other species are colorless, striped, or milky. Sapphire occurs crystallized in six-sided prisms, with six-sided pyramidal ends. The most valuable specimens are produced in Ceylon, Bohemia, Burmah, and Persia. Several species are obtained in the United States, Germany, and Australia. The value of sapphires depends upon the color and transparency.

SARACEN (săr'ă-sën), meaning Oriental or Eastern, the name first applied by Pliny to the Bedouin Arabs who inhabited Mesopotamia. Later it became gradually extended in meaning to include the inhabitants of the Syro-Arabian desert, who harassed the frontiers of the Roman Empire, and still later it was given to any Mohammedan enemy of the Christians. In the latter sense it was applied to those who embraced the doctrine of Mohammedan and held it to be

their duty to spread the Moslem faith everywhere, which in fact meant to conquer the whole world. To accomplish this purpose they resisted the Crusades and made many invasions of Europe, giving men a threefold choice,—the Koran, tribute, or the sword.

The Saracens originated a style of architecture peculiar to themselves, of which representative specimens are still abundant in Southern Europe. It is spoken of generally as Arabian architecture in Asia and Egypt, and as Moorish in Spain. The finest specimens of Saracenic architecture in Asia are found in the public buildings erected in Persia by Shah Abbas, in the early part of the 17th century. These include the magnificent mosque known as Mesjid Shah, a structure 223 feet long and 130 feet wide. It is crowned by a double dome 165 feet high. The most noted specimen in Africa is the beautiful mosque built by Ibn Tooloon in 876 A. D., at Cairo, Egypt. Another fine specimen near Cairo is the mosque and tomb of Kaid Bey, completed in 1463. See **Moors**.

SARAGOSSA (săr-ă-gös'să), a city of Spain, capital of the province of Saragossa, on the Ebro River, 175 miles northeast of Madrid. It has ample railroad facilities and is important as a trade and manufacturing center. The city is divided into two parts by the river, which is crossed by a stone bridge which dates from 1437. Most of the streets are narrow and tortuous and many of the buildings are low, but it has a number of structures of historic interest. Among them are two cathedrals, known as El Pilar and La Seo, the former dating from 1677 and the latter, a Gothic structure, was completed in the 13th century. The university was founded in 1474 and was once an institution of wide fame. At present it has 800 students and a library of 20,000 volumes. Other noted institutions include several hospitals, a museum, a townhouse, and an exchange. The Moorish citadel, called the Aljaferia, formerly served as a palace for the kings of Aragon, but later became connected with the Inquisition. Among the manufactures are leather, silk and cotton textiles, utensils, vehicles, cigars, and clothing.

Saragossa is an attraction for pilgrims from many parts of the Spanish world, who come here to witness the image of the Virgin, a fine figure in one of the cathedrals. The place is an ancient city, dating from a remote period. Its present name was applied in honor of Caesar Augustus in 25 B. C. The Romans made it an important trade center, but it was captured by the Moors in the 8th century. Alfonso of Aragon captured it in 1118, after which it remained the capital of the kingdom of Aragon for some

time. The French besieged it in 1808 and 1809, during which time many perished. It was then that a woman named Augustina snatched the match from the hands of a dying cannoner and fired his cannon at the enemy. She is known as the *Maid of Saragossa* and her fame has been extended by the writings of Southey and Byron. Population, 1906, 99,648.

SARATOGA (sär-ä-tō'gä), **Battle of**, an important engagement of the American Revolution. It occurred near Saratoga Springs, N. Y., on Oct. 7, 1777, and is classed by Creasy as one of the "Fifteen Decisive Battles of the World." The Continental army had been victorious at Bennington and was daily increasing its strength, while the British under Burgoyne were awaiting help from General Howe. General Gates held a strong position at Bemis Heights, which Burgoyne decided to storm, but in this he was thwarted by the prompt and vigorous action of Benedict Arnold, who led a furious opposition with 3,000 men. The battle ended at dark without decisive results, and on the 9th Burgoyne fell back to Saratoga, where his supplies were cut off and he was besieged by the Continentals under General Gates. After several light skirmishes, Burgoyne decided to surrender, which he did on the 17th, with the understanding that he and his men were not to serve against the Americans again. The Continentals secured 5,804 prisoners, 4,650 muskets, and 42 guns. A beautiful obelisk 155 feet high is located 12 miles east of Saratoga Springs, on a bluff near the Hudson, which was the scene of the principal engagement.

SARATOGA SPRINGS, a village of New York, in Saratoga County, 38 miles north of Albany, on the Boston and Maine and the Delaware and Hudson railroads. It is one of the most noted watering places of the United States. In its vicinity are many mineral springs. Fashionable and convenient cottages and hotels are abundant. The prevailing character of the water is cathartic and it is bottled and shipped in large quantities. About five miles from the city is Saratoga Lake, to which an electric railroad extends. Among the noteworthy buildings are the public library, the State armory, the Convention Hall, the Athenaeum, the Saint Faith School, and the Saint Christina Home for Orphans. Large quantities of mineral waters are bottled and shipped. The manufactures include clothing, machinery, cigars, and earthenware. It has a growing trade in fruits and merchandise. The place was settled in 1773 and General Schuyler erected a fort here in 1777, but the village was not chartered until 1834. Population, 1910, 12,693.

SARATOV (sä-rä'tōf), or **Saratoff**, a city

of Russia, capital of the government of Saratov, on the Volga River, 460 miles southeast of Moscow. It is a commercial and manufacturing center, has steamboat and railroad facilities, and is surrounded by a fertile farming and fruit-growing country. The site of the city is on the east side of the Volga, where it stretches over a rolling tract of land. Many of the streets are improved by pavements, gas and electric lighting, rapid transit, waterworks, and beautiful gardens and parks. Among the principal buildings are two cathedrals, a museum, the government buildings, and several excellent high schools, colleges, and hospitals. The manufactures include woolen textiles, cotton and silk goods, cordage, pottery, tobacco products, furniture, chemicals, leather, clothing, and machinery. The exports consist principally of corn, tobacco, hemp, flax, and live stock. Population, 1906, 142,091.

SARCOPHAGUS (sär-kōf'ä-gūs), a stone coffin or tomb, employed to inclose a dead body. The wealthy classes of Egypt were the first to use sarcophagi, but later the practice extended to the inhabitants of the region of Asia bordering on the Mediterranean Sea, particularly to the Phoenicians, Carthaginians, Persians, Grecians, and Romans. Many of these structures were decorated and ornamented with elaborate carvings and inscriptions. The most beautiful specimens were found in the Egyptian pyramids. Coffins of stone have been used to some extent for royal or distinguished persons even in modern times.

SARD, a reddish-brown species of chalcedony, distinguished from carnelian by the deepness of its color. When held between the eye and the light, it has a flesh-red color. The ancients prized it highly as a gem, and early writers credit it with having virtue in cheering the heart and encouraging the intellect. See **Chalcedony**.

SARDINE (sär'dēn), a class of small fishes, belonging to the same genus as the herring and the pilchard, much valued as food. They are mostly canned in oil. This is done after salting and partly drying by pouring hot olive oil, or oil and butter, over them and sealing in a tin can. The young of the herring and menhaden are preserved in the same way in Canada and the United States. Sardines are abundant in the Mediterranean and off the western coast of Europe, where they are caught and canned in large quantities. Anchovied sardines are those preserved in red wine.

SARDINIA (sär-dīn'ī-ä), an island in the Mediterranean, lying south of Corsica. Next to Sicily it is the largest of the Mediterranean islands. It is separated from Corsica by the

Strait of Bonifacio, a channel about seven miles wide, and its shores are indented by numerous gulfs, including the gulfs of Asinara, Oristano, Palmas, Cagliari, and Orosei. The length from north to south is 155 miles; the width, 70 miles; and the area, 9,294 square miles.

DESCRIPTION. Several mountain groups characterize different parts of the island. The most elevated peaks are in the eastern part. Many of them are chiefly of granite formations. Mount Gennargentu, height 6,225 feet, is one of the highest peaks. The coasts are generally steep and rugged and near the shore are a number of small islands, but they are mostly off the northern and western coasts. Sardinia has an abundance of drainage, the most important rivers including the Coghinas, flowing into the Gulf of Asinara in the north; the Tirso, flowing into the Gulf of Oristano in the west; and the Flumendosa, flowing into the Mediterranean on the east. The climate is mild, with a temperature ranging from 30° to 90°, and it has an amplitude of rainfall. Both the climate and rainfall vary somewhat on account of elevation, but it may be said that the most pleasant weather is experienced in autumn.

INDUSTRIES. The soil is generally fertile, especially in the valleys and coast regions, and there are an abundance of timber, fine fisheries, and valuable deposits of minerals. Among the mineral productions are sulphates of iron and copper, arsenic, nickel, cobalt, silver, zinc, antimony, lead, quicksilver, granite, and limestone. Agriculture is the principal occupation, though mining, manufacturing, and fishing have been developed considerably. The principal soil products include maize, wheat, beans, barley, tobacco, hemp, vegetables, flax, oranges, lemons, and many other fruits. The fisheries yield sardines, tunny, anchovies, and coral. Cattle, horses, sheep, goats, and swine are reared profitably. Among the manufactures are cotton textiles, silk and woolen fabrics, clothing, hardware, machinery, furniture, and cured fish. Several railroad lines penetrate different parts of the island, the most important being the line built from the Gulf of Asinara to the Gulf of Cagliari, which touches the coast of the Gulf of Oristano.

GOVERNMENT AND INHABITANTS. Sardinia is now divided into the provinces of Sassari and Cagliari. The local government is the same as that of Italy, to which country it belongs. The people are a mixture of Italian and Spanish stock and somewhat resemble the Greeks. They are in a very backward state educationally. Fully 80 per cent. are unable to read or write. Public education may be said to be in a primitive condition, the schools being dominated largely by

the clergy. The family feud, or *vendetta*, is still practiced, but to a more limited extent than in Corsica. Universities are located in Cagliari and Sassari and elementary schools and convents in the smaller towns. The religion is almost exclusively Roman Catholic. Cagliari, on the Gulf of Cagliari, is the capital and principal seaport. Other cities include Sassari, Tempio, Alghero, and Oristano. Population, 1907, 841,417.

HISTORY. The early history of Sardinia is wrapped in tradition, but it is reasonably certain that a high state of civilization was developed at the time of the greatest prosperity of Greece. It was known to the Greeks as Ichnusa. The Carthaginians conquered it about 480 B. C., and during their occupancy it became noted for its production of corn and fruits. It was made a Roman possession in 238 B. C. and was long noted as the granary of Rome. The Vandals, Goths, and Saracens successively conquered it after the fall of the Roman Empire, but the Eastern Empire recovered it in 534 A. D. Saracen invaders obtained a foothold a second time, but they were driven out by an allied army from Genoa and Pisa in 1299. The conquerors divided the island as two separate possessions. Shortly after it became a territory of the kings of Aragon and remained tributary to Spain until it was annexed by the British, in 1708. The Treaty of Utrecht, in 1713, transferred it to Austria, and in 1720 it became a part of the kingdom of Sardinia under the house of Savoy. The history is merged into that of Italy from the ascension of Victor Emmanuel II. to the throne of United Italy.

SARDINIA, Kingdom of, formerly a kingdom of Europe, situated in the southern part of the continent. It was formed principally of the duchies of Savoy and Genoa, parts of Milan and Montferrat, the county of Nice, the principality of Piedmont, and the islands of Caprera and Sardinia. It had an area of 28,769 square miles and a population of 5,167,542. Victor Amadeus II., Duke of Savoy, in 1720 assumed the title of King of Sardinia. This he did in accordance with a treaty with Austria, which provided that he was to surrender Sicily and receive in exchange the island of Sardinia. The history of the kingdom is largely wrapped in the fortunes of war with Austria and other countries, and is important as bearing upon and forming the nucleus of the present kingdom of Italy. The last war of the kingdom was under Victor Emmanuel II., who formed an alliance with France against Austria in 1859. In 1861 he came into possession of all of Italy, except Rome and Venetia, and assumed the title of King of Italy instead of King of Sardinia. He added Venetia

to the kingdom in 1866 and completed the union of Italy by annexing the papal states in 1870.

SARDIS (sär'dis), or **Sardes**, the name of an ancient city in Asia Minor, capital of Lydia, on the Pactolus River, about 45 miles east of Smyrna. The Greek writer Aeschylus made the first mention of the city. It was captured by the Cimmerians about 650 B. C. The greatest prosperity was reached in the reign of Croesus, who became its king about 568 B. C., when it was in possession of fabulous wealth and power. The importance of Sardis was due to its military strength, the fertility of the surrounding country, and its location on the highway leading from the interior of Asia to the Aegean coast. The Athenians burned it in 503 B. C., and after the Roman conquest it was made a provincial government. Sardis is mentioned in the book of Revelation (Rev. iii., 1-5). In profane history it is spoken of as the residence of both Xerxes and Cyrus the Great. Timour conquered it in 1402, when much of it was destroyed. The site is at present occupied by a dilapidated village called Sart.

SARDONYX (sär'dō-niks), a mineral of the quartz variety, so named because it contains layers of sard and white chalcedony. It is a kind of onyx and is used quite extensively in making brooches and other forms of jewelry. In some specimens the color is orange or reddish yellow, while in others it is red with white markings.

SARMATIANS (sär-mā'shanz), a powerful race of nomadic people of Europe and Asia, who occupied the vast region lying in the vicinity of the Caspian, Black, and Baltic seas in the time of the Romans. It is thought that they were of Asiatic origin. Tradition makes them the descendants of the Amazons by fathers of Scythian birth. Their women became famous as warriors, and as such entered the campaign on horseback with lance and spear. At first composed of various tribes, they became amalgamated into a powerful nation, and in the 4th century B. C. made the Scythians tributary. No barbarian peoples were more formidable in harassing the Roman frontiers than they. It is probable that they were conquered by the Goths in the 4th century A. D. Much of the history of Sarmatia was recorded by Ptolemy, but the manner in which he speaks of the Slavs, Finns, Goths, and other peoples of a barbarian nature makes it certain that he applied the term quite loosely.

SARNIA (sär'nī-ā), a port city of Ontario, capital of Lampton County, opposite Port Huron, Mich., on the Saint Clair River and on the Grand Trunk and the Père Marquette railways. It has connection with Port Huron by a steam

ferry and a railway tunnel under the river. The manufactures include malt liquors, woolen goods, machinery, leather, and agricultural implements. It is a port of entry and has a large lake trade. The chief buildings include the county courthouse, the high school, the public library, several banks and hotels, and a number of churches. Electric lighting and waterworks are among the municipal improvements. Population, 1901, 8,176.

SARSAPARILLA (sär-sä-pä-ril'lä), the dried root or root-stalk of the smilax, a genus of shrubby climbing plants native to tropical America. The plants grow only in the presence of an abundance of moisture, developing roots many feet long but remarkably slender. They are sold in the market as drugs, being used in the preparation of medicine. The drug is sold largely as a purifier of the blood, but its value for that purpose is overestimated.



SARSAPARILLA.

SASKATCHEWAN (säs-käch'ë-wön), a river of Canada, which rises in the Rocky Mountains by two sources called the North and the South Saskatchewan. The two branches unite some distance below Prince Albert, in Saskatchewan, and flow east into Lake Winnipeg. The north branch is 815 miles long and the south branch, 775 miles. From their confluence to Lake Winnipeg the distance is 280 miles. In its course the Saskatchewan passes through Cedar Lake. The valley is a fertile region and contains extensive and valuable forests and vast deposits of salt, iron, coal, and other minerals. About 1,000 miles of navigable waterway are afforded and in the upper course are ample opportunities for utilizing water power. The river is frozen from the middle of November to the middle of April.

SASKATCHEWAN, a Province of the Dominion of Canada, located in the west central part. It is bounded on the north by Mackenzie, west by Keewatin and Manitoba, south by North Dakota and Montana, and west by Alberta. The northern boundary is 265 miles and the southern is 375 miles long. It has a length from north to south of 720 miles. In form it resembles an upright oblong, whose base rests upon the bound-

ary line of the United States in latitude 49° , while its upper border lies in latitude 60° . The area is 251,887 square miles, of which 27,112 square miles are water surface.

DESCRIPTION. The surface is diversified, but may be said to be generally of an undulating character, and includes the principal part of the great valley of the Saskatchewan River. Three belts of prairie steppes lie parallel to the Rocky Mountains, but are not very distinctly marked. The first of these crosses Manitoba and enters Saskatchewan, being a broken escarpment about 500 feet high, and in the west central part of the Province gives way to the forest belt of the north. It is pierced by the valley of the Red Deer River and extends toward the northwest as the Porcupine Mountains and Pasquia Hills. The second steppe, known in the United States as the Coteau du Missouri, extends in a northwesterly direction across the Province and into Alberta. It is about 200 miles wide, has an altitude of 1,600 feet above sea level, and is more or less broken into spurs and hills. Various names are applied in different parts, including Bear Hills, Eagle Hills, and Vermilion Hills. Moose Hills and Touchwood Hills, which belong to this escarpment, rise from 250 to 300 feet above the surrounding plains. In the southwestern part is the third steppe, which consists in part of a plain and in part of small plateaus. The general altitude ranges from 2,000 to 3,000 feet above the sea, being highest on the border of Alberta. All of the southern part of the Province may be described as a prairie country, which merges into a region broken by wooded areas in the central part, while the northern section is densely wooded with a valuable growth of timber.

The drainage belongs to four great basins, separated by low swells of ground. These basins include those of Lake Winnipeg and the Missouri, Churchill, and Mackenzie rivers. The southwestern part lies in the basin of the Missouri and is drained by French Creek and Wood River, both of which cross the southern border and enter the Missouri in Montana. Through the south central part flows the Saskatchewan, which rises in Alberta and flows entirely through the Province into Keewatin, where it discharges into Lake Winnipeg. The southeastern part is drained by the Souris or Mouse River, which makes a bold curve through North Dakota, thence enters Manitoba and joins the Assiniboine, which has its source in Saskatchewan. The Churchill drains a large section in the north central, flowing eastward through Keewatin into Hudson Bay. The northwestern part is drained through Lake Athabasca, on the border of Alberta, toward the northwest, hence the overflow

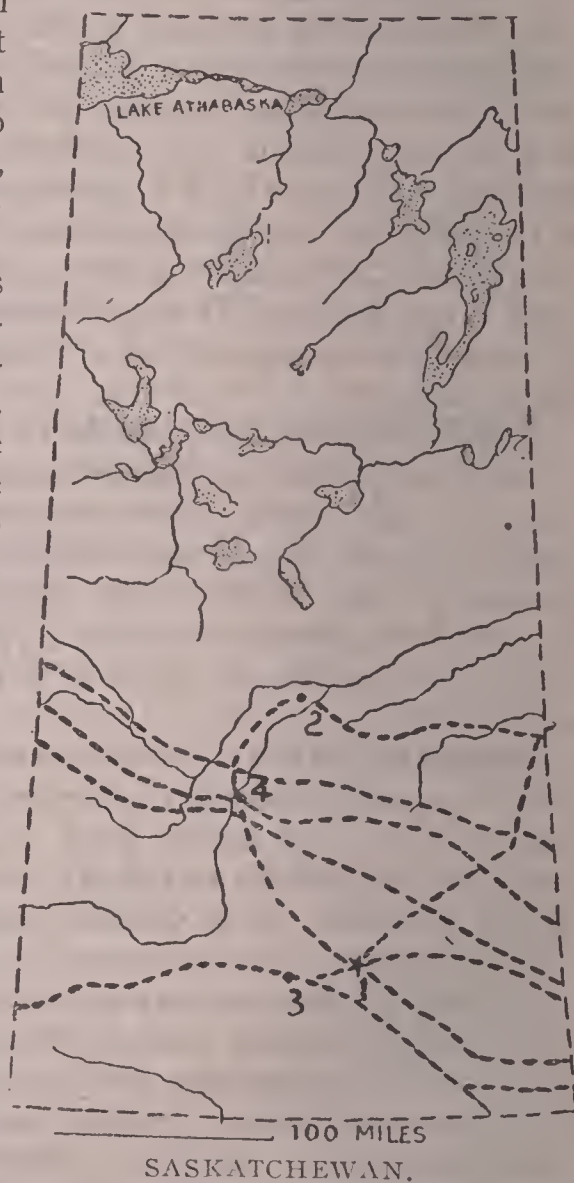
reaches the Arctic Ocean through the Mackenzie River. Many lakes characterize the central and northern parts, all of which are rich in fish and surrounded by fine forests. Lake Athabasca, partly in Saskatchewan and partly in Alberta, is the largest sheet of water. Next in size is Wollaston Lake, in the northeastern part, and it is drained in two directions, one outlet leading southward through Reindeer Lake and the Churchill and the other toward Lake Athabasca and the Mackenzie.

The climate is continental, being cold in winter and warm in summer. Rainfall is scant in

the southern part, where it ranges from twelve to twenty inches, while the central and northern portions have an abundance of precipitation. However, the summers are favorable to the cultivation of crops in the southern part, where irrigation is employed to some extent, but the northern section is not adapted to general farming. Snow falls to a depth of one or two feet and the winters are long and cold, but quite clear. At

Regina, in the south central part, the extremes range from 40° below zero to 90° above. Blizzards occur in the southern part during the winter, where the wind has a clear sweep across the prairies, but they are rare in the northern section.

AGRICULTURE. A large majority of the inhabitants are engaged in agricultural enterprises. It is estimated that 32,000 square miles are suitable for farming by irrigation, 86,500 square miles produce grain without artificial watering, and 106,000 square miles are adapted to ranch-



SASKATCHEWAN.
1, Regina; 2, Prince Albert; 3, Moose Jaw; 4, Saskatoon. Dotted lines indicate chief railroads.

ing. These figures exclude the country that is now covered with timber and for that reason not suitable for cultivation at present. Farming is carried on most extensively on the fertile plains of the southern part, where large quantities of small grain are grown. Hard spring wheat is the principal crop and the yearly production ranges from 35,500,000 bushels to 55,500,000, depending upon rainfall and other essentials of the growing season. Settlements have been extending with remarkable rapidity, hence the cultivated area is becoming greatly enlarged. Potatoes of a fine grade are grown with profit. Oats and barley produce abundantly and hay yields good returns. Small fruit, such as grapes, currants, plums, and strawberries, are cultivated extensively and a northern variety of apples is grown with good results. Ranching is carried on most extensively in the south and southwest, where cattle sustain themselves almost the entire year on the open plains. Sheep and horses are grown in large numbers. Other products include flax, sugar beets, rye, and vegetables.

OTHER INDUSTRIES. Lumbering is an important enterprise in the northern part, where the forest wealth is enormous. Many species of the hardy northern woods abound, but pine and spruce predominate. These forests yield large returns for fuel and building purposes. Coal deposits, both bituminous and lignite, are widely distributed, but the latter is most abundant, being mined extensively for local purposes in many parts of the Missouri drainage basin. Iron deposits exist north of Lake Athabasca, but these are not worked at present. Limestone, granite, and clays are widely distributed.

Manufacturing is confined chiefly to products consumed locally and to the railway repair shops. However, there is a considerable output of lumber and lumber products for export. Dairying is receiving considerable attention and the butter and cheese produced are of a fine quality. Many flouring mills are operated and sugar is manufactured from sugar beets. Other manufactures include pottery, brick, furniture, and clothing. Large quantities of whitefish, pickerel, sturgeon, and other species of fish are found in the lakes, but the catches are used chiefly for local consumption.

COMMERCE AND TRANSPORTATION. Saskatchewan exports large quantities of barley, oats, flax, and cattle. Within recent years it has materially extended its exportation of flour and lumber. The imports consist principally of manufactured materials, such as clothing, foodstuffs, and farming machinery. Communication by the waterways extends a distance of 1,500 miles,

being chiefly from Lake Winnipeg to the interior by the Saskatchewan and its tributaries. Additional transportation facilities are afforded by numerous lakes, many of which will ultimately be connected by a network of canals. The railway lines have a total of 2,125 miles. They include principally the Canadian Pacific, the Grand Trunk, both of which cross the Province from east to west, and the Canadian Northern Railway. These lines and others have branches to many interior points.

GOVERNMENT. The Lieutenant Governor is appointed by the Governor General of Canada and is assisted by an executive council, or responsible ministry, of four members, consisting of the premier, attorney general, commissioner of education and commissioner of agriculture. Legislative authority is vested in the assembly of one department, known as the Legislative Assembly, which is composed of 41 members elected by the people. All native born and naturalized citizens may vote at the elections. The Lieutenant Governor receives a salary of \$9,000; the members of the executive council, \$5,000; and the members of the Legislative Assembly, \$1,000. Local government is administered by the officers of the counties, municipalities, and townships.

EDUCATION. A system of public schools is maintained for the free attendance of all persons who are of school age. The schools are supported partly through the sale of public lands and partly by local taxation. New schools may be organized by the settlers, but each school district, when so organized, must have not fewer than ten pupils. High schools and institutions of industry and higher learning are maintained in the cities. A commissioner of education has general charge of public education, but additional supervision is provided in the cities and counties. All the larger towns have inspectors of schools. The provincial university, established by the Legislative Assembly in 1908, is at the head of the educational system. A number of parochial and private denominational institutions are in a flourishing condition.

INHABITANTS. The southern part contains the larger number of inhabitants, while the northern section is at present almost entirely unoccupied, except by government officials and hunters. The greater number of people are of Canadian descent, but a large portion is made up of immigrants from the United States. Regina, in the southern part, is the capital. Moose Jaw, in the southwest, is an important distributing point. Prince Albert, on the Saskatchewan, is noted as a railway and commercial center. Other towns include Saskatoon, Indian Head, Moosomin, and

Yorkton. In 1901 the Province had a population of 91,460. The rapid growth and development are evident by the fact that the population in 1906 was 257,763.

HISTORY. Saskatchewan was first explored by French fur traders and they were succeeded by the employees of the Northwest Company, whose headquarters were at Montreal. The Hudson Bay Company took control of the region in 1821 and held it until 1869. Settlements began to be made by that time, but the early development was slow, owing to a lack of transportation facilities. Regina was made the seat of civil government in 1882. Louis Riel became the head of a rebellion in 1885, when about 35,000 Black Feet, Crees, and Ojibwas became dissatisfied through the destruction of the buffalo and other wild animals utilized for food. A number of these Indians and many half-breeds constituted a formidable force, which was met in a final battle by Canadian troops under General Middleton at Batoche on May 9th, where the rebels were defeated after an engagement lasting four days. Riel was captured, was tried for treason, and after due conviction was hanged. The government was that of a Territory until 1905, when it was admitted as a Province of the Dominion. It contains the larger part of the former districts of Assiniboia, Athabasca, and Saskatchewan. Since its organization as a Province and the establishment of civil government, it has grown with remarkable rapidity, both in wealth and population.

SASSAFRAS (sās'sā-frās), an extensive genus of plants, several species of which are



SASSAFRAS.

noted for the medicinal virtues of their roots. They are widely distributed in North America from Canada to the Gulf, ranging in size from a large tree fifty feet in height to a small bush

in the cold regions. Most species have yellow flowers and bear dark-blue fruit. The root yields the oil of sassafras. The chips are used in preparing a light drink known as sassafras tea. Allied species are found distributed quite extensively, known as the *sassafras-nut tree* of Brazil, the *plume-nutmeg tree* of Australia, the *laurel tree* of New Zealand, and the *sassafras laurel* of California.

SATAN. See Devil.

SATELLITE (săt'čl-lit), a celestial body attending upon and revolving around some planet. It is often spoken of as a *secondary planet*, while the body around which it revolves is called a *primary planet*. The earth's satellite is called the *moon*. It has been ascertained that the eclipses, inclinations, inequalities, and reciprocal attractions of the satellites of all the planets more or less distinctly correspond with that of the moon. While the earth has but one satellite, other planets have a larger number, but some of the planets are not attended by any. Neptune is accompanied by one; Mars, by two; Uranus, by six; Jupiter, by seven; and Saturn, by nine. It is supposed that Saturn's rings are composed of a multitude of satellites. The following table gives the more interesting facts in relation to the different satellites, but several of those referred to, as the unnamed satellite of Jupiter, were not generally admitted until recently:

NAME OF SATELLITE.	PLANET.	YEAR DISCOVERED.	DIAMETER IN MILES.	DISTANCE FROM PLANET.
Moon	Earth.....	.....	2,160	238,818
Phobos	Mars	1877	7	5,900
Deimos	Mars	1877	5	14,000
Io	Jupiter	1610	2,352	261,000
Europa	Jupiter	1610	2,099	415,000
Ganymede	Jupiter	1610	3,436	664,000
Callisto	Jupiter	1610	2,929	1,167,000
Unnamed	Jupiter	1892	100	.....
Mimas	Saturn.....	1789	600	117,000
Encheladus	Saturn.....	1789	800	157,000
Tethys.....	Saturn.....	1684	1,100	186,000
Dione	Saturn.....	1684	1,200	238,000
Rhea	Saturn.....	1672	1,500	332,000
Titan	Saturn.....	1655	3,500	771,000
Hyperion	Saturn.....	1848	500	934,000
Ipatus	Saturn.....	1674	2,000	2,225,000
Phoeba	Saturn.....	1898	.....	.....
Ariel	Uranus....	1854	500	120,000
Umbriel	Uranus....	1851	400	167,000
Titania	Uranus....	1787	1,000	273,000
Oberon	Uranus....	1787	800	365,000
Unnamed	Neptune...	1846	2,000	225,000

SATIN (săt'in), a silk fabric of a close texture, made with an overshot wool and a glossy surface. The warp forms have a close and smooth surface, and, to obtain its luster, it is

passed between heated cylinders. An interval of fifteen threads occurs in a full satin twill.

SATINWOOD, an ornamental wood obtained in the West and East Indies. It is one of the most highly prized light woods for cabinetwork. The best grades that come from the West Indies are lighter in color than those produced in the Asiatic islands, and are considered the most valuable. Several species of trees yield satinwood. The finest products secured in the West Indies are from the prickly ash, called *Bahama satinwood*. Satinwood has a close grain and is hard and durable. It is capable of taking a fine polish and is exported largely for furniture. In India it is used for building purposes, especially for floors in dwellings.

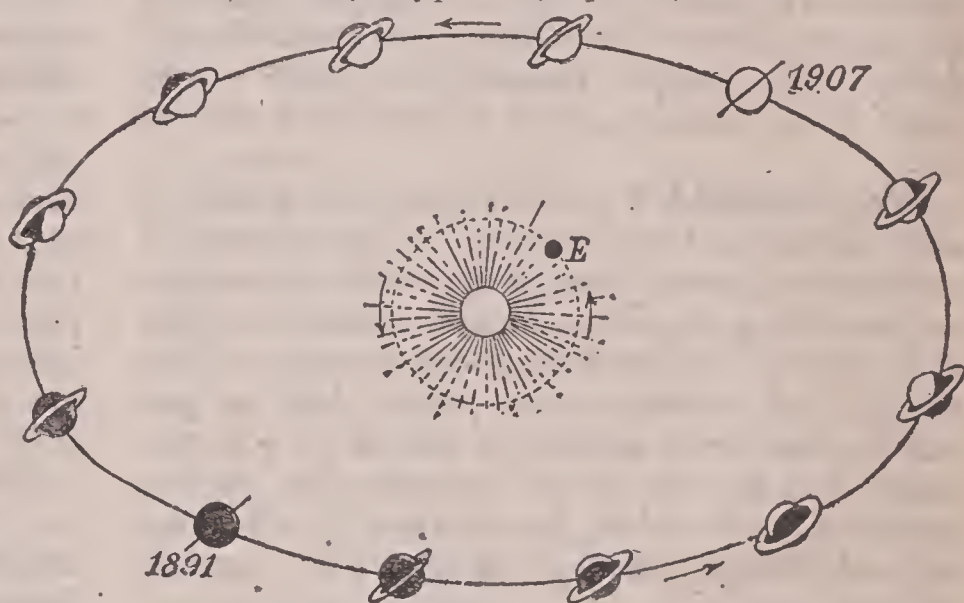
SATIRE (săt'ir), the employment of sarcasm, irony, or keen wit in attacking individuals, manners, or social or political movements. The Romans were the first to employ satire in holding wickedness and folly up to public ridicule and censure. Lucilius and Horace are generally regarded as the originators of satire, and toward the end of the republic it was used both in prose and verse. Lowell is the great master of satire in America. The leading English satirists are Byron, Pope, and Dryden, and the leading Germans, Goethe and Wieland. The sting of satirical writings lies in the discovery between the man spoken of as he appears to himself and the man as he appears to others.

SATURDAY (săt'ür-dâ), the seventh and last day of the week, so named from Saturn. It is the Sabbath of the Jews and several Christian denominations, including the Seventh Day Adventists and the Seventh Day Baptists.

SATURN, one of the major planets, which is sixth in distance from the sun. It is the second planet in size, being exceeded only by Jupiter, and has a mean diameter of 71,000 miles. It occupies the most remote position known to the ancients, shines with a feeble but steady pale-yellow light, and to the eye appears as large as a fixed star of the first magnitude. The polar diameter is about 68,000 miles and the equatorial, about 74,000. The movement upon its axis is with remarkable rapidity, making a complete revolution in 10 hrs. 4 min. 23.8 sec., thus having a day less than one-half as long as ours. However, its year is much longer, the time of a complete revolution around the sun being twenty-nine and a half earthly years. Its movement can be noted by any careful observer, since it passes through about 12° of the sky in a year. The weight is estimated at about eighty times that of

the earth, but its density is only one-eighth of the earth, being about equal to that of pine wood.

Saturn revolves about the sun at a mean distance of 886,000,000 miles, but as the earth and Saturn occupy different portions of their orbits, the distance between them at different times may vary 200,000,000 miles. Astronomers generally agree in stating that nine satellites attend Saturn, though some writers think even more, and it is surrounded by a system of rings. Some of the rings shine with a golden light and others are transparent. It is thought that the rings are composed of an immense multitude of small satellites, and that many of them resemble the meteors surrounding the sun. The nine satellites are named Tethys, Enceladus, Mimas, Dione, Rhea, Titan, Hyperion, Iapetus, and Phoeba.



SATURN'S REVOLUTION AROUND THE SUN, SHOWING THE RINGS AS SEEN FROM THE EARTH AT DIFFERENT TIMES.

SATURNALIA (săt-ür-nā'li-ä), a national festival of the Romans in honor of Saturn, celebrated after the gathering of the harvest, usually from Dec. 17 to 23. It was a time of universal cessation from labor, rejoicing, and merrymaking. No business was transacted, the courts were closed, friends sent presents to each other, and school children were given a holiday. Rome was flocked with crowds of people from the surrounding country. All classes partook of the general exultation, giving themselves over to enjoyment, practical jokes, and general rejoicing. Social distinctions were for a time suspended, or even reversed. The Romans entered so heartily into the spirit of this festival that masters waited upon their slaves, the latter being dressed on these occasions in the garments of their superiors. The modern carnival now celebrated in Italy is a survival of the ancient Saturnalia.

SATYRS (săt'tērz), in Greek legends, a race

of woodland sprites, who personified the free life of the forest. They were generally represented as half human and half animal, the upper part being that of a human being and the lower that of an animal. Their appearance was both grotesque and repulsive, but their life was one of pleasure and self-indulgence, mostly given to the chase and wild music. At intervals they partook of wine and indulged in restful slumber. Both mortals and the gentle woodland nymphs dreaded them, mostly because of their reckless sports. They were represented in the train of Dionysius and were inseparably connected with his worship. Greek poets delighted to praise the innocent frolics of the little satyrs, and sculptors represented the older forms as nearly approaching human beings, but placed horns upon their heads and gave them the feet and legs of a goat. The Satyr of Praxiteles at Athens is a famous specimen of Greek sculpture. Pliny used the word to indicate a kind of ape.

SAUERKRAUT (sour'krout), an article of food prepared from cabbage. The cabbage is gathered when the heart is firm, cut into shreds, and packed with salt in a cask or barrel, where it is allowed to ferment under pressure. The addition of caraway seeds, juniper berries, and other condiments improves the taste. Sauerkraut was first made in Germany, but is now produced and sold in the markets of all countries of Europe and America having a temperate climate.

SAUGUS (sə'gūs), a town of Massachusetts, in Essex County, eight miles north of Boston. It is on the Saugus River and the Boston and Maine Railroad, and is the residence of many Boston business men. The chief buildings include the townhall, the high school, several churches, and a library of 8,500 volumes. Woolen goods, brick, boots and shoes, spices, and machinery are among the manufactures. The place was incorporated in 1815. Population, 1905, 6,253; in 1910, 8,047.

SAULT SAINTE MARIE (sōō sānt mā'rī), a port city of Michigan, county seat of Chippewa County, on the Saint Mary's River, near Lake Superior. It is on the Duluth, South Shore and Atlantic, the Canadian Pacific, and the Minneapolis, Saint Paul and Sault Sainte Marie railroads and on the Sault Sainte Marie Canal. On the opposite side of the Saint Mary's River is the Canadian town of Sault Sainte Marie, with which it is connected by an international railroad bridge. Among the noteworthy buildings are the county courthouse, the public library, the high school, and a number of fine churches. Other features include Canal Park, Fort Brady,

and an immense electric power plant. The manufactures include lumber, sailing vessels, machinery, tobacco and cigars, flour, furniture, leather, and hardware. It is the seat of a branch of the State fish hatchery and has a large trade in fish, lumber, and manufactures. Electric lighting, pavements, waterworks, and rapid transit are among the improvements. Extensive timber and minerals abound in the surrounding country. A mission was established here in 1641 by Jesuits, but the first permanent settlement was not made until 1662. It was incorporated in 1887. Population, 1904, 11,442; in 1910, 12,615.

SAULT SAINTE MARIE, a port of entry of Ontario, in Algoma County, on the Saint Mary's River. It is finely situated on the Saint Mary's Falls Canal and the Canadian Pacific and the Algoma Central railways, and is connected with the opposite side of the river by a bridge one mile long. The surrounding country is agriculture and has productive iron ore and copper mines. The principal buildings include the city hall, the high school, the public library, and the Cornwall and International hotels. Among the manufactures are steel rails, lumber products, and machinery. Electric lighting, waterworks, telephones, and sewerage are among the public utilities. Population, 1901, 7,169.

SAULT SAINTE MARIE CANAL, an important waterway of the United States, extending round the rapids of the Saint Mary's River at Sault Sainte Marie, Mich., and connecting Lake Superior with the Saint Mary's River. It is two-thirds of a mile long and has a fall of eighteen feet, which is overcome by two locks located side by side. These locks include the Poe lock, which is 21 feet deep, 100 feet wide, and 800 feet long, and is the largest improvement of the kind in the world. The expense of construction was \$5,000,000. It has a larger traffic than the Suez Canal in Africa. A similar canal, but somewhat smaller, is located on the Canadian side. The latter canal carries a comparatively small per cent. of the traffic between Superior and the other waters of the Great Lakes.

SAURY PIKE (sə'rŷ pīk), a kind of fish belonging to the flying fishes, peculiar for its greatly prolonged body. It is covered with minute scales, has long jaws resembling a beak, and swims very near the surface, often leaping out of the water and gliding through the air for some distance. This habit, due largely to its seeking to escape the danger of attacks of larger fish and tortoises, has given it the name of *skipper*. Several species are native to American and European waters. The American saury pike is

remarkable for its long, thin body. These fish are edible.

SAUSAGE (sa'sāj), an article of food prepared of chopped or minced meat. It is made of fat and lean meat mixed in varying proportions and is highly seasoned with salt and pepper. Some varieties are made of lean beef, which is mixed with a small quantity of fat pork and seasoned with sage or garlic, and is inclosed in a cylindrical case or skin made of the prepared intestine of some animal. Sausage is a by-product of markets and packing-houses, where trimmings of all sorts are used for the purpose. The meat is carefully chopped or minced by machinery, after which it is seasoned with salt and pepper, and machines are used to press the soft and pliable mass into skins. Stuffing machines consist of two cylinders, one for steam and the other for pressing the meat into the skins, which is done by means of a piston rod being worked by the piston rod of the steam cylinder. At the bottom of the stuffing cylinder is a tube, over which the sausage casings are slipped, and they are filled rapidly by the meat being forced through this orifice. The manufacture of sausage is one of the most profitable parts of the packing industry. The varieties of sausage are very numerous. In the United States the casings for sausages have an annual value of \$2,500,000 and the output of sausage is \$298,500,000.

SAVANNAH (sā-văn'ă), a river of the United States, which rises near the southern boundary of North Carolina and, after a general course toward the southeast, flows into the Atlantic Ocean. It forms the boundary between South Carolina and Georgia, is 450 miles long, and is navigable for large vessels to the city of Savannah, eighteen miles from the sea, and for small steamboats to Augusta.

SAVANNAH, the second city of Georgia, county seat of Chatham County, on the Savannah River, 15 miles from the Atlantic. It occupies a commanding site about fifty feet above sea level and has transportation facilities by the Atlantic Coast Line, the Seaboard Air Line, the Southern, and other railways. The streets are broad and straight. They are paved largely with stone, asphalt, and macadam. Magnolias, catalpas, and japonicas beautify the streets and many of the squares, hence the city has been popularly named the *Forest City*. Forsyth Park, a tract of ten acres in the center of the city, is one of many beautiful resorts. The Parade Ground, in the southern part of the park, has a fine Confederate monument. About thirty squares are maintained in different sections of the city, many of which contain handsome monuments, includ-

ing those of Count Casimir Pulaski, Nathanael Greene, William Jasper, and William Washington Gordon.

The architecture is, in general, modern and substantial. Among the leading public buildings are the county courthouse, the customhouse, the post office, the Union Passenger Station, the Masonic Temple, the City Exchange, the De Soto Hotel, and the public library. It has numerous church edifices of historical interest and maintains many ward and several high school buildings. Among the institutions are the Savannah Hospital, the Telfair Hospital for Women, the Saint Joseph's Hospital, and the Georgia Infirmary for Colored People. It is the seat of a Roman Catholic bishopric, the Jewish Synagogue of Mickva, and the Telfair Art Gallery. Bethesda Orphanage, founded by George Whitefield in 1740, is located about ten miles from the city. The Christ Church occupies the site on which John Wesley first preached to the colonists in America.

Savannah is located in a fertile region which produces large quantities of cotton, fruits, rice, sugar cane, and vegetables. It has an extensive coastwise and foreign trade, and is one of the largest cotton-shipping ports in the United States. The river is sufficiently deep to admit the largest steamers and has been greatly improved by wharves and by dredging. It has large exports of rice, lumber, phosphate rock, cotton seed oil, tobacco, and turpentine. The manufactures include fertilizers, furniture, railroad cars, confectionery, pipe tobacco and cigars, locomotives, patent medicine, and clothing. Among the public utilities are extensive systems of waterworks, sewerage, and surface drainage. Intercommunication is provided by a system of electric railways, which has branch lines to all parts of the city and many points in the adjoining country.

James Edward Oglethorpe founded a settlement in the vicinity in 1733. A large number of German colonists settled in the vicinity during the next few years, and Charles and John Wesley arrived in 1735. It was occupied by the British in 1778, who compelled the Americans to surrender, and was held by them until the close of the Revolutionary War. In 1789 it was incorporated as a city. The *Savannah*, which was the first steamer to cross the Atlantic, was owned and constructed by people in the city. General Sherman captured Savannah in 1864, when completing his march to the sea. At that time it had a population of about 25,000. Although the navy yard and many buildings were destroyed, it was rebuilt with rapidity, and is at present one of

the leading commercial cities of the South. Population, 1900, 54,244; in 1910, 65,064.

SAVE (sáv), a river in Austria-Hungary, which rises in the southeastern part of that country, near the boundary of Italy. After a course of 550 miles toward the southeast, it joins the Danube near Belgrade. It separates Carniola from Styria, crosses Coatia, and separates Slavonia from Bosnia and Servia. The valley of the Save is highly fertile, producing large quantities of cereals and fruits. Among the principal tributaries are the Una, Drina, Bosna, and Kulpa rivers. It is navigable for 335 miles.

SAVINGS BANK, an institution for receiving and investing savings. The primary object of savings banks is to encourage thrift and the accumulation of earnings among the laboring, professional, and other classes. They pay interest on deposits at stated intervals, the interest depending on the rate of profit accruing to the bank from loaning the deposits. Savings banks originated in the latter part of the 18th century and were, in general, managed by persons seeking no remuneration for their services. The first banks of this kind in Europe were established in accordance with suggestions made by Daniel Defoe in 1697, when several small institutions were founded in England. Banks of a similar character were soon after instituted on the continent. The first large savings bank was established at Brumath, France, in 1765; another at Hamburg, Germany, in 1778; one at Berne, Switzerland, in 1787; and the first large institution of this kind in England, in 1799. These particular banks and others of a similar kind furnish depositors an opportunity to place small savings at interest, and the state is the direct security for the repayment of the amounts deposited.

It has been found that savings banks promote habits of economy among the less wealthy classes, and thus constitute a source of much benefit to society generally. The promotion of systematic saving of small earnings has been still further extended in many European countries by the establishment of post office, military, and naval savings banks. *Postal savings banks* were authorized in England by an act of Parliament in 1861. Depositors are provided with a deposit book. Every deposit is entered in the deposit book by the receiving officer. It is attested by the stamp of his office, and the amount is reported to the Postmaster General the same day it is received. No depositor may place savings exceeding \$150 per year and the minimum receivable at any time is 25 cents. *Military and naval savings banks* are designed to accommo-

date the frugal soldiers and sailors. Institutions of this character are maintained in several countries of Europe.

The savings banks of the United States are under the direction of private corporations. Depositors are protected by State laws in some instances, though a number of the states have not yet enacted laws of this character. However, there are building and loan associations, a form of coöperative savings banks, in most of the states. These institutions take the place of savings banks in many respects, but money is loaned only to members on improved real estate security. The first savings bank incorporated in the United States was the Boston Provident Savings Institution, in 1816, and the same year was founded the Philadelphia Savings Fund Society, but it was not incorporated until 1819. More than a thousand similar institutions are maintained at present in the United States, all of them resembling the common plan in receiving deposits and paying a rate of interest according to the profit from loaning the deposits. Depositors are provided with a pass book, in which all sums of money deposited by individuals, corporations, or societies are entered, and in it is made an account of the withdrawals.

In 1908 there were 85,753,963 depositors in the savings banks of the world and the total deposits amounted to \$11,052,716,598. The latest report shows the following interesting facts regarding the savings banks of the leading countries of the world:

	NUMBER DEPOSITS.	TOTAL DEPOSITS.	AVERAGE DEPOSITS.
Australia.....	1,086,018	\$164,161,981	\$151.15
Austria.....	4,946,307	876,941,933	177.29
Belgium.....	2,088,448	141,851,419	67.92
Canada.....	213,638	60,771,128	289.14
Denmark.....	1,203,120	236,170,057	196.29
France.....	11,298,474	847,224,910	75.01
Germany.....	15,432,211	2,273,406,226	147.38
Holland.....	1,330,275	72,738,817	54.83
Hungary.....	1,717,515	432,810,515	251.91
India.....	866,693	34,656,371	39.98
Italy.....	6,740,138	482,263,472	71.55
Japan.....	7,467,452	40,887,186	5.48
New Zealand.....	261,948	38,332,823	146.34
Norway.....	718,823	89,633,481	124.69
Rumania.....	145,507	7,426,031	51.04
Russia.....	4,950,607	445,014,951	89.90
Sweden.....	1,892,586	151,480,442	80.54
Switzerland.....	1,300,000	193,000,000	148.46
United Kingdom.....	11,093,469	966,854,253	87.15
United States.....	7,305,443	3,060,178,611	418.89

The laws of some states provide that depositors shall be amply secured, and others have provisions which limit the amounts that may be deposited by any one person. In some cases the laws exempt from liens and executions the deposits made by minors and females. These banks are limited in some states by statutory

law as to the character of investments that may be made with the deposits, and the amount that is to be invested in proportion to the receipts of the bank. In most states provisions have been made for the examination of the condition of the banks at regular intervals. Only ten savings banks were maintained in the United States in 1820, in which \$1,138,576 were deposited by 8,635 persons.

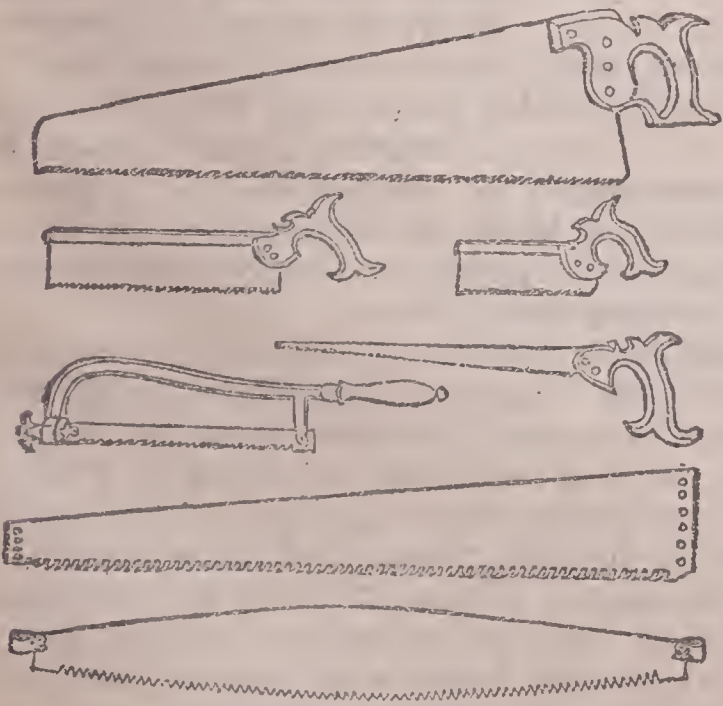
SAVOY (sà-voi'), **House of**, a distinguished royal house of Europe, which is now represented in Italy by the reigning dynasty. It may be said to be traceable back to the year 407 A. D., when the small territory of Savoy was seized by the Burgundians from the declining power of Rome. Emperor Henry V. bestowed the title of Count of Savoy on Amadeus III. in 1111 and Emperor Sigismund, in 1416, made Amadeus VIII. the first Duke of Savoy. From 1485 the dukes of Savoy claimed to be kings of Cyprus and Jerusalem, but the title of king was not generally recognized until the Treaty of Utrecht was concluded in 1713. That treaty ended the War of the Spanish Succession and gave to Victor Amadeus II. the island of Sicily and a part of the duchy of Milan, and conferred upon him the title of king. He was compelled to surrender Sicily to Austria in 1720, but received in exchange the island of Sardinia, which, along with his other possessions, was erected into the kingdom of Sardinia.

SAW, an instrument with a tempered steel blade and pointed teeth arranged continuously,

surgical and dental operations, from which they range to the great saws employed in sawmills for cutting the largest timber. The best saws are of tempered steel, ground smooth and bright, and the teeth are either cut, filed, or punched, but in larger ones, especially circular saws, inserted and removable teeth are employed to a considerable extent. To manufacture a first-class saw it is necessary to secure uniform thickness in the blade. It is required to have elasticity sufficient to spring back into shape, if bent into a bow by accident. The teeth are sharpened with a triangular file, the blade of the saw being first fixed in a whetting block. When inclined forward or backward, they are said to rake, and to give better clearance the teeth are alternately inclined laterally, hence they cut a little wider than the blade. This is called the *set*.

The two general classes of saws are known as handsaws and machine saws, and of each there are numerous kinds. *Handsaws* are variously named, according to the uses they serve. The most common forms include the panel saw, meat saw, ripping saw, frame saw, keyhole saw, tenon saw, dovetail saw, and sash saw. All these are for use by one person, and the blade tapers in width from the handle. The *crosscut saw* is intended for two persons, having a handle at each end, but there are forms of the crosscut saw designed for use by one person. A *circular saw* consists of a disc having saw-teeth cut or fixed in its periphery. It is mounted on an arbor, with which it rotates, usually at a high speed. The circular saw is used in sawmills, often one saw above another, and the log is pushed against it by means of a traveling platform. This saw is likewise employed for cutting across blocks of wood, as cutting cordwood for fire lengths.

Three forms of sawing machines are used in the sawmills, including the circular, band, and straight saws. Where large logs are cut, two circular blades instead of one are used, the advantage being that lumber may be cut with greater rapidity, while timber may be saved in that the *kerf*, or *groove*, can be less wide. Besides, two saws arrayed in this way make it possible to drive them faster and secure a truer cut. A *bandsaw* is one made by placing a thin endless saw like a belt over two wheels, the band passing rapidly and operating on the material moving against it, either by hand or on a platform. Bandsaws are used largely for resawing, and a saw deflector is often used to keep the belt in line. *Straight saws* are of two kinds, the drag saw for cutting a log in two, and the jig saw for light ornamental work.

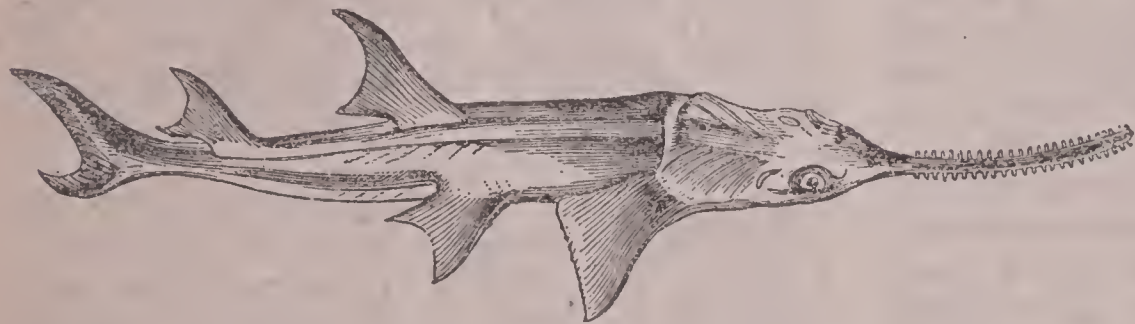


SOME FORMS OF SAWS.

used to cut wood, stone, metal, or other substances. Many kinds of saws are employed in the arts and industries, their form, size, and shape depending upon the uses for which they are intended. The smallest are those used in

Circular blades are used largely in metals; some are toothed, while others are plain, the friction of rapid rotation cutting the metal. Toothless blades are used quite largely in marble and other stone. Many saws have come into use for special purposes, such as are employed for rabbeting and cutting weatherboards and for circular and ornamental work. Sawmills are large establishments for sawing logs into lumber by power, either steam or water power being used. It may be said that sawmills are comparatively modern, the earliest having been built at Augsburg, Germany, in 1322. The first one set up in England was built by the Dutch in 1663, near London, but prejudice against labor-saving machinery caused the populace to destroy it. The sawmills of Canada and the United States constitute a vast industry, millions of feet of lumber being cut for domestic use and exportation.

SAWFISH, a genus of fish bearing resemblance both to the sharks and rays, but distinguished by having a long beak or snout. They attain a length of from ten to twenty feet and may be counted among the most savage of



COMMON SAWFISH.

fish. The beak is often six feet long. It has from 16 to 28 pairs of teeth set horizontally in sockets, and is used to rip or tear open its prey. Sawfish have been known to inflict mortal wounds on whales. Their flesh is too coarse to be eaten. Many species have been enumerated. The common sawfish, native to the Atlantic from New Brunswick to Florida, is the best known.

SAWFLY, the popular name of a class of insects that deposit their eggs in holes cut into vegetable tissues. They are so named from the sawlike apparatus with which the females are supplied, which they use in conveying the eggs into these openings. The female deposits one egg in each perforation, together with a peculiar fluid, which gives rise to a small swelling or enlargement to accommodate the larva. Most of the species, of which there are about 2,000, are native to the temperate regions. Some species are very injurious to the leaves and fruit of cultivated trees, while others are pests

to wheat, barley, grapes, and other plants. The *Cimbex Americana*, the largest species of North America, lays eggs in the leaves of birch, elm, and willow trees. Others attack the rose, currant, and pear trees.

SAXHORN (säks'hörn), a wind instrument much used in military bands. It was invented at Paris, France, in 1842 by Adolph Sax, a native of Belgium. It has a long, winding tube with a wide, bell-shaped opening, is supplied with from three to five valves, and possesses a large compass with full, rich tone. Several sizes and varieties are in use, thus supplying the necessary instruments to make up a whole band, but the tone is not sympathetic enough for fine orchestral use. Military music has been much influenced by the saxhorn and another instrument by the same inventor called the *saxophone*. The latter has a clarinet mouthpiece and a single reed. Its body is a parabolic cone of brass provided with a set of keys. It is of value in military bands and, like the saxhorn, is easily learned and carried.

SAXIFRAGE (säks'î-fräj), an extensive genus of hardy perennial herbs, with alternate leaves and simple flower stems. They are distinguished by a many-seeded capsule, have leaves six to seven inches long, and the stalks are one to two feet high. The flowers are yellow, white, or red, and most of the plants grow in rocky places, to which their clustered roots are well adapted. About 160 species have been

described, many of them being domesticated for ornamental garden plants, and fully 50 are native to America. Plants of this genus are confined largely to the colder and temperate parts of the Northern Hemisphere. A species known as *beefsteak*, or *strawberry*, *geranium*, is a common house plant.

SAXONS (säks'ünz), one of the races of people that originally inhabited the northern part of Germany, called *Sachsen* in the German. They are first mentioned in history by Ptolemy, in whose time they occupied a large region between the Elbe, Trave, and Eider rivers. By the 3d century of the Christian era their numbers had increased materially and they organized themselves into a confederation, which occupied the northwestern part of Germany. Subsequently they formed an alliance with the Franks. They invaded Roman territory in the times of Emperors Julian and Valentinian, and about the same time made settlements on the coasts of Gaul and Britain. It is probable

that the first Saxon settlements were made in Britain as early as 287, but their union with the Angles and Jutes appears to have been formed about 450, and about that time they conquered a large region of that island, giving to the people of England the name of *Anglo-Saxons*. Their principal settlements in England were in Sussex, or South Saxon, and Essex, or East Saxon.

The Saxons remaining in Germany occupied a vast region that became known as *Alt Sachsen*, or Old Saxon, but its limit cannot be easily defined, since frequent wars against invading tribes changed the boundaries at various times. It may be generally defined as including the country inclosed by the North Sea, the Hartz Mountains, the Rhine, and the Elbe. In 531 they fought under an alliance with the Franks against the Thuringian kingdom, which they subdued and destroyed, and in consequence added it to their possessions. In 719 a prolonged war arose between the Saxons and the Franks, which terminated in 804 by Wittikind, the last Saxon king, submitting to the Franks under Charlemagne. At that time they gave up paganism and adopted Christianity as their religion. See **Saxony**.

SAXONY (säks'ün-ī), a kingdom of Germany, lying north of Bohemia and east of Silesia. The length from east to west is about 135 miles; breadth, 75 miles; and area, 5,788 square miles. Practically all of Saxony lies in the Elbe basin, being drained by that river and its tributaries, the Elster, Mulde, and Spree rivers. A small part in the east is drained into the Oder by the Neisse. It is separated from Bohemia by the Erzgebirge and slopes gradually toward the north, most of the surface being fertile and undulating.

PRODUCTS. The country has valuable deposits of granite, iron, silver, tin, nickel, lead, bismuth, cobalt, zinc, arsenic, antimony, and coal. The mines are among the most important of Germany, especially those producing iron and coal. The soil products embrace cereals of all kinds, vegetables, pears, apples, plums, and grapes. Horned cattle, horses, milch cows, swine, sheep, and poultry are produced in abundance. The manufactures include large quantities of cotton and woolen goods, ribbons, silk textiles, pottery, leather, chemicals, and machinery. Saxony is traversed by a large number of railroads, including a total of 2,125 miles, and it has excellent highways and numerous telephone and telegraph lines.

GOVERNMENT. Saxony is divided for governmental purposes into the four districts of Leipsic, Dresden, Bautzen, and Zwickau. It is a constitutional monarchy, under the constitution of

the German Empire. The crown is vested in the Albertine line. It has a legislative assembly of two houses, the higher chamber of which is formed of princes of the royal family, nobles, proprietors, and representatives of the universities, while the lower chamber is constituted of deputies from the towns and rural communes. Lutheran is the state religion, but all religious forms are tolerated. The University of Leipsic is the recognized head of its educational affairs. It has an excellent system of public schools, including kindergartens, elementary schools, gymnasia, and *Real-schulen*. The government owns practically all the railroads and telegraph lines, and fosters agricultural and industrial arts by the maintenance of institutions of learning devoted to special lines. All male citizens are required to serve three years in the army, but in addition are classed for four years in the reserve and five in the *Landwehr*. The kingdom has four votes in the federal council of the German Empire and is entitled to 23 deputies in the *Reichstag*. Dresden is the capital. Other important cities are Leipsic, Plauen, Chemnitz, Freiberg, and Zwickau.

HISTORY. The people of Saxony are descendants from the *Sachsen*, or Saxons, and the reigning dynasty descended from Wittikind, the last Saxon king, who was conquered by Charlemagne in 804. At that time they became a part of the German Empire, but the territory now included in Saxony does not correspond to the region then occupied by them, when it was farther toward the north. It was made a dukedom in 880, when Otto became the first duke, reigning until 912. He greatly extended the territory by conquests from the Normans and his son, Duke Henry (912-936), became Emperor of Germany in 919. The duchy passed to the Bavarian branch of the Guelph family in 1127, and Rudolph II. (1356-1370) assumed the title of Elector of Saxony.

John George I. (1611-1656) sided with the Protestants in the Reformation and joined Gustavus Adolphus, his army taking part in the battles of Bridenfeldt and Lützen. Frederick Augustus I. (1694-1733) embraced Catholicism in 1697 to become King of Poland, since which time the court of Saxony has been Roman Catholic, but the state religion has remained Protestant. Frederick Augustus II. (1733-1763) joined the War of the Austrian Succession against Maria Theresa. During the Seven Years' War the country was ravaged, and it was many years before prosperity was fully restored. Frederick Augustus III. (1763-1827) first fought against France, but his army went over to Napoleon's side after the Battle of

Jena, and he received in return the title of king, and large additions of territory.

Saxony became the battle ground between Napoleon and the allies in 1813. Within its confines were fought the decisive battles of Lützen, Dresden, Bautzen, and Leipsic. When the Congress of Vienna, in 1814, adjusted the division of territory, a large part of Saxony was turned over to Prussia. Peace was not disturbed after that until the Revolution of 1848-49, but in the Austro-Prussian War of 1866 Saxony sided with Austria, and was immediately invaded by a Prussian army. After the war Saxony became incorporated with the North German Confederation, since which time it has enjoyed remarkable prosperity in railroad building and manufacturing enterprises. When Napoleon III. declared war against Prussia, in 1870, Saxony rallied to the support of the German states, its present king, Albert, commanding the army of the Meuse. In 1871 it became a part of the German Empire. Population, 1905, 4,508,601.

SAYRE (sā'ēr), a borough of Pennsylvania, in Bradford County, 58 miles northwest of Scranton. It is on the Susquehanna River and the Lehigh Valley Railroad, and is surrounded by a coal-mining and agricultural region. The chief buildings include the high school, the Packer Hospital, and the public library. Electric lighting and waterworks are among the public utilities. The manufactures include machinery, hardware, clothing, and farming utensils. The region was settled in 1840. Sayre was incorporated in 1891. Population, 1900, 5,243; in 1910, 6,426.

SCAB, a contagious disease common to sheep, but which also attacks horses and cattle. It is due to a minute insect burrowing in the skin, causing baldness and itching. The disease is favored by dirt. Among the remedies are turpentine, mercurial ointments, tobacco water, and solutions of arsenic. The remedies should be carefully applied and repeated a number of times.

SCABBARD FISH (skāb'bērd), a fish of the mackerel family, distinguished by having a continuous spinous dorsal fin. The body is elongated, the teeth are pointed and cutting, and the caudal fin is forked. Several species grow to a length of five or six feet. They swim with much velocity, waving through the water like a long and wide ribbon of silver, displaying beautiful reflections with the change of light.

SCALE, in music, the regular succession of notes arranged in the order of pitch. In its simplest form the scale consists of seven steps

or degrees, counted from a root or prime upward in regular order, and to this series is added the eighth to complete the octave. The same notes constitute the descending scale when the motion is reversed. To this may be added other notes, either above or below, in a continuous order to form seven, eight, or more octaves. The tones and semitones of the octaves in their natural order constitute the *diatonic scale*, as *A, B, C, D, E, F, G, A*. In modern music only two varieties of the diatonic scale are in use, namely, the *major* and the *minor*, but other diatonic scales were used in ancient music. However, one semitone greater in the major than in the minor is called the *third diatonic scale*. A scale is major when the interval between the keynote and the third above it consists of two tones, as from *C* to *E*, and it is minor when the interval between it and its third consists of a tone and a half, as from *D* to *F*.

SCALE INSECT, the common name of a class of destructive insects, frequently called *bark louse*, or *scale bug*. They are distinguished in that the female is wingless, that both sexes have legs which terminate in a single claw at the tip of a tarsus, and that the male has two wings. The body is covered with small scales, which in some species are naked and in others are covered with minute hair or minute down. These insects gather in large numbers on plants and injure them by sucking the juices. They are especially harmful to hothouse plants and many fruit-bearing trees. Some of the species produce several broods in a year. Alkaline washes are effectual in checking their ravages, both within and without the greenhouse. In some states and countries it is required that nursery stock must be examined by an official before it can be sold, this precaution being necessary to protect orchards from scale insects. Young trees that contain these pests may be fumigated with hydrocyanic acid.

SCALES, the name applied to protective plates that arise from the skin of various animals, such as fishes and snakes. The purpose of such scales is to protect the body. In lizards and snakes the scales are formed by the cutis, but they are attached to the skin and adhere to it when the latter is shed. Some lizards are almost without scales, while in some animals they are so small that they can hardly be seen without the microscope. Some mammals are scaly, such as the scaly ant-eater and the scale-tailed squirrel. The term *scale* is applied in botany to the bracted leaves which protect the delicate organs of plants, as in the leaf buds of some species during the winter.

SCALLOP (sköl'lüp), the name of several species of shellfish, so called from their round, ribbed shell with scalloped edges. They are classed as bivalves, having shells connected at the upper side with a hinge. The shells are fan-shaped and have numerous green eyes on the inner fold or mantle. The animal is enabled to swim by means of a little air bag inside, and it is facilitated in movement by opening and shutting its shell. Young scallops are frequently



COMMON SCALLOP.

seen swimming in the water, but the older animals attach themselves to rocks, where they remain stationary like oysters. The term *scalloped oysters* was derived from the circumstance that the shell was used frequently in cooking oysters. Scallops abound in almost all seas, about 200 species

being known, many being edible. In the Mediterranean, off the coast of Palestine, scallops are quite abundant and were caught from remote antiquity, their shells being converted into souvenirs for those visiting the Holy Land. A number of species are abundant off the coasts of New England and the Middle States, where they are caught extensively for food.

SCALP, the skin forming the outer covering of the skull. It is quite the same as the skin growing on other parts of the body, differing from it only in having a more prolific growth of hair, and being composed of an expanded muscular tendon in addition to the ordinary skin, through which many blood vessels permeate. The term scalp is generally applied to all the part of the skin of the head which is covered with hair. Formerly the American Indians used the scalping knife to remove a part of the scalp from those killed or taken captive in war. Frequently the victim was alive when the scalp was being removed. Indian warriors who secured the greatest number of scalps were highly honored, and it was a matter of pride to wear a large number as trophies dangling from the belt.

SCAMMONY (skäm'mō-nÿ), the name of a twining plant found in various parts of Europe and Asia, especially in Greece and Asia Minor. The root is a tuberous and tapering growth, from three to four feet in length, and contains a milky juice. When a fresh root is cut, the juice exudes and later dries into a slate-colored

lump, which constitutes the cathartic drug known as *scammony*. It is a resin and has been used as a medicine from a remote period. Scammony is commonly administered in combination with other purgatives, since it is quite harsh and violent if taken alone.

SCANDINAVIA (skän-dī-nā'vī-ä), anciently the name of the region now included in the kingdoms of Sweden, Norway, and Denmark.



SCANDINAVIA.

At present it is variously applied to the language and literature of the people occupying this region and Iceland. The Scandinavian Peninsula is situated in the northwestern part of Europe. It is bounded on the east by Finland, the Gulf of Bothnia, and the Baltic Sea, south by the Skager-Rack and Cattegat, west by the Atlantic, and north by the Arctic. It is 1,240 miles long, from 225 to 260 miles wide, and has an area of 298,000 square miles. The two kingdoms of Sweden and Norway occupy the whole of the peninsula, and south of it, across the Skager-Rack and Cattegat, is the kingdom of Denmark. A Teutonic people occupied most of the region in the early historic period of Europe. The inhabitants of the territory now included in Denmark and Schleswig were known to the Romans by the name of Cimbri, and the region occupied by them, as the Cimbrian Peninsula. In the 9th century large numbers of Vikings or Northmen moved

in their galleys along the coasts of Northern Europe, visiting England, France, Germany, Spain, and Italy. In these movements they plundered cities and the coast regions, but founded new states and materially influenced the industries and the language. Scandinavian literature includes a number of valuable productions, the most notable being the *Sagas* and *Eddas*. See **Iceland**.

SCAPULA (skăp'û-lâ), the shoulder blade, a triangular bone of the upper extremity, forming a part of the shoulder. In form it is flat and irregular, suitable for the attachment of many muscles. In man it is located back of the chest. It is not fully ossified until the age of 25 years.

SCARABÆUS (skâr-â-bē'ûs), an extensive genus of insects, including about 3,000 species. The greater number are native to the tropical regions, but species of the genus are found in nearly all countries. Those found in the warm climates include the largest of beetles and the size decreases with the colder latitudes, those found in Central North America and Europe being comparatively small. The *dung beetles* are well known types of this class of insects. They are useful in warm and temperate countries for their habit of removing offensive matter, which they roll in the form of balls. They often lay their eggs within the balls and bury them below the surface. The *sacred scarabæus* of Egypt is another familiar kind. It is still the type for the Egyptian scarab, an ornament made in the shape of a beetle of hard stone or gems. This beetle was worshiped by the ancient Egyptians. It was embalmed for centuries. Many of the tombs and monuments of Egypt contain representations, and they are often accompanied by hieroglyphics. Many scarab gems were also engraved by the Greeks and Etruscans.

SCARLATINA (skâr-lâ-tē'nâ), or **Scarlet Fever**, an infectious specific form of fever. It is most prevalent among children, but occurs at any age. Scarletina consists of an inflammation of the skin and extends along the mucous membrane of the throat. It is attended by a contagious fever and is followed on subsidence of the fever by scaling off of the cuticle. Three more or less distinct forms are recognized, all requiring careful attention. *Scarlatina simplex* is a mild form of scarlet fever, but sometimes merges into more complicated ailments. *Scarlatina anginosa* is a form with intense fever, extensive ulceration of the throat, and livid rash. *Scarlatina maligna* is a form of the disease in which all the morbid conditions are distinct and usually proves fatal. Headache,

shivering, frequent pulse, loss of appetite, and flushed face are among the early symptoms of the disease. Eruptions about the size of a pin-head appear on the skin the second or third day, when the throat is largely affected and the tonsils become swollen. Since it appears as an epidemic, it includes both mild attacks and epidemic forms uniformly severe.

SCHAFFHAUSEN (shăf-hou'zēn), a city of Switzerland, capital of the canton of Schaffhausen, 25 miles north of Zurich. It is finely situated on the Rhine, has electric and steam railway facilities, and is the center of a large trade in produce and merchandise. The chief buildings include the townhall, the museum and library, the theater, and several fine schools and churches. Two bridges cross the Rhine and connect it with Feuerthalen, on the opposite side of the river. It has manufactures of watches, textiles, machinery, pottery, and scientific instruments. Schaffhausen was long a free city, but joined the Swiss Confederation in 1501. The early growth is due to the famous falls of the Rhine, which descends nearly 100 feet in passing over three ledges. Most of the people are Protestants. Population, 1906, 18,345.

SCHELDT (skēlt), a river of Europe, one of the most important of Belgium and the Netherlands. It rises in the French department of Aisne, flows north through Belgium, and enters the North Sea by two arms, known as the Eastern and Western Scheldt. The entire course is 260 miles, of which about 210 miles are navigable. Among the flourishing cities on its banks are Ghent and Antwerp. Numerous canals connect it with other river systems, forming a very important commercial highway. The lower course was entirely monopolized by Holland in 17th and 18th centuries, other nations using it being compelled to pay toll for the passage of vessels. When Holland and Belgium separated, in 1831, these rights passed to the latter country, but in 1863 other powers were given the right to use the river for commercial navigation in consideration of the payment of \$3,750,000.

SCHENECTADY (skē-nēk'tâ-dÿ), a city in New York, county seat of Schenectady County, on the Mohawk River, sixteen miles northwest of Albany. It is on the Erie Canal and the Delaware and Hudson and the New York Central railroads. The site rises gradually from the Mohawk River. The noteworthy buildings include the county courthouse, the public library, the city hall, the Ellis Hospital, the high school, the Y. M. C. A. and the Van Curler Opera House. It is the seat of Union College, which was founded in 1795. Among its manufactures

are cotton and woolen goods, flour, machinery, farming implements, cigars, varnish, carriages and wagons, iron bridges, and locomotives. The public utilities include waterworks, sanitary sewerage, and electric street railways. It has a large trade in produce and merchandise. The first settlement on its site was made by Dutch traders in 1662 and a charter was issued in 1684. It was burned by the French and Indians in 1690. In 1798 it was incorporated as a city. Population, 1905, 58,369; in 1910, 72,826.

SCHLESWIG-HOLSTEIN (shlāz'vīg hōl'stīn), a province of Prussia, in the most northerly part of the German Empire, except the district about Memel. It is bounded on the north by Denmark, east by the Baltic Sea, Lübeck, and Mecklenburg-Schwerin, south by Hamburg and Hanover, and west by the North Sea. It forms a part of the same peninsula with Jutland. The area is 7,340 square miles.

DESCRIPTION AND INDUSTRIES. The surface is level or gently undulating, and the eastern part is indented by deep and narrow fiords. Much of the interior is moorland, while the western part is marshy and requires dikes to protect it from the sea. It is separated from Hanover by the Elbe, while much of the interior is drained by the Eider. A ridge extends along the eastern coast, hence the drainage is almost entirely into the North Sea. The Kaiser Wilhelm Canal, which connects the Baltic with the North Sea, extends through this province. Agriculture is the principal occupation. The leading products include wheat, barley, oats, sugar beets, rye, live stock, and fruits. Iron and turf are the leading minerals. Large quantities of fish and oysters are taken off the shore. Extensive interests are vested in shipyards, machine shops, textile mills, and sugar refineries. Cattle, horses, and swine are reared in large numbers.

INHABITANTS. The inhabitants are almost exclusively Germanic in descent, but the Frisian, Danish, and Plattdeutsch are spoken in some localities. The public schools and the government use the German language. Almost the entire population is Protestant. In 1900 the province had 1,387,968 inhabitants, of whom 135,000 were Danes. Population, 1905, 1,504,248.

HISTORY. Schleswig constituted a so-called *mark* in the kingdom of Germany in the 10th century. It was ceded to Denmark in 1027, when it was conquered by King Canute from Emperor Conrad II. Denmark raised it to the dignity of an hereditary duchy in the 13th century, and in 1375 it passed to the counts of Holstein. When the Holstein dynasty became extinct, in 1460, Schleswig and Holstein were

united in choosing Christian I. of Denmark as the ruler, but with the understanding that they should not be separated from each other nor made a part of Denmark. While Holstein was German and Schleswig was Danish, the nobility and the people became Germanized at an early period.

Christian VIII., who became King of Denmark in 1839, pursued a policy of bringing Schleswig-Holstein more firmly into a union with Denmark. In 1848 he was succeeded by Frederick VII., who proclaimed the annexation of Schleswig. This caused a revolution in Schleswig-Holstein, which was occupied by troops from Germany and the Danes were expelled. In 1850 the protection of Germany was withdrawn and a war began the following year, which resulted in a return to the Danish authority. However, Frederick VII. died in 1863 without heirs and was succeeded by Christian of Augustenburg, under whom the constitution of Denmark and Schleswig was ratified.

It was a part of the policy of Bismarck, when promoting the unification of Germany, to incorporate Schleswig-Holstein with the German Empire. In this movement Prussia was aided by Austria and the two powers sent a force to occupy Schleswig. The Danes were defeated by superior numbers and Christian IX. was compelled to accept the Treaty of Vienna, in 1864, which ceded Holstein, Lauenburg, and Schleswig to Austria and Prussia. The two powers agreed by annexing Holstein to Austria and making Schleswig and Lauenburg a part of Prussia. This agreement finally caused the Seven Weeks' War, in 1866, in which Austria was defeated and Holstein became an integral part of Prussia.

SCHMALKALDEN (shmäl'käl-dēn), a town of Germany, in the Prussian province of Hesse-Nassau, 30 miles southwest of Erfurt. It has a considerable local trade, various manufactures, and a population of 7,688. It is a center of interest on account of the League of Schmalkalden, which was drawn up here on April 4, 1531, by nine Protestant princes and eleven imperial cities, to resist aggressive opposition measures promoted by Emperor Charles V. and the Catholic states. Soon after other princes and cities joined the league, and in the time of its greatest strength it included all the Protestant states lying between northern Italy and Skager Rack. It was first intended to continue the league for six years, but in 1535 an extension for ten years was made, at which time a permanent army was raised to defend the religious and political freedom of the Protestants. A Catholic federation was formed in 1538 in opposition to the Prot-

estant league, but the latter was joined by Francis I., King of France, and Henry VIII, of England declared himself its protector, thus giving the Protestants such strength that Emperor Charles V. found himself unable to contend against it. Mutual jealousy crippled the league. When a battle was ventured at Mühlberg on April 24, 1547, the Protestants were defeated and John Frederick and several other leaders were taken prisoners. However, the objects of the league were accomplished through the diplomacy of Duke Maurice, who, as Elector of Saxony, declared war against the emperor and compelled him to grant the Treaty of Passau, on July 31, 1552, by which the Protestants secured religious liberty.

SCHOLASTICISM (skō-lās'tī-sīz'm), the name of a movement that began with the opening of cloister schools by Charlemagne for the education of the clergy. It was both philosophical and theological in its character and, although confined to no one school, it was distinguished by its teaching of classical logic and philosophy as applied to theology. The philosophers identified with it were known as *scholastics*, or *schoolmen*. The exact time of its origin cannot be clearly stated, and there is a vast difference in the scholastic philosophy of different periods, but the time of medieval scholasticism is generally assigned to the period beginning with 1000 and ending with 1500. It may be said that the scholastics aimed to reduce church doctrines to a scientific system. Their basic assumption was that the church creed is absolutely true, and, when they found a discrepancy between ancient philosophy and ecclesiastical discipline, they accommodated the former to the latter.

Scholasticism had two chief epochs. The first began with John Scotus Erigena in the 9th century and extended to the beginning of the 13th century, in which the Aristotelian logic and Neo-Platonic philosophemes were accommodated to the doctrines of the church. Among the representative names of this epoch are those of Berengarius of Tours, Pope Sylvester II., Anselm, Archbishop of Canterbury, and John of Salisbury. It was a period of contention between the Nominalists and Realists, which terminated in the triumph of the latter, and it therefore became the prevailing mode of thought in philosophy during the golden age of scholasticism, in the 12th and 13th centuries. The second epoch extends from the 13th to the 15th century, ending with the Renaissance and the Reformation. It witnessed the adaptation of the whole Aristotelian philosophy to theology.

Alexander of Haler (died 1245) was perhaps the first scholastic who was acquainted with all

the works of Aristotle and the Arabian commentaries on the same, but after his time many others of wide study succeeded in molding thought from the standpoint of a larger view. In this period rose the Scotists and the Thomists, the former being represented by the Franciscans and the latter by the Dominicans, and the quarrels that resulted greatly curbed the influence of scholasticism. It finally laid down the remarkable proposition that a thing might be philosophically true and theologically false, and *vice versa*. With the revival of letters and the Reformation study began to turn away from the formalities of old philosophies and dead languages as a primary object of investigation, and instead directed its energy to the sciences and human nature. Teachers began to study and observe pupils, to investigate the laws governing physical and spiritual growth, and to proceed according to the newer and better methods.

SCHÖNEBERG (shē'ne-bērk), a city of Germany, situated immediately south of Berlin, of which it is a suburb. It has electric and steam railway communication with the capital. The noteworthy buildings include the public library, the observatory, an insane asylum, and the buildings of the aerial navigation bureau of the imperial army. It has manufactures of paper, clothing, military supplies, scientific instruments, and photographic apparatus. Schöneberg is noted as a residential center and for its fine gardens and boulevards. Population, 1905, 141,010.

SCHOOLS, the institutions maintained for giving instruction in arts, sciences, languages, or any other branches of learning. Schools in the widest sense include all establishments for systematic instruction of any kind or grade, from the kindergarten to the university, whether of a private or public character. Education in the earliest periods was mainly domestic, being conducted by the parents, and its character was largely religious. Writers generally agree that public schools existed in the time of Babylonia and that they were introduced among the Hebrews shortly after the return from Babylonian captivity. The ancient Greeks maintained public educational institutions for the training of the young, not only in elementary branches, but in industrial arts, sciences, and languages. Schools of a like character were maintained by the Romans. In the Middle Ages educational institutions sprang into existence in many parts of Western Europe, but the schools were for centuries largely in the hands of the clergy and comparatively few of the laymen acquired ability to read and write. This condition was favored by the extended discussion of the scholastics in

relation to hair-splitting theories of ancient philosophy and ecclesiastical discipline.

This condition continued unchanged until the revival of letters, when thought began to be directed toward the investigation of natural sciences and the organization of schools well calculated to train the child from infancy, according to recognized and salutary methods of instruction. In this period two great classes formed, the one holding that it is the duty of the state to supervise the education of the child from its first attendance at school until at least the elementary branches are mastered successfully, the other promoting the view that instruction should be under the guidance of the church. However, both classes became impressed with the need of making instruction more nearly fitted for the wholesome and progressive development of youth, being in this respect influenced by the eminent teachers of Western Europe, including Pestalozzi, Froebel, Herbart, Rousseau, Rosenkranz, Ratich, Richter, Schlegel, and many others. Instead of making instruction conform to the dead formalities of ancient philosophies, these teachers directed attention to the laws of mind growth and development, and brought the child and teacher in contact with the living and vitalizing influences of nature and first principles.

PRIVATE OR PUBLIC INSTRUCTION. The two parties advocating private and public education are still represented in large numbers, both in America and Europe. The term *private education* implies the instruction given by tutors or in schools other than those supported by the state, including the schools maintained by various religious denominations, societies, and numerous other organizations. These schools in some places have come in conflict with public schools, since the withdrawal of a part of the children from the latter has decreased their enrollment. Again, they have obliged those patronizing private schools to pay double support—taxes to the public schools and voluntary appropriations to the private. In some countries private schools receive partial support from the government, as in Ontario and Quebec, but in the United States no such aid is given, and all the parochial and other private schools are maintained voluntarily.

The advocates of private schools maintain them for two principal reasons, one being that religious instruction of a definite character is excluded from the public schools, and the other that private schools offer to the parent the particular branches of study and forms of instruction that are wanted for the child. On the other hand, those who advocate education in public schools are of the general opinion that the child

should be trained with a special view of fitting him for citizenship, and, to accomplish this to the best purpose, they think it necessary that the state should prescribe a course of study and require attendance until at least the elementary branches have been completed successfully. While all advocate the highest form of moral instruction, they regard it possible to give a sufficient amount of religious or sectarian training in Sunday schools and churches and during the period of vacation.

SYSTEMS OF SCHOOLS. It is generally admitted that the first public and free school in America was founded by the Dutch in New York, but others were established soon after, the earliest in Massachusetts dating from 1635. The remark made by Governor Berkeley, in 1670, that he thanked God that there were no free schools in Virginia, is often quoted as an evidence that a free and intelligent people are not easily suppressed by tyrants. The public schools of the United States and Canada are not organized on a national basis, but they are under the direct control and supervision of the states and provinces. In this respect they are like those of Germany. Both governments have given aid to the establishment and maintenance of many institutions of learning by the reservation of public lands and by making appropriations for special purposes. The total amount of land appropriated in the United States is 78,889,839 acres. Of this land granted for educational purposes, 67,892,919 acres were appropriated to aid common schools; 9,600,000 acres, to aid mechanical and agricultural schools; and 1,395,920 acres, to support universities. A national commissioner of education is maintained to conduct the Bureau of Education, whose object is to gather statistics of general interest and to give aid by publishing and otherwise disseminating educational intelligence.

It may be said that there are as many educational systems as there are states and provinces, but they are similar in many respects. In most instances the schools are under a superintendent or minister of education, or an officer having similar executive duties. He is aided in the work of superintendence by county superintendents or similar officers, who have general supervision of the common schools in their respective counties. City superintendents are in most cases appointed by boards of directors in the larger cities and principals are similarly chosen in the towns. In some cases supervisory officers have charge of the schools in the townships. Revenues to maintain the schools are derived from various sources, of which the principal ones are state or provincial school taxes, local taxes, and

permanent school endowments. All these are utilized in most instances, but in addition there are other sources of revenue, such as license taxes, fines, and penalties, and in some states poll taxes.

The common schools give instruction in the common branches of education, corresponding to the elementary schools of England and the *Volks-schulen* of Germany. In some states common schools are the only educational advantages provided in rural districts, but others have township or county high schools. Towns and cities have both elementary and high schools, and in many of the larger cities kindergarten and special schools of various kinds are maintained. In others the same results are obtained by the employment of special teachers in the public and private schools.

Universities and colleges are maintained by all the states, the revenues being secured under state taxation. Normal schools for the professional training of teachers are supported by state taxation, and in most cases a small contingent fee is charged those who attend. Some states maintain a number of normal schools, while others have only one, but in such cases provisions are made for normal instruction to be given in various high schools. Teachers' institutes are inspirational schools with a short course of study. They are designed to inspire educationally and professionally the teachers already in the work and those intending to become teachers. Practically all the states have ample provision for the training of incorrigible children and for the care of the criminal, defective, and dependent classes. Manual training schools and other institutions with special courses are maintained in some states. Laws requiring attendance for a limited period have been enacted in most cases, as in Illinois and Massachusetts, and the period for school attendance is generally fixed by law from the age of six to fourteen years. The prohibition of child labor in mines and factories has greatly facilitated educational advancement, and friends of education generally look upon this as wholesome for both private and public schools. The lowest per cent. of illiteracy in the United States is in the states of the central west. This corresponds somewhat to the condition in Canada, where the lowest per cent. of illiteracy is in the south central provinces. See **Education**.

SCHOOLS OF CORRESPONDENCE, a class of educational institutions which teach and examine their students by correspondence. This system had its beginning in Germany in 1856, being originated as a means to furnish instruction to those who are unable to attend institu-

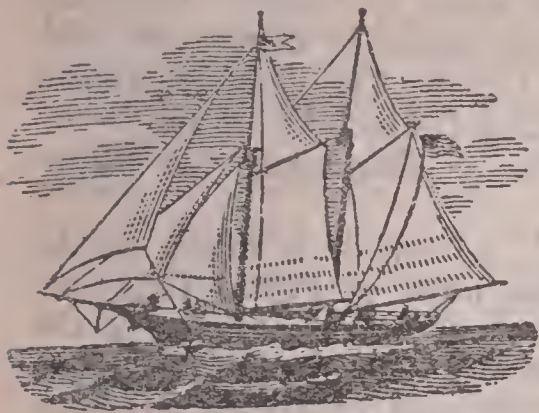
tions of higher learning, such as academies and universities. At first the instruction was limited largely to training in certain industrial arts, especially in surveying and architecture. From this beginning a large number of greatly diversified courses originated. These courses now cover practically the entire field of learning.

The general plan of conducting schools of correspondence requires enrollment for instruction for a definite time, usually not less than three months, but the greater number of courses cover a line of work for four years. Students receive their lessons by mail or express, doing the work at home, and examinations required at the end of a term are under the direct supervision of some responsible person appointed for that purpose, usually a local justice of the peace or a teacher or principal of schools. The matter of conducting such an examination is merely supervisory, since the questions are furnished by the school or university with which the school of correspondence is associated, and the written examinations are returned and graded by examiners in the home school or office. The University of Chicago developed a scheme for conducting instruction by correspondence, offering courses in about thirty departments, but students who expect to receive a degree are required to take two-thirds of the work by attendance upon the institution. The International Correspondence School at Scranton, Pa., is one of the largest of the kind in the world. Institutions of this kind are now maintained by many colleges and universities, while others are organized by corporations which conduct the work entirely by correspondence.

The lessons were originally sent out in circular form, but now they are more generally published in a series of books. These books or volumes are sent to the student from time to time as he progresses in his study, or he may purchase the entire course and have it delivered to him at the beginning, but the rules require that each student proceed in regular order and that the promotions are based upon examinations at the end of each quarter. In this scheme the personal contact between the teacher and student is replaced with notes and queries sent by mail from time to time. Although all schools of correspondence grant degrees at the completion of the courses, personal attendance is required for at least a part of the time in the larger number of institutions. The phonograph has become an important factor in teaching modern languages by correspondence, making it possible that the instruction and the examination be dependent in a large measure upon the articulation and

pronunciation as expressed by both the instructor and the learner.

SCHOONER (skōon'ēr), a sailing vessel with two or three masts. Vessels of this class are built for fast sailing and are provided with



SCHOONER.

fore-and-aft sails on two masts, and vessels of the latter class carry a square topsail and top-gallant sail. Schooners provided with three masts carry fore-and-aft sails on each mast.

SCHUYLKILL (skōol'kīl), a river in Pennsylvania, the largest tributary of the Delaware. It rises in Schuylkill County, near Pottsville, and, after a course of 130 miles toward the southeast, enters the Delaware at Philadelphia. The Schuylkill flows through a rich mining and agricultural country, supplies excellent water power, and is one of the most beautiful features of Fairmount Park, Philadelphia. It furnishes that city its water supply and is navigated by canal boats, by means of dams and locks, to the coal region in Schuylkill County. Among the thriving cities on its banks are Philadelphia, Phoenixville, Reading, Norristown, and Pottsville.

SCHWERIN (shvā-rēn'), a city of Germany, capital of Mecklenburg-Schwerin, 60 miles east of Hamburg. It is beautifully located on Lake Schwerin, a body of water fourteen miles long and three miles wide. The noteworthy buildings include the Grand Ducal Library, the palace of justice, the public theater, the gymnasium, and many churches. It is the seat of a fine Gothic cathedral founded in 1248, and near it is a ducal castle erected by Wallenstein. In front of the theater is a statue of Rauch. The manufactures include tobacco and cigars, clothing, earthenware, cotton and woolen goods, carriages, and machinery. It is first mentioned in 1018 and became a municipality in 1161. Population, 1905, 41,628.

SCIENCE, the sum of universal knowledge. In a more limited sense the term is applied to any department of knowledge gained and verified by exact observation and correct thinking. According to the former definition it resembles philosophy, which deals with the whole sum of

fore-and-aft sails. Many kinds of schooners are employed, but the two chief classes are those known as *fore-and-aft rigged* and the *topsailschooner*. The former are provided with

knowledge, but as limited by the latter it deals with a particular department of knowledge concerning some subject or group of subjects. In the beginning of study it was necessary to collect and observe facts, then to form them into a system and reduce the generalizations to laws, and finally to proceed to some principle accounting for these laws. It is clearly shown by history that many laws long accepted were overthrown by subsequent investigation, but in the course of time it became possible to demonstrate the truth of certain basic principles that are now accepted generally. The five divisions of science include mathematics, treating of quantity; physics, treating of matter and its properties; biology, treating of the phenomena of life; anthropology, treating of the phenomena of mankind; and theology, treating of the Deity.

Another classification of the sciences divides them into applied, or practical, sciences, and pure, or theoretic, sciences. The former include those that treat of the knowledge of facts or events accounted for or produced by definite laws, and the latter embrace the knowledge of these laws as considered apart from all application. *Pure*, or *fundamental*, sciences include mathematics, psychology, physics, sociology, and chemistry. The *applied*, or *concrete*, sciences embrace botany, meteorology, mineralogy, geology, geography, zoölogy, law, ethics, politics, grammar, jurisprudence, rhetoric, logic, philology, engineering, economics, surgery, medicine, and many others. The development of the sciences may be traced through different stages of evolution, the initial periods being found in remote antiquity.

Man's desire to ascertain his proper conduct toward his fellows and his Creator caused moral science, a department of mental science, to be the first to attain some degree of maturity. The next to receive attention was mental science, or the study dealing with the power to think, feel, and will, but slow progress was made in the latter. As a result psychology as a branch of knowledge is in its conclusions still far from certainty. Many myths of the ancients were hypotheses connected with natural phenomena, and in them may be found the beginning of physical sciences. Progress in the physical sciences was slow until the beginning of the 18th century, when they began to develop with remarkable rapidity, and knowledge connected with them surpassed the advances made in astronomy, physics, chemistry, and botany, though all these had received attention long before. Little study was given to geology before the 19th century, while anthropology, comparative religions, and other allied sciences are materially newer.

No one can be a successful student of science unless he considers truth of prime importance and is willing to sacrifice preconceived notions whenever he discovers new truths to render the formerly accepted views erroneous. The expenditure of money, time, or even life is not considered useless if the student adds fresh truth, or even paves the way for the addition of valuable discoveries. No limit to the field of discovery can be conceived, although at times mankind was led to believe that human ability to add to knowledge had been exhausted. However, modern discoveries demonstrate conclusively that there are still fields as productive as ever confronting the seeker for scientific extension. This is evidenced by turning to practical account through scientific inquiry such resources as culminated in the application of telegraphy, steam, electricity, and many others of vast importance.

SCILLY (sil'li), an island group belonging to the British Isles, situated 28 miles southwest of Land's End, England. The group includes about 35 islands, but only 6 possess any importance, the others being formed largely of rocks. These islands belong to and form a part of Cornwall County. Saint Mary's Island is the largest, having an area of 1,528 acres. The climate is moist and variable, and the principal products are vegetables and spring flowers, which are transported to the London market. Deposits of tin and granite abound and the fisheries are of value. The islands were conquered by Athelstan in 938 and were granted to some monks, who formed settlements on the island of Tresco. Sir Francis Godolphin secured a lease of them from Queen Elizabeth and they remained in possession of his family for 250 years, but are now the property of the crown. Population, 1908, 2,160.

SCIO (si'ō), an island in the Aegean Sea, 7 miles off the coast of Asia Minor, 52 miles west of Smyrna. It is 32 miles long, 17 miles wide, and has an area of 400 square miles. The climate is favorable. Among the chief productions are silk, cotton, wine, mastic, cereals, and many species of fruits. Horses, cattle, swine, and sheep are grown. It has valuable fisheries and manufactures of silk and woolen goods, confectionery, carpets, and clothing. Formerly the island was populated entirely by Greeks, but in 1822 the Sciotes joined the revolution against Turkey, when many were massacred. Scio holds a prominent place in ancient history and contends for the honor of being the birthplace of Homer. Kastro, population 18,975, is the capital. Population of the island, 1908, 71,486.

SCIOTO RIVER (si-ō'tō), a northern tributary of the Ohio, which rises in Auglaize

County, western Ohio, and after a course of 285 miles toward the east and south, flows into the Ohio River at Portsmouth. The Scioto valley is fertile, producing large quantities of cereals, fruits, and live stock. The river is navigable during high water about 130 miles from the mouth and is of importance in connection with the Ohio and Erie Canal. The chief tributaries are the Whetstone and Derby.

SCISSORSBILL, or **Skimmer**. See **Skimmer**.

SCONE (skōn), a town of Scotland, on the Tay River, two miles north of Perth. It is celebrated for its monastery, first mentioned in the early part of the 10th century, in which the kings of Scotland from 1153 until 1458 were crowned. It contained the famous Stone of Destiny on which the kings of Scotland were inaugurated, which was taken to Westminster Abbey by Edward I. in 1296.

SCORPIO (skōr'pī-ō), or **Scorpius**, the eighth sign of the zodiac. This constellation is now situated in the sign Sagittarius, owing to the precession of the equinoxes. It contains Antares, a bright red star, and on each side of it is a smaller star. See **Zodiac**.

SCORPION (skōr'pī-ūn), the name of an extensive genus of insects, native to the warm climates of both hemispheres, belonging to the same family as the spiders. The body is elongated,



SCORPION.

usually from two to six inches, and somewhat resembles that of small lobsters in shape. They have a long, narrow, flexible tail, which is capable of being curved over the back and terminates in a poisonous sting. Six broad segments are found in the abdomen and six narrow ones in the tail. The sting consists of a curved and sharp modification of the last segment. They are provided with six, eight, or twelve eyes, and have eight legs and two large claws resembling those of the lobster. The scorpions frequent dark places during the day, usually seeking shelter under stones, but at night come out in search of food. It is not uncommon to find them in

hiding under pillows, boots, and other objects in warm climates, where they are disliked and dreaded. Their sting, though painful and poisonous, is not usually, if ever, fatal to man.

Scorpions are found in abundance in Southern Asia and Europe, Northern Africa, Australia, and the tropical parts of America. The *black scorpion* has a body about six inches long. Its sting is very poisonous. Several small species are native to the southern part of the United States. The so-called *rock scorpion* is a familiar kind. Another group of insects allied to them is the *book scorpions*, but they are smaller and do not possess the jointed tail common to the true scorpions. They live in or among books, where they subsist on minute insects that frequent such places. The true scorpions feed on spiders and insects. From thirty to sixty young are brought forth from eggs at a time and are carried on the back of the mother during early life.

SCORPION FISH, the name of several species of fishes of the gurnard family. The common scorpion fish of the Pacific coast, found off the shores of California and Mexico, is sold extensively on the market. It is a foot in length and has a brownish color, tinted with rosy and olive shades. Several species are found in the Mediterranean and off the Atlantic coast of Southern Europe, including the red and the spotted scorpion fishes.

SCORPION FLY, the name of several insects related to the dragon flies, so called from the terminal segments of the abdomen being mobile and elongated. The outer segments are curved over the back similar to the tail in the true scorpion, and in some species a pair of forceps are attached to the last joint. When excited and irritated, the forceps are used as offensive and defensive weapons. These insects have four wings, through which many veins permeate, and the head is prolonged in the form of a beak. The larvae feed upon insects and dead animals, while the adults subsist largely on juices of plants. Many species are common to Canada and the United States, including some wingless forms.

SCOTCH TERRIER. See **Terrier.**

SCOTLAND (skōt'land), a political division of the United Kingdom of Great Britain and Ireland. It is situated north of England, from which it is separated by the Cheviot Hills, the Tweed River, and the Solway Firth. All the remainder of the boundary is formed by the Atlantic Ocean, which extends into its shores by numerous indentations of such extent that practically all parts are within forty miles of the sea. The length from north to south is 285 miles and

the width varies from 25 to 145 miles. Including the adjacent islands; it has an area of 39,785 square miles.

DESCRIPTION. Scotland is remarkable for its extensive coast indentations, which give a coast line of about 2,500 miles. The most important indentations include the Firth of Forth, the Firth of Tay, Moray Firth, and Dornoch Firth on the east; and the Firth of Lorne, the Firth of Clyde, and Solway Firth on the west. Between Scotland and Ireland extends the North Channel. About 800 islands are adjacent to its shores, of which the Orkney and the Hebrides are the largest groups. Along the western coast are numerous small islands, of which the principal ones are Arran, Bute, and the Cumbraes. The islands stretching along the coast from Islay to Skye are known as the Inner Hebrides, and these are separated from the Outer Hebrides by the straits of Minch and Little Minch.

Three natural divisions characterize the surface, including the southern uplands, the central lowlands, and the highlands of the north. The Grampian Hills form the larger part of the highlands and are located north of the Caledonian Canal, which connects the Firth of Lorne with Moray Firth. They include summits that rise somewhat more than 4,000 feet above sea level, of which Ben Nevis, the highest mountain in Great Britain, rises 4,406 feet. South of the Grampians are the central lowlands, which stretch from the Firth of Clyde to the Firth of Tay, and include many beautiful lakes and streams, connected largely by important canals, among them the Caledonian Canal from the west to the east. The southern uplands are formed largely by the Cheviot Hills, from which ranges stretch toward the north, culminating in peaks about 3,000 feet above sea level. Within this section are many fertile valleys, but the largest cultivated region of Scotland is in the plain of Strathmore, in the central part.

Most of the streams are valuable for the production of salmon and other fish, and the lower courses of many are important for their navigation facilities. The rivers flow chiefly toward the east into the North Sea. These include the Tweed, on the southern border, the Tay, the Forth, the Don, the Dee, the Spey, and the Findhorn. Among the rivers flowing toward the west are the Clyde, the Doon, the Nith, the Esk, and the Annan. Many beautiful lakes are found in various sections of the country, but especially in the mountains. Of these, Loch Lomond, area 28 square miles, is the most important. Other fine sheets of water include Doon, Dee, and Saint Mary's lakes, in the southern uplands; Leven Lake, in the central lowlands; and Tay,

Earn, Awe, Rannoch, Shiel, Katrine, and Maree lakes, in the highlands of the west and north.

The climate of Scotland resembles that of England, but it is somewhat colder, owing to its location farther north and to its surface being somewhat higher. It is influenced by the warm waters of the Gulf Stream, which wash its western shore, but this is partly overcome by masses of floating ice from the Arctic Ocean. The thermometer rarely falls to zero in winter and the summer heat is seldom above 80°. Rainfall is heavier on the west coast than on the east, varying between 40 and 80 inches along the former and between 20 and 30 inches along the latter. In the western highlands the rainfall is excessive, reaching 130 inches. Snow lies on the ground for two or three months in the hills.

MINING. The country is rich in coal and iron and the output of both minerals is large. Coal is found in large deposits in the southern part, especially in Lanarkshire. Iron is mined in Ayrshire and Stirlingshire and lead is produced in Lanarkshire and Dumfriesshire. The lowlands have deposits of mineral oil. Granite, slate, and limestone are quarried in large quantities for commercial purposes. Valuable clays are widely distributed.

FISHING. The fisheries yield large quantities of herring, haddock, cod, and salmon. Scotland has held high rank in the output of herring for centuries, the product being largely cured or canned for the markets in Great Britain. Dundee and Peterhead are headquarters for whaling fleets for the Arctic and Antarctic regions. Aberdeen is the most important fishing center of the eastern coast. The total output of the fisheries has an annual value of \$2,500,000.

AGRICULTURE. The cultivation of the soil is not profitable in many parts of the country, owing to its rugged and barren surface. Farming is confined largely to valleys and the lowlands, which are highly fertile and are cultivated with great care. Oats are grown on the largest parts of the cultivated area. Other cereals include barley, wheat, and rye. Turnips are grown extensively as stock food, and potatoes are everywhere an important crop. Grasses of all kinds yield well, especially clover, which is grown extensively for hay and as a means of maintaining fertility. The highlands are utilized for grazing, especially in raising the Cheviot grade of sheep, which are native to Scotland. Many breeds of cattle are celebrated and have been naturalized in other countries, such as the Jersey, Ayrshire, Galloway, and Polled Angus. Shetland ponies and Clydesdale horses, two celebrated breeds, are grown extensively. Other domestic animals include swine and poultry.

MANUFACTURES. About one-fourth of the people are engaged in manufacturing enterprises. These industries of Scotland have kept pace with those of England, both in quality and quantity. Cotton, linen, and woolen textiles comprise the most important manufactures. Glasgow is noted as a center of the iron and steel industries, especially in producing hardware and machinery, and extensive shipyards are located along the Clyde. Scotland has large interests in distilling and is unrivaled in the output of whisky of a high grade. Large publishing and printing establishments are maintained in Edinburgh and chemicals are manufactured in large quantities in Glasgow. Other products include glass, confectionery, pottery, boots and shoes, lace, silks, worsted goods, and machinery.

COMMERCE AND TRANSPORTATION. The trade of Scotland is closely identified with that of Great Britain and it carries a large share of the coastwise and foreign trade. Improvements on the Clyde River have made it possible for ocean vessels to reach Glasgow, which is the principal port of Scotland. A large volume of local traffic is carried through the Caledonian Canal, which is not sufficiently large for seagoing ships of modern manufacture. Railways have taken the place of many canals formerly maintained in the lowlands, but these are still of importance in handling a share of local traffic. At present the railways have a total of 3,750 miles, but the lines are confined chiefly to the region south of the Caledonian Canal, and the larger systems have direct connection with those of England and Wales. The highways are in a good condition, many being improved by a superior grade of macadam.

GOVERNMENT. Scotland forms an integral part of the United Kingdom and is represented in both branches of the British Parliament, having 72 members in the House of Commons and 16 representative peers to the House of Lords. At the time of the union, in 1707, the judicial system and the Church of Scotland were left intact. Two high courts are maintained, a court of session for civil cases and a judiciary for criminal offenses. For local government it is divided into 18 counties, presided over by county councils, and cities and burghs are governed by municipal bodies. In educational matters it has long been in advance of England and education is free in the borough schools, which are managed by local authorities. Four excellent universities are maintained, situated at Aberdeen, Edinburgh, Glasgow, and Saint Andrews. These institutions receive aid from the government and are open to women and men under the same condition.

INHABITANTS. About one-tenth of the people are foreigners, consisting chiefly of English and Irish. Practically the entire mass of the Scotch people belong to the Presbyterian denomination, known here as the United Free Church of Scotland. A number of the inhabitants are Episcopalians and Roman Catholics, but the former are constituted mainly of English and the latter of Irish elements. The density of population is 150 to the square mile. Edinburgh, which has its seaport at Leith, is the capital. Glasgow, on the Clyde, is the largest commercial center. Other cities include Dundee, Aberdeen, Paisley, Kilmarnock, and Perth. In 1901 Scotland had a population of 4,472,103; in 1907, 4,776,063.

LANGUAGE AND LITERATURE. The Gaelic or Celtic tongue was spoken in northern and western Scotland down to the 15th century, but English was in general use in the lowlands toward the center and east. Peculiar characteristics prevail that still mark with local dialects the language spoken in different parts of the country, but there has been a constant tendency to make the language conform to the form spoken in northern England. The literature of Scotland may be said to date from 690, when Adamnan, abbot of Iona, wrote the life of his predecessor in the Latin. This was followed by other productions in the native dialect, but there were few writings of note until in the latter part of the 14th century, when Barbour wrote his famous work entitled "Bruce." Wyntoun's "Oryginale Cronykil of Scotland" appeared about 1422, and about the same time James I. wrote a number of poems, among them "King's Quhair." William Dunbar, Gawyn Douglas, and Sir David Lyndsay produced several works of high literary value in the latter part of the 15th century. A work on religion by John Hamilton, Archbishop of Saint Andrews, was published in 1552 under the title "Catechism, that is to say ane Commonne and Catholike Instruction of the Christian People in Materis of our Catholike Faith and Religioun." In 1560 Sir Richard Maitland published a collection of satirical poems and Alexander Scott soon after wrote a number of domestic poems, among them "Jousting Betwixt Adamson and Sym." Other writers of this period include Alex. Montgomery, Sir William Alexander, and John Rolland.

Scottish literature was greatly influenced by the Reformation. Among the leading writers of that period are John Knox, James VI., and Sir David Lyndsay. The last named is noted particularly for his collection of songs published in 1597, entitled "Ane Compendious

Booke of Godly and Spiritual Sangs for Avoiding of Sinne and Harlotrie." Allan Ramsay (1686-1758) is the author of a collection of songs and short essays, entitled "Gentle Shepherd." Many songs, ballads, essays, and other productions belong to that period. Subsequently Scottish literature became interwoven with that of England, and an account of it will be found in the subject under English literature. Among the prominent writers of Scottish descent are Sir Walter Scott, Hector Macneill, James Hogg, Fergusson, Burns, Ramsay, John Galt, and George MacDonald.

HISTORY. The early history of Scotland is wrapped in obscurity and tradition, and the first definite information regarding its people dates from the time when Britain was occupied by the Romans. It appears that the early inhabitants were non-Aryan, closely resembling the Iberians. Later the *Scoti*, or *Scots*, invaded the country from Ireland, forming settlements in the northern part of England and the southern part of Scotland. The descendants from the original inhabitants became known as Picts, but they were called Caledonians by the Romans and the country was known as Caledonia. The Picts were most numerous in the latter part of the 5th century and with the colonization of the Scots, a Celtic people, a long line of controversies arose between these two predominating classes. In the 4th century a large Teutonic element from the north of Germany formed colonies near the Firth of Forth, which finally resulted in annexing the region south to the kingdom of Northumbria, whose boundaries extended from the Forth to the Humber River. In the meantime the Norsemen were establishing themselves on the Orkney and Hebrides islands.

The Picts and Scots were united into one kingdom under Kenneth MacAlpin, a Scottish ruler of Pictish descent, in the 9th century, and soon after the country became known as Scotland. Thirty-eight Pictish kings appear to have reigned and are mentioned in the history of Scotland, but in the latter part of the 9th century the Scots became the predominating influence and slowly united the independent chiefs in the north of Scotland to their dominion. Subsequently followed a long period of wars against the Norsemen on the north and the Britons and Saxons on the south. In 937 the Scottish king, Constantine, aided the Danes in a battle against the Saxon king, Athelstan, this being the first battle of importance fought on English soil. Malcolm I. (943-954) conducted a successful war against Edmund I. of England, which resulted in Cumbria being annexed

to Scotland, and in 1018 Lothian, formerly a part of Northumbria, was annexed to England by Edmund II. The three succeeding kings of Scotland are Malcolm II., Duncan, and Macbeth, whose history is made a part of the tragedy of Shakespeare. Malcolm III. ascended the throne in 1057, after defeating the usurper Macbeth at Lumphanan, and with his reign commenced a social and political revolution in Scotland. He married the English princess, Margaret, sister of Edgar Atheling of England, and thus the English language and customs were introduced.

At that time occurred the conquest of England by William the Conqueror, which was followed by a large number of Saxons leaving England and forming settlements in Scotland. Many serious struggles took place between Malcolm and the Norman invaders of England. He made two successful invasions of England, but William soon collected a large army and invaded Scotland, which resulted in a loss of territory to the former, and Malcolm and his eldest son were slain in 1093 while attempting to seize Alnwick Castle. Malcolm was succeeded by his three sons, Edgar, Alexander, and David. Of these David was the most successful. He reigned from 1124 to 1153, devoting himself earnestly to internal improvements and the spread of the Christian religion. When he ascended the throne Scotland had only a primitive civilization, but he founded schools, introduced a system of written laws, organized a representative legislature, and established the manners and language of the Teutonic race. He was succeeded by Malcolm IV. (1153-1165), in whose reign Cumberland and Northumberland were annexed to England. The latter was succeeded by William the Lion, who was taken prisoner in 1175 while attempting to regain Northumberland, and Scotland was declared dependent on England.

Scottish independence was restored in 1189 by Richard I., and at the death of William, in 1214, Alexander II. (1214-1249) succeeded to the throne. He was succeeded by his son, Alexander III. (1249-1286), whose reign gave importance and prosperity to Scotland, but his sudden death brought on the ambitious designs of Edward I. of England to make Scotland a part of his kingdom, as he had Wales. The situation was further complicated by the death of Margaret of Norway, who had been selected for the crown at a meeting of the estates of Scone, and soon after followed the long struggle of John Baliol, Robert Bruce, and David de Hastings. The dispute was settled by arbitration under Edward I. of England. He decided

in favor of Baliol, who received the crown at Scone in 1292. Edward soon after invaded Scotland, took the king prisoner, and placed the entire country under English officials and garrisons. William Wallace and Robert Bruce now raised large armies to throw off English occupation and Edward I., dying in the meantime, was succeeded by Edward II. The latter was defeated by the Scots under Bruce at the Battle of Bannockburn on June 24, 1314, and Bruce reigned with remarkable success until his death in 1329, as Robert I.

Robert I. was succeeded by his son, David II., but Edward Baliol, son of John Baliol, made pretensions to the throne and received powerful support from Edward III. of England. He was successful in a number of battles and was crowned at Scone in 1322, but David succeeded in defeating him shortly after and continued the war against England. He was succeeded in 1370 by his son, Robert II., who was the first Stuart on the throne of Scotland. After his death in 1390, his son, Robert III., succeeded to the throne, and at his death, in 1406, James I. became king under the regency of the Duke of Albany. Internal strife greatly disturbed the kingdom and resulted in James being held a prisoner in England for eighteen years, where he secured a liberal education and finally obtained his release, receiving the crown at Scone in 1423. He reformed the constitution of the parliament and established obedience to law, but was murdered at Perth in 1437. His son succeeded to the throne as James II. when only seven years of age, which again placed the country under a regency, and he was killed in the siege of Roxburgh Castle in 1460.

James III., now only eight years of age, became king. He married Margaret, daughter of the Norse king, Christian, and received the Shetland and Orkney islands, which have ever since belonged to Scotland. His reign was generally successful, but it was disturbed by the pretensions of the nobles, which finally resulted in a battle and his death at Sauchieburn in 1488. He was succeeded by his son, James IV., who, in 1503, married Margaret, daughter of Henry VII. of England, thus hastening the union of the two kingdoms. James formed an alliance with France and invaded England in the reign of Henry VIII., which resulted in his defeat and death at Flodden Field in 1513. His infant son succeeded him as James V., when only two years of age, under the regency of the Duke of Albany, but in 1528 attained to full government. The chief events of his reign include those in connection with the

war against England, in which he was finally defeated at Solway Moss. He died a few days later at Caerlaverock Castle, on Dec. 14, 1542.

James V. was succeeded by his infant daughter Mary, who was born a few days before his death. Her reign is famous for the Reformation in Scotland and because of extended discussions regarding the question of uniting Scotland and England. She was affianced to the dauphin of France and sent to Paris to be educated, the government at home being conducted under the regency of her mother. Her marriage with the dauphin was celebrated in 1558, but his death two years later caused her to return to Scotland, where she found two well-organized parties, the Reformed party under the leadership of her half-brother, the Earl of Moray, and John Knox, and the Roman Catholics headed by Huntly. Her unfortunate marriage to Darnley, in 1565, lost her the support of the Reformed party. Shortly after the murder of her husband she married Bothwell, which caused a large number of her subjects to become alienated. After vainly attempting to defend her rights against a strong confederacy at Loch Leven Castle, she was forced to abdicate in favor of her infant son, who, in 1567, became king under the regency of Moray. Soon after she attempted to recover the throne, but her forces were defeated and she escaped to England, where she was kept a prisoner for eighteen years by Elizabeth, and in 1587 was beheaded at Fotheringay Castle. Her son assumed the title of James VI., and on the death of Elizabeth, in 1603, succeeded to the throne of England, being the nearest heir. He is known as James I. of England. On receiving the crown at Westminster he assumed the title of King of Great Britain, France, and Ireland.

At the death of James VI., in 1625, the throne passed to Charles I., whose reign was disturbed greatly by foreign wars and internal troubles, and ended in his execution in 1649. His son, Charles II., became king under the promise that he would espouse the cause of the Covenanters, and landed in Scotland in 1650, but his reign was disturbed by the events attending the protectorate under Cromwell, and he was finally defeated at Drumclog in 1679. On his death, in 1685, he was succeeded by his brother as James VII. of Scotland and II. of England. His short reign was disturbed by religious dissensions. In 1688 William and Mary were placed on the throne by the Revolution, and they were succeeded by Queen Anne in 1702. The last meeting of the parliament of Scotland was held in 1706, when articles for the

final union between Scotland and England were drawn up. This was the result of the general feeling that peace could not be maintained for any considerable time with the two countries separated. Among the conditions provided were that the name of the united country should be Great Britain, that the Presbyterian Church of Scotland should be maintained, that the crown of the United Kingdom should be vested in the Electress Sophia of Hanover and her heirs, being Protestants, that the laws and customs relating to property and private rights should be maintained in Scotland, that there should be free intercourse, equal trade, and citizen rights between the two countries, and that 16 peers and 45 members of the House of Commons should represent Scotland in the national Parliament in London. After that time the history of Scotland is merged into that of England and Great Britain.

SCRANTON (skrăn'tün), the third city of Pennsylvania, county seat of Lackawanna County, in the northeastern part of the State. It is on the Lackawanna River, 160 miles north of Philadelphia, and has communication by the Erie, the Central of New Jersey, the Delaware and Hudson, the Delaware, Lackawanna and Western, and other railroads. The city occupies a fine site on high and undulating land and has an area of twenty square miles. The streets are broad and well paved with stone and macadam. Electric street railways furnish transportation facilities to all parts of the city, and are connected with lines that penetrate the Wyoming valley and other sections of the country.

Scranton has several fine public parks and the residential sections are beautified by lawns and avenues of trees. Within the public square is a fine county courthouse. Other buildings of note include the city hall, the post office, the Everhart Museum, the Albright Memorial Library, the Board of Trade, the Masonic Temple, the Jermyn Hotel, and the Connell Building. About forty public school buildings of modern construction are maintained. It has the Taylor Hospital, the Home for the Friendless, several colleges and academies, the International School of Correspondence, and many fine church edifices.

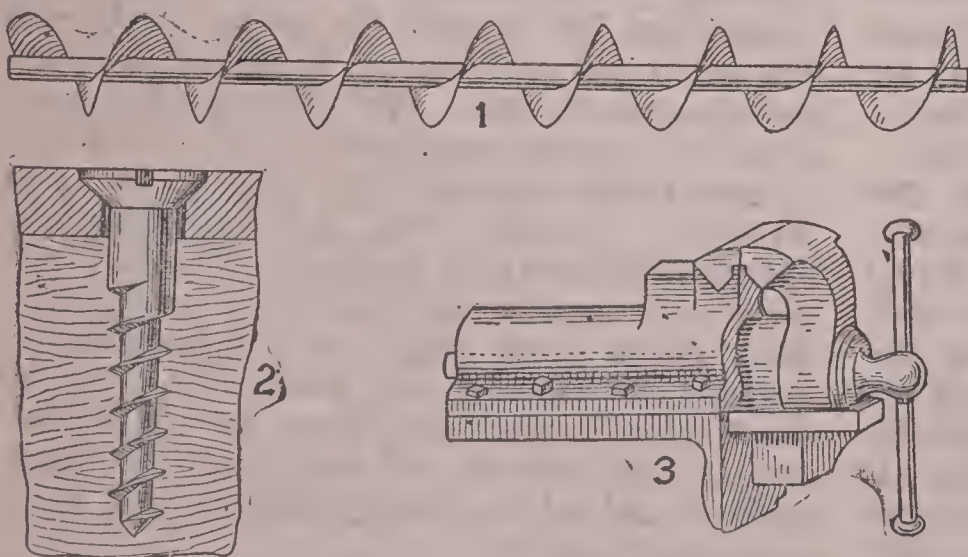
The surrounding country produces vast quantities of anthracite coal, of which it is an important distributing point. It has a large wholesaling and jobbing trade in merchandise and manufactures, and is an important market for fruits, cereals, and live stock. The manufactures represent a total capital of \$32,500,000. They include extensive knitting and lace curtain mills,

iron foundries, locomotive works, and machine shops. Among the general manufactures are hardware, clothing, earthenware, glass, carpets, musical instruments, and spirituous liquors. Waterworks, sewerage, and gas and electric lighting are among the public utilities.

The first settlement in the vicinity of Scranton was made in 1788 by Philip Abbot of Connecticut, who opened a farm on the Roaring Brook, a tributary of the Lackawanna. It was named Slocum Hollow in 1799 from a family of that name. Two brothers, Joseph and George Scranton, founded the city in 1840 and named it. It was incorporated as a borough in 1854 and chartered as a city in 1866. The rapid growth is due to the development of its manufacturing and mining interests. Population, 1900, 102,026; in 1910, 129,867.

SCREAMER (skrēm'ēr), a class of wading birds native to South America. In habits they somewhat resemble the duck, but do not have webbed feet. They have large feet, a short, conical bill, a bare space around the eyes, and two spurs on each wing. The color is blackish-brown and the size is nearly that of a turkey. Screamers frequent swamps and marshes, where they feed on insects, water plants, and seeds. The *horned screamer* has a long, slender horn on the top of the head. It is nearly four feet long and is seen mostly near the sea. These birds are found in large numbers in Brazil, Guiana, Venezuela, and other countries of South America. They are so named from their loud and harsh cry.

SCREW, one of the six mechanical powers, which is a modification of the inclined plane.



APPLICATION OF THE SCREW.

1, Screw conveyor; 2, common wood screw; 3, metallic vise.

It consists of a wooden or metal cylinder, called the *male screw*, having a groove or thread in an advancing spiral on its outer surface. It may be used separately, as in fastening metal to wood, but in fastening objects to metal

a *female screw* is used in connection with a male screw corresponding in diametrical size and cut of the spiral ridge. If one be turned while the other remains fixed, as in the vise, there is an advance equal to the distance between two connective threads. The mechanical effect is increased by making the threads finer, or decreasing the distance between them, or by increasing the length of the lever by which the power is applied. If the power moves through a circumference of thirty inches and the distance between two consecutive threads is one-tenth of an inch, a force of one pound applied at the head of the screw will move a weight of 300 pounds at the other end, since the power moves through a distance 300 times as great as that which the weight moves. Equilibrium results when the circumference at which the force is applied bears the same proportion to the pitch of the screw as the distance bears to the applied force. Thus friction enters very largely as a modifying element. Many forms of the screw are employed in machinery and mechanical arts. In general it is used to exert great pressure or overcome great pressure through a short distance. Among the common forms are the screw nail, for fastening separate pieces of material; the gimlet, for boring; and the screw presses and jack-screws, for securing pressure. Other forms include the endless screw, ball screw, screw conveyor, Archimedian screw, screw propeller, etc.

SCREW PINE, or **Pandanus**, a genus of tropical plants in the Eastern Hemisphere, so named from their spiny-edged leaves. They include both shrubs and trees and bear some resemblance to the palms. The leaves are two or three feet long, are shaped similar to a sword, and occur in three spirally arranged rows. When without branches, they resemble the pineapple plants. The common screw pine grows to a height of 25 feet and thrives in a poor but moist soil. Natives gather the unexpanded flowers as articles of food, and the odor of the bloom is utilized in making perfumes. An allied species grows somewhat taller and has leaves from six to ten feet long. The leaves yield fibers that are of value in making gunny bags. These trees are most abundant in the southern part of Asia and the East Indies. Some species are grown as ornamental plants in greenhouses.

SCREW PROPELLER, a contrivance used in the construction of sailing vessels of various kinds. It utilizes the principle of the screw in acting upon the water, for which purpose it is

driven rapidly by steam power. It consists of a cylindrical or spherical hub, to which blades are attached so as to form the screw. Some are cast in one piece, while others are built up by bolting the blades to the hub, both being of bronze, iron, or steel. The shaft is made very strong and passes parallel to the keel into the engine room, where the steam is applied to cause it to revolve rapidly. Back of the ship, projecting from the stern, is the screw, usually submerged entirely below the surface of the water. One or more engines act upon the shaft either by cranks formed on the shaft or by means of geared wheels. The screw turns in the water as a bolt turns in a nut, but the pitch is not constant at all points, since it varies somewhat near the hub. No absolute rule can be given in reference to the diameter of the screw, which varies somewhat according to the speed desired and the size of the vessel to be propelled. Patents on screw propellers were awarded independently to John Ericsson and F. P. Smith in 1838, from which time the successful introduction may be said to date. The screw came into general use in 1870 and it is now the propeller employed generally, except where the water is too shallow.

SCRIBE, an order of teachers among the ancient Jews, whose office was to write and teach the Mosaic and traditional law. The name was first applied to military secretaries, who kept the records of the nation, recruited and organized troops, and levied the war taxes. At the time of the Babylonian captivity the language in which the law was written had become obsolete and a new order of scribes had arisen among the Levites, of whom Ezra was chief. To them was intrusted the task of transcribing and translating the law, and of applying it to conduct. They grew rapidly to influence, and at the time of Christ comprised the learned body of the nation, when they were looked upon as public teachers and lawyers. Their rank was in accordance with their talents. The higher class occupied a place in the sanhedrim, practiced law, or taught in schools, while the less gifted engaged more largely in transcribing and writing laws. The scribes united with the chief priests in plotting the death of Christ.

SCROFULA (skrōf'ū-lā), a constitutional disease, either hereditary or acquired, leading up to the formation of tubercles in various tissues and organs of the body, chiefly in the lymphatic glands. It is generally inherited and is attended by glandular tumors that degenerate into ulcers, particularly at the side of the neck and under the angles of the jaw. The disease

has a disposition to degenerate into consumption of the lungs or of the mesentery, a fold of the peritoneum that infests an intestine or other viscus and connects it with the abdominal wall. Scrofula is sometimes called *king's evil*, from the view long held in England that scrofulous tumors and abscesses could be cured by the king's touch.

SCRUPLE (skrup'l), a weight equal to one-third of a dram, or the 24th part of an ounce, as used in apothecaries weight. A scruple is equal to 20 grains.

SCULPTURE (skūlp'tūr), the art of imitating natural objects, chiefly the human body, by carving or chiseling figures from stone or other solid material, or of modeling them in some plastic substance for subsequent reproduction by carving or casting, as in bronze. The word is from a Latin term meaning to cut out or carve, but it is used to express the molding of figures in clay, wax, or other material, to be afterward cast in some metal or plaster.

PROCESSES. Sculptures are of two classes, known as sculpture proper and relief. In *sculpture* proper the three dimensions of length, breadth, and height are reproduced, while in *relief* the dimension of thickness or depth is relatively reduced. Different names are applied to productions in relief according to the depth in which the object is represented. *Bas-relief* is a common form and is a type of carving or sculpture in which the figure projects but slightly above the background. *Messo-rilievo* is a type of sculpture in half-relief, and *alto-rilievo* is a form in which the carving or figures stand out very strongly from the background.

MATERIALS AND METHODS. The materials generally used in sculpturing include marble, stone, ivory, gold, bronze, granite, and wood, but any substance that may be cut or molded into form is employed for various products. The art has many disadvantages as compared with painting in recording facts and representing ideas, since neither color nor picturesque backgrounds may be utilized in sculpture, though there are exceptions to this general rule. While paintings appeal to the sense of sight chiefly through color, sculptures rely wholly upon pure form, both of line and composition, thus differing from painting in the mode of expression. In modern sculpture the artist usually models his work in moist clay, which in the case of a large statue is supported by a skeleton framework. If the finished product is to be in marble, a plaster cast is made from this model, which a skilled workman uses in

preparing a copy, while the sculptor puts on the finishing touches.

HISTORY. Sculpture is one of the most ancient of arts. Its origin is lost in antiquity. The first productions were in clay, but as knowledge advanced other materials, such as wax, marble, and bronze, came into use. It is remarkable that the most ancient sculptors did not seek to represent natural figures, but instead connected their products with mythology and religion, thus producing representations of strange and fantastic figures. The Egyptians made the earliest forms of higher art, and their sculptures differ from those of China and India in representing men engaged in various industries instead of confining them to gods and deformities of the human figure. Most of their products are large, and are peculiar for symmetry, stability, and calm and solemn expression. The most distinct and dignified sculptures of Egypt date from the period included between 1500 and 1000 B. C., but there are large and remarkable productions dating much earlier, particularly the *Sphinx*, which is thought to date from about 4000 B. C. Assyrian sculpture is like that of Egypt in representing historical and general scenes. While more vigorous in spirit, it is much inferior in idealistic beauty and trueness to nature. It dates from the 9th and 10th centuries B. C. Persian sculpture reached its height of development in the period from 575 to 331 B. C., but is less beautiful and artistic than the Assyrian. The early sculptures of India are chiefly in connection with the religion of Buddhism and later Brahmanism, and all may be said to be inferior as art products. While the works of art produced in Egypt and Asia are of interest historically, they are particularly valuable as influencing the development of art among the Grecians, who carried sculpture to the highest perfection.

The first forms of Grecian art bear a close resemblance to those of the East, but by the 6th century B. C. a distinct school developed, and their artists began to replace the conventional and lifeless types of Eastern sculptures with human figures true to nature. Among the earliest works of Grecian art that have come down to us are the sculptures from the temple of Athena at Aegina, which date from about 475 B. C. A number of them are preserved in the museum at Munich, Germany. Phidias carried Grecian art to its highest perfection about 442 B. C. His most notable productions are the statues of Athene in the Parthenon and that of Zeus in the temple at Olympia. Sculpture in his time still retained connection with mythology, but it showed remarkable nearness in

imitating nature, thus furnishing beautiful specimens of art in which human beauty was characterized by spiritual and godlike perfection. Sculpture declined for nearly a century after the time of Phidias, but new interest was awakened by Praxiteles about 363 B. C. This sculptor began to represent the human body more fully than the workmen prior to his time, and he was the first of the great artists to represent human form quite nude. Other noted artists of Greece include Scopas, who made the "Niobe Group," now at Florence; Chares, the author of the famous "Colossus of Rhodes;" and Agasias, the sculptor of the "Fighting Gladiator." Other productions dating from about the 4th century B. C. include the celebrated group of the "Laocoön," "Apollo Belvedere," "Venus of Milo," "Dying Gladiator," and "Dying Alexander."

Roman sculpture may be attributed wholly to Grecian artists, who found employment in all parts of Italy after the Roman conquest of Corinth. The Romans carried the finest treasures of art from Greece to Rome, whence many of the valuable specimens were transported to Byzantium in the 4th century A. D. by Constantine. Art declined in Italy with the barbaric invasions from the north. It began to revive in the 10th century, but no material advancement was made until the early part of the 13th century, when Nicola Pisano carved a number of fine specimens of art at Pisa and Siena. His son, Giovanni, is the next artist of note, but the most marked progress in the revival of art began with Lorenzo Ghiberti (1381-1455), who made the wonderful doors of the baptistry of Florence. Donatello is noted for his statues of Saint George and Saint Mark. Verrocchio is the most famous sculptor of the 15th century, but the perfection of Italian art was reached in the sculptures of Michael Angelo in the 16th century. Lorenzo Bernini (1598-1680) is one of the most noted Italian sculptors of the 17th century. Canova is the greatest representative of the 18th century, and Monteverde and Gallori are the most prominent of the 19th.

Sculpture found its way from Italy toward the north and west with remarkable rapidity at the beginning of the revival of learning. At present there are representative schools in the different European and American countries. Among the noted sculptors of Germany are Albert Dürer, Peter Vischer, Rauch, Kiss, Bandel, Siemering, Drake, and Schilling. The sculptors of France include Jean Goujon, Pierre Puget, Rodin, Dubois, Houdon, and Mercié; those of Denmark, Thorwaldsen; and those of



RAPHAEL'S TRANSFIGURATION OF CHRIST.
(Now in the Vatican at Rome.)

England, John Flaxman, John Gibson, Alfred Stevens, Watts, Gilbert, and John Henry Foley. The most eminent sculptors of the United States include Crawford, Greenough, Clevenger, Bartholomew, Rinehart, Keyser, Niehaus, Taft, French, Saint Gaudens, Story, Ward, Thompson, Hosmer, Rogers, and Warner. For further information consult the articles treating of the sculptors mentioned above.

SCURVY (skûr'vÿ), or **Scorbutus**, the name of a constitutional disease, due chiefly to the use of impure water and salt meat for a long period of time. Persons who subsist on a mixture of fresh vegetables and animal food are not subject to the malady. Those suffering from the disease experience great weakness, the face becomes sunken, and the gums relax and appear dark and spongy. Purple spots or patches appear upon the skin, due to an effusion of blood beneath the true skin or between superficial muscles, and these spots are not only painful but sometimes develop into ulcers. In the last stages the patient bleeds at the nose and vomits blood, and finally death occurs from exhaustion. Formerly scurvy was very devastating in the navies and merchant marine of all nations. It is now of rare occurrence, except among the poor and careless. Cleanliness, wholesome food, and proper dieting avert the disease entirely.

SCUTARI (skoo'tä-rē), a city of Asiatic Turkey, on the eastern shore of the Bosphorus, opposite Constantinople. It occupies a fine site on slopes gradually rising from the water, has good railroad facilities, and is the seat of a large interior and foreign trade. Scutari has many beautiful mosques, baths, and bazaars, and is the seat of several educational institutions, including a dervish college. Its extensive cemeteries are famed for their beauty, being adorned with magnificent cypress trees and works of art. The high degree of interest in the cemeteries is due to the fact that the Turks look upon Asiatic soil as sacred, in which they desire to have their last resting place. Scutari is well fortified. It has a large trade in cereals and fruits. Among the manufactures are cotton textiles, silk and woolen goods, saddlery, implements, and machinery. The English occupied Scutari in the Crimean War. Immediately south of it is the burial ground established for the soldiers of the British army. Florence Nightingale made it the basis of her operations during that war, and in the burial ground is a beautiful monument in honor of the troops. Population, 1908, 78,485.

SCYTHE (sith), an implement used for mowing and reaping. It consists of a long, curved

blade attached to a handle. The blade is sharpened on its inner or concave side, and is swung with both hands, the workman holding it by two smaller handles attached to the principal one. The scythe was preceded in general use by the *sickle*, an instrument with a short curved blade and a wooden handle, to be held in one hand when reaping. Later a framework of wooden bars was fastened above the blade of the scythe, thus forming the *cradle*. The scythe is used mostly in cutting grass and weeds on small farms and the cradle has taken its place in cutting grain. These implements are generally used in countries where farming is on a small scale or in a primitive state, the reaper having taken their place in all leading agricultural countries. However, all well-equipped farms have a scythe for various purposes, such as cutting weeds and grasses where a mower cannot be used.

SCYTHIANS (sith'i-anz), the name of a race of people that anciently occupied the region from the Carpathian Mountains in Europe to the Aral Sea in Asia, where they were found by the Greeks when settling on the northern shore of the Black Sea, in the 7th century B. C. Ancient writers used the name with considerable vagueness, often associating it with the Scoloti and other nomadic tribes, but the name Scythian was applied generally to the wandering tribes that occupied the region between the Carpathians and the Volga. These people led a wandering life, subsisting by rearing large herds of cattle, sheep, and horses. Their food consisted of cheese, milk, and boiled flesh, and their habitations were in wagons roofed with felt and drawn by oxen. As the food supply of one region became exhausted, they moved to newer pasture, their horses and cattle following, and later their sheep. The government was despotic. It was vested in a number of chiefs. Their warriors developed remarkable skill in handling the bow and arrow on horseback.

A large army of Scythians invaded Media in the latter part of the 7th century B. C., which they made subject for ten years, but were finally expelled by Cyaxares. In the 2d century B. C. they invaded Persia, where they founded a kingdom known as Indo-Scythia, and in the 1st century B. C. they secured a foothold in northern India, which they occupied about four centuries. Grecian writers regarded the Scythian language of Aryan derivation and as nearly akin to the Iranian. Scythia was the name of the region lying between the Volga and the frontier of India in the time of the Roman Empire.

SEA, or **Ocean**, the great body of salt water which covers about three-fifths of the earth's

surface. It is one continuous expanse of water, but for the purpose of description and study it is generally divided into five smaller bodies. They are known as the Pacific, Atlantic, Indian, Arctic, and Antarctic oceans. The Pacific separates America from Australia and Asia, the Atlantic separates America from Europe and Africa, the Indian lies between Africa and Australia, and the Arctic and Antarctic lie respectively within the north and south polar circles. The comparative sizes may be stated in the following order: one-half of the entire water area of the earth is included in the Pacific, one-fourth in the Atlantic, one-fifth in the Indian, one-seventeenth in the Antarctic, and one-thirty-fifth in the Arctic.

The coast lines of the ocean are variously formed, but they may be arranged in the four classes which constitute inland seas, border seas, gulfs and bays, and fiords. *Inland seas* are those formed by a nearly continuous land border, as the Gulf of Mexico and the Red Sea; *border seas* are isolated from the rest of the ocean by island chains and peninsulas, as the Gulf of Saint Lawrence and the Sea of Japan; *gulfs* and *bays* are broad expansions of the water extending but a small distance into the land, as the Bay of Biscay and the Gulf of Guinea; and *fiords* are deep inlets with high, rocky headlands, extending often from 40 to 100 miles into the land, as are found off the coasts of Norway and Chile.

The bed of the ocean is diversified like the surface of the land, having plains, mountains, rocks, and valleys, though the irregularities are fewer. It has been demonstrated by recent soundings that many of the plains and plateaus of the ocean are of great size, compared with those of the continents, and there are submerged mountain ranges both along the shores and in the deep ocean. The mean depth of the ocean is placed at 12,600 feet, or nearly two and a fourth miles. It is thought that the greatest depth of the Atlantic is in the neighborhood of the island of Saint Thomas, in the West Indies, where soundings have been established a depth of 27,300 feet. The deepest region in the Pacific Ocean is east of Japan, where a depth of 27,935 feet has been reached, this being somewhat less than the highest elevation of the land. It is found that the greatest depths are near the highest elevations, though there are some possible exceptions. The entire bulk of water in the ocean is placed at 323,813,000 cubic miles. It is estimated that if the surface of the earth were perfectly level a sheet of water two miles deep would entirely surround the crust.

Sea water in small quantities is transparent and colorless, but when viewed in a large mass it has a deep blue appearance. The reddish or greenish hue often seen in limited portions of the ocean is due to the presence of numberless organisms and the phosphorescence visible at night in some places arises from the presence of animalculae, but the latter phenomenon appears only where the air comes in contact with the water, as in the crests of waves or the disturbance of the surface due to the passage of a vessel. Sea water is heavier than fresh water in the proportion of 1.027 to 1, owing to its containing a number of saline ingredients. About three pounds of various saline matters are found to every hundred pounds of ocean water. The saltness of the ocean is due to the evaporation taking up pure water, which is borne in the form of clouds to remote regions and dropped to the surface of the earth in the form of rain, which, as it flows through the channels of streams, carries large quantities of mineral matters into the sea. It is estimated that about 6,575 cubic miles of water are taken up in this way annually. Thus, it is not difficult to understand that large quantities of mineral ingredients are dissolved from the crust of the earth and carried with the current.

Oceanic water is affected constantly by vast movements, which correspond to the motions of the atmospheric air. They are known as waves, tides, and currents. *Waves* are swaying movements of the water, caused by the action of the wind. Apparently the wave motion is in the direction in which the wave is advancing, but there is no perceptible progressive movement of the water, except in shallows. The height of waves depends upon nearness to the shore and the depth of the sea, ranging usually not over six feet in the open sea with a moderate wind, and in high storms from thirty to sixty feet. The wave motion decreases rapidly in proportion to the depth below the surface, and there is a very feeble effect at a depth of forty feet, even in moderately strong winds. *Tides* are the periodical risings and fallings of the water, caused by the attraction of the sun and moon. These follow each other with marked regularity about every six hours, and, unlike waves, whose motion is confined practically to the surface waters, tides influence the waters of the ocean from top to bottom.

Ocean currents affect the water of the sea with considerable regularity, causing it to move to and from the equatorial and polar regions. In this way they constantly produce an interchange of water between the lower and higher latitudes. They somewhat resemble rivers, but

are vastly wider and deeper, and, unlike waves, consist in a real onward movement of the water. These currents are caused chiefly by the difference of density of water produced by the inequality of temperature between the equatorial and polar regions. The warmer waters from the equatorial region are upper currents and move both north and south from the Equator, but never cross it, and as they lose their heat they become denser, and, sinking to the bottom, spread throughout the ocean basin. It has been found that there is no perceptible difference in the temperature of the water near the bottom of the sea in any latitude, the extreme difference ranging from four to six degrees. The lowest temperature at the greatest depth near the Equator is about 35° Fahr. and in the highest latitude it reaches about 28° Fahr., while the temperature at the surface varies from 85° Fahr. in the former to 28° Fahr. in the latter region. Ordinary ocean water freezes at 27° Fahr., and in places where it is densely salt the freezing point is still lower. Since ice formed of ocean water is comparatively fresh, it follows that the salt, being separated as the water freezes, increases the per cent. of salt in the lower strata. For this reason the water below the ice may have a temperature lower than that at which the surface freezes, without being transformed into ice.

The constant circulation of water in the ocean causes a general distribution of oxygen and other atmospheric gases throughout the sea, even to the greatest depth. It follows from this that both plant and animal life may subsist in all parts of the sea, but their form and size depend largely upon the depth and temperature. Animal life is most abundant at the surface and near the bottom, but there are living forms throughout the intervening space. The sea has many different species of both plants and animals, some being confined to the bottom, others floating in the water, and still others are in shallows, coming in contact with both the bottom and the surface. Pelagic deposits of matter at the bottom of the sea are remains of the fishes and other forms of life that sink after death. Other deposits, known as terrigenous, are formed of earthy matter carried into the sea by the movements of oceanic waters and through the action of streams.

SEA ANEMONE (ă-nēm'ō-nē), the name of several animals belonging to the polyps, or zoöphytes, called *actinians* by some writers. They are low in the scale of life and are fastened at one end to the surface of rocks or stones in the water, but are able to move slowly.

At the upper or free extremities are their mouths, which are surrounded by arms or tentacles. The body is vase-like, usually about three inches in diameter, and the height is from three to five inches. They seize their food by the tentacles, which they move outward in all directions, and at the extremity is a stinging cell. When a small fish or shrimp comes in contact with certain tentacles, it is immediately seized and paralyzed by the cells, and is then dragged into the distensible mouth, where it undergoes the first process of digestion. Later the food passes to the lower part of the digestive canal, where it undergoes the final digestive processes. These animals multiply by eggs as well as by budding, and frequently from ten to twenty young forms spring from the base of the adult. Some species are popular in natural collections, where they may be made the subject of a very interesting study.

SEA CUCUMBER, or **Holothuria**, the name of the highest class of radiated animals, so called from their elongated and more or less warty and cylindrical form. Some writers designate them as sea slugs, owing to their vermicular mode of creeping. When parts of the body are destroyed, they are reproduced quite rapidly. The body is rather soft, having no covering like that of the starfishes and sea urchins, and motion is effected principally by longitudinal rows of suckers on the sides of the body. Water introduced and ejected causes motion and enables them to extend the body greatly in length and width. The sexes are distinct and some multiply by means of fission, but most species promulgate by means of eggs. In size they vary greatly, ranging from the small species off the New England coast to the large size in the Bay of Fundy and on the shores of Newfoundland. Species from ten inches to a foot in length and from three to four inches in circumference are found in the mud flats of the Florida reefs.

SEA EAGLE. See **Eagle**.

SEA HORSE. See **Hippocampus**.

SEAL, the general name of certain genera of carnivorous mammals, having feet adapted for swimming and being able to live both in and out of water. The body is long and slender, tapering toward the tail, and the small head is destitute of outside ears. They have five toes on each limb, joined to each other by webs. The two fore limbs are short and adapted to crawling out of the water, and the hind limbs project backward on each side of the tail. Seals are able to remain under water nearly half an hour, where they pursue their prey by swimming with great rapidity, but their move-

ments on land are awkward. Most of the time is spent in water, but seals congregate a part of the time on the shores, where they repose and bask in the sunshine on sand banks, ice fields, or rocks. There they bring forth their young. They subsist mostly on fishes, which they pursue with marked skill, often chasing them up the mouths of rivers, but they also feed on crabs and other forms of marine life. In the warm season they move toward the colder regions of the North and South poles, and in winter go to the milder waters.

The seals make holes in the ice in winter, thus enabling them to come up to breathe, where they are often watched by the Esquimos and caught for their flesh and skin. The oil

The *common seal* is most abundant in the northern regions. It attains a length of from three to five feet. The female usually produces one young at a birth, but sometimes two. They are animals of considerable intelligence, having large and brilliant eyes and a well-developed sense of smell, and may be trained to perform peculiar tricks when domesticated. It is possible to teach them to come when called by name, and to obey instruction of various kinds. The *sea lion* is a larger species, attaining a length of from ten to twelve feet, and a weight of about 1,000 pounds. It is destitute of fur, but its hide, fat, flesh, sinews, and intestines are useful to the natives and in commerce. Sea lions are found in the North and South



SEALS.

1, Common Seal; 2, Sea Lion; 3, Greenland Seal.

is of value in lighting, warming, and cooking. Their skins are used in making clothes, coverings of capes and coats, and for footwear. The sinews are employed by the natives in making fishing lines and thread. Sealskins form an important commodity of commerce, being of value in making articles of wear, such as caps, ladies' cloaks, and trimmings. They are employed to some extent for card cases, pocket-books, and other articles. The oil, known in the market as *seal oil*, is made from the fat or blubber, and is more valuable than whale oil. The fur is of a grayish-brown color, mottled with black, and is usually dyed before being used for articles of wear.

Many species of seals have been described, varying somewhat in size, nativity, and habits.

Pacific, particularly on the coast of the Kurile Islands, off Kamchatka, and in the vicinity of San Francisco. The *harp seal* is a species common to the northern part of Europe. The *crested seal* has a peculiar crest above the nose and is native to the northern parts of North America. A spotted species, known as the *leopard seal*, is native to the South Orkney Islands. The *elephant seal*, or *sea elephant*, is the largest of this class of animals. It is native to the Antarctic seas and attains a length of from twenty to thirty feet. The *northern sea lion* is a species having a small outer ear, an extended neck, and a mane of crisp hairs on its neck and shoulders. It is native to Alaska and the Pribilof Islands. An allied species, the *fur seal*, or *sea bear*, is native to the polar

regions. It has a brown or gray-brown fur of much value.

It requires considerable patience and skill to successfully conduct seal hunting, owing to the gregarious habits of most species, and their tendency to have one or more sentinels constantly watching for danger. The most extensive hair-seal fisheries are off Newfoundland, in the Caspian Sea, and off Jan Mayen, but nearly half the world's supply is secured off Newfoundland. The principal fur-seal fisheries are off the coasts and islands of Alaska and Kamchatka. Seals are most commonly secured by shooting while congregated on the ice, but in some cases they are watched at their holes in the ice and secured by inflicting a wound on the head administered by a club or some similar implement. Reckless destruction of these animals has caused the supply to decrease rapidly. In 1870 about 100,000 seals were taken in the vicinity of Bering Sea, but there has been a general decrease until in 1908 only 22,470 skins were secured in the same region. It is thought that ultimately pelagic sealing, the killing of seals in the deep sea, should be prohibited entirely and that the sealing season on the coasts should be limited to several months, in order to preserve a supply of these animals.

SEALED ORDERS, the term applied to orders issued and delivered to the commanding officer of a ship or squadron, whose seal is not to be broken until the vessel has reached sea. In such cases all on board are ignorant of the destination of the vessel, this being unknown even to the commander. Sealed orders are issued when a ship or squadron is sent on any secret service, the object being to prevent information regarding the movements becoming known.

SEALING WAX, a composition for sealing letters or packets, designed both to protect the message and receive the impression of a seal fixed to an instrument. In the Middle Ages sealing wax was made of beeswax and turpentine, and to these was added a coloring matter, usually vermilion. At present beeswax is not used in making sealing wax, but shell-lac is the principal component. The fine grade of sealing wax for stationery contains about seven parts of shell-lac, four of turpentine, and from three to four of vermilion. Inferior grades contain common resin and the coloring used is red lead, but black coloring is not infrequent. Sealing wax was first employed in China in the 7th century, whence it was introduced into Europe.

SEA LION. See Seal.

SEA MOUSE, the name of a small worm

found in the sea. It is covered with fine hairs or bristles, hence resembles the mouse in appearance. The body is about two inches in length and when exposed to light the hairs show iridescent hues of great beauty. Several species have been described, some of which are found in the Atlantic at great depths. They are frequently brought to the surface or thrown upon the shore by storms.

SEA OTTER, an animal found off the islands and shores of the North Pacific. It is about three feet long, has a stout form and a massive head, and bears a dark brown fur of value in the market. Formerly these animals were very numerous along the coast from Puget Sound to Bering Strait, but fur traders have hunted them so persistently that they are now becoming rare. The skin of a sea otter is valued at from \$500 to \$1,500. These animals live in the sea a greater part of the time and subsist principally on fish, crabs, and sea urchins.

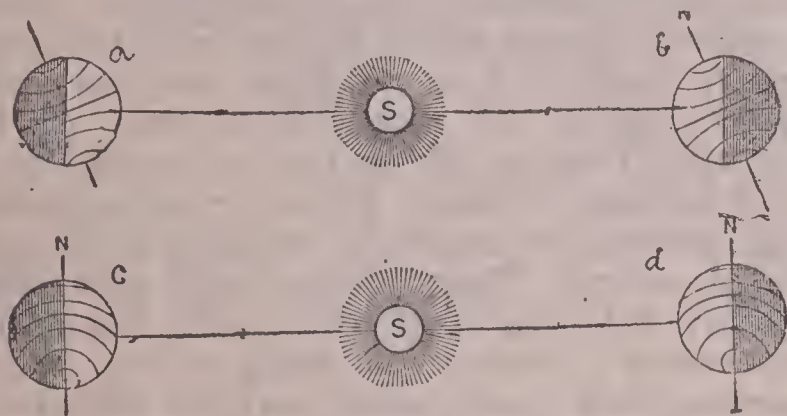
SEARCH, Right of, the right that a belligerent nation has to examine the papers and cargoes of private ships sailing on the high seas, in order to ascertain their character and designation. The right of search is limited to the officers of cruisers that have been lawfully commissioned by a nation at war, but ships cannot be detained or boarded by the public ships of another power in the time of general peace, since such an act is an intrusion upon the rights of the State whose ships are so visited. However, in the time of war the general consent of nations yields to the belligerent the privilege of searching the ships professing to be neutral. This is quite necessary in order to have it known whether the neutral flag masks an enemy or covers contraband of war. Both persons and goods found concealed unlawfully may be captured. The War of 1812 was caused partly by England insisting upon the right of search.

SEA SERPENT, the name of a monster supposed by some writers to exist in the sea. It has been described in the literature of many countries, but such an animal has never been captured and its existence is purely mythical. Such a monster was first mentioned in Norse literature, in which it is described as being 200 feet long and 20 feet in circumference. Paul Egede, while on a voyage from Norway to Greenland, in 1734, claimed to have seen a living sea serpent. Since then numerous reports have been published. A. C. Oudemans, an English writer, in 1892, published an account of the various appearances of the sea serpent in a work entitled "The Great Sea Serpent." While a few scientific men are in-

clined to believe that some marine reptile like the plesiosaurus is in existence, the large majority give no credence to the suggestion. It is probable that floating logs, schools of porpoises, the ribbon fish, or collections of seaweed are the source of this mythical animal.

SEASICKNESS, a nervous affection due to the motion of ships at sea. The early symptoms are headache and nausea, which are followed by vomiting and general weakness. While oscillations and movements to which persons are not accustomed are known to be the general causes, the exact origin and nature are not perfectly understood. Frequently it attacks the strong and cautious, while the weak and careless are unaffected. Usually it passes away in a few hours, but sometimes continues several days or during the entire voyage. Persons in middle life are subject to the more severe attacks, while children and aged persons are less liable to the malady. Soda water, calomel, and bromide of potash are sometimes prescribed, while others escape by lying down when they feel uncomfortable. See **Gyroscope**.

SEASON, the division of the year as determined by the position of the earth with respect to the sun and as marked by a particular state of moisture, temperature, vegetation, and



SEASONS IN THE NORTH TEMPERATE ZONE.

a, Winter,
c, Spring,

b, Summer,
d, Fall.

difference in the length of day and night. The rays of the sun shine directly on the Equator on the 21st of March, and fall directly on localities farther north until the 21st of June, when the sun is directly over the Tropic of Cancer. It begins to move southward on the latter date, shining directly on the Equator on the 22d of September, but continues the movement southward until the 21st of December, when it shines directly on the Tropic of Capricorn and thence again moves northward. The effect is that four seasons occur in the Temperate zones, namely, spring, summer, autumn and winter. Only two seasons occur in the tropics, the wet and the dry, this being due to an almost uniform temperature throughout the year and to the fact

that rain follows the sun. This results in a wet season succeeded by a dry season at the tropics, while in the vicinity of the Equator there are two wet seasons and two dry seasons each year, this being due to the circumstance that the sun crosses the Equator twice each year. In effect there are but two seasons in the Arctic and Antarctic regions, a long, cold winter and a short, dry summer. The four distinct seasons are found only in the middle portions of the Temperate zones. They are modified noticeably by proximity to the sea and elevation above sea level.

In speaking of the seasons from an astronomical standpoint, it may be said that spring extends from the vernal equinox, when the sun enters Aries, to the summer solstice; summer, from the summer solstice to the autumnal equinox; autumn, from the autumnal equinox to the winter solstice; and winter, from the winter solstice to the vernal equinox. However, this is true only of the North Temperate Zone, since the seasons are reversed in the Southern Hemisphere. The greatest summer heat is not reached on June 21, when the days are longest, for the reason that as the rays of the sun shine more nearly vertical on the earth's surface a quantity of heat is stored, and, when this is united with the heat received at the time the days begin to decline in length, the temperature gradually rises until the sun's rays fall quite obliquely on the surface. In the same way the coldest days do not occur near Dec. 21, when the days are shortest, but some time thereafter, when practically all the latent heat stored in the surface during the summer has radiated. It will be observed that the warmest part of the day is shortly after noon and the coldest part of the night in the morning, this being due to the same cause.

SEA SQUIRT, the name applied to several species of *Ascidians*, owing to their habit of squirting jets of water when irritated. The young resemble a tadpole, and the adult is constituted of leathery or gristly tissues. These animals are found in many places attached to shells and stones near the shores of the sea. They are mollusks of a low class.

SEATTLE (sê-ăt't'l), the largest city in Washington, county seat of King County, on Elliot Bay, an inlet from Puget Sound. It is 28 miles north of Tacoma, 345 miles west of Spokane, and 125 miles inland from the Pacific Ocean. The city occupies a fine site between Puget Sound on the west and Lake Washington on the east, the area included within the limits being about thirty square miles. The ground rises gradually from the waters of Puget Sound,

but in some places has elevations of 300 feet, and the higher altitudes are separated by beautiful valleys or terraces. Along the waterfront is a narrow tract, peculiarly suited for docks, wharves, and railway yards. The streets are regularly platted and the principal thoroughfares extend north and south. They are finely paved with stone, asphalt, vitrified brick, macadam, and wooden blocks.

DESCRIPTION. Seattle is beautified by numerous parks of great beauty. These include Lincoln, Denny, Woodland, Kennaer, Volunteer, Washington, and Ravenna, the last mentioned being a public ground in which the natural scenery is finely preserved. Extensive grounds are located at Fort Lawton and the State university. Brick and stone constitute the principal materials used in building, but in much of the newer buildings the steel frame has been utilized. Among the public structures are the county courthouse, the city hall, the Federal building, the Carnegie public library, the high school, and the buildings of the State university. It is the seat of the University of Washington, in which the educational system of the State culminates. Other institutions include several fine public school buildings, the Seattle Seminary, the Academy of the Holy Name, the College of the Immaculate Conception, and several private and denominational institutions. The public library, constructed by a gift of \$200,000 by Andrew Carnegie, contains 50,000 volumes. Hotel Washington, the Butler, the Seattle, and the Rainier are among the leading hotels.

INDUSTRIES. The city has transportation facilities by the Northern Pacific, the Great Northern, the Chicago, Milwaukee, and Saint Paul, and other railways. A network of electric lines furnish transportation to all parts of the city and branches extend to Tacoma and other cities of the State. The harbor is safe and extensive and is reached by the largest ocean steamers at all seasons of the year. Puget Sound is connected with Union and Washington lakes by a canal recently completed by the Federal government, hence additional landing and anchorage facilities are afforded by the valuable harbor on Lake Washington. The foreign trade has a value of \$60,500,000. It consists largely of exports to the markets of Asia. The products exported include lumber, coal, cotton, wheat, flour, gold and silver, cured and packed meats, fruits, and machinery. The city has an extensive wholesaling and jobbing trade and ships large quantities of lumber and shingles to eastern points.

Seattle has vast interests in manufacturing en-

terprises, whose products have an annual value of \$35,500,000. The principal establishments include flouring mills, lumber yards, slaughtering and meat-packing plants, machine shops, and shipyards. Among the general manufactures are confectionery, furniture, carriages, dairy products, canned fish and fruits, clothing, and tobacco products. Vast power is derived from Snoqualmie Falls, on a river of the same name, about 25 miles southeast of the city. At Port Orchard, about fourteen miles from Seattle, is the Puget Sound Naval Station. The streets are well lighted with gas and electricity and it has extensive systems of waterworks and sewerage, both of which are owned and controlled by the municipality.

HISTORY. The first settlement on the site of Seattle was established in 1852 and it was named from an Indian chief. It was platted the following year, but remained a village until 1880, when it was chartered as a city. At an early date it became prominent as a commercial center for the Puget Sound region, and its prosperity was greatly augmented by the discovery of gold in Alaska. A great fire swept over the business district in 1889, but it was soon rebuilt on a much more substantial plan. The building of railroads and the establishment of steamboat lines made it a commercial rival of San Francisco, and since then its increase in wealth and population has been continuous. In 1909 it was the seat of the Alaska-Yukon Exposition. Population, 1900, 80,621; in 1910, 237,194.

SEA URCHIN, the name of a genus of marine animals, belonging to the class *Echinoidea*. These animals are widely distributed in the shallow waters and along the coasts of the sea. The body is anchored to the bottom, or to rocks, and is studded with movable spines. While living, the shell and spines are quite flexible, but they become hard when dried and the shell assumes a more or less globular form. If undisturbed in the water, they expand the upper extremity, but it is drawn together rapidly when touched or irritated. They propagate by small eggs. The young swim freely while in the larval stage, but pass through complicated phases of development. Large numbers are found on the coasts of the Pacific, especially where the sea covers the surface during high tides, and when the water is low or has flowed entirely away they are preyed upon by crows and other birds. Some large species, as those of the Mediterranean, are gathered as an article of food.

SEBASTOPOL (sê-bàs'tô-pôl), or **Sevastopol**, a seaport city of Russia, on the Black Sea, in the government of Taurida. It is in

the southwestern part of the Crimea and has important railroad connections with Eurasian cities. It has a secure and commodious harbor. Sebastopol is the seat of a large interior and foreign trade, particularly in grain, hides, salt, and manufactures. It is strongly fortified. The harbor is sheltered on the north and south by lofty limestone ridges, and there are ample facilities for the largest vessels to anchor safely on the shore. The allied armies of Turks, French, and English conducted a memorable siege in the Crimean War of 1854-55, and the first bombardment took place on Oct. 17 of the former year. General Todleben defended the land side against the French and English for eleven months, but on Sept. 8, 1855, Malakoff and Redan were captured, which resulted in the Russian evacuation. The city had substantial buildings and a population of 40,000 before the siege, but it suffered a general destruction of property and life by reason of being bombarded with terrific force. Since then the forts have been rebuilt and the city has been greatly improved, making it an important Russian stronghold and trade center on the Black Sea. Catharine II. founded Sebastopol in 1783, at which time a small Tartar village called Akhtiar occupied its site. Population, 1908, 61,482.

SECESSION (sĕ-sĕsh'ŭn), War of. See Civil War in America.

SECONDARY SCHOOLS, the name given to institutions of learning that are classed between the common schools and the colleges. These schools are intended to prepare pupils for entrance into the institutions of higher learning. The list of these schools in Canada and the United States includes academies, seminaries, and public high schools, and in many cases their courses are such that pupils who graduate from them are entered without examination into colleges and universities. In the United States the high schools are under township or city control, and the academies and seminaries are either managed as private or denominational institutions. Besides college preparatory courses, they usually maintain departments of music, commerce, and manual training. Secondary schools are known in Germany as *Realschulen* and in France as *Lycées*.

SECRETARY BIRD (sĕk'rĕ-tā-rĭ), a genus of rapacious birds native to Africa and the Philippine Islands. They are so named from the fanciful resemblance between the crest, made up of a peculiar plume of long feathers, and pens projecting behind the ears of a clerk. The species native to South Africa is typical and is the best known. The head and neck are long, the height when standing is about four

feet, the color is grayish-blue, and the tail is very long. The wings and legs are long. It can fly with facility when it is in the air, but greatly prefers to run. The natives and Europeans of South Africa protect it for its service in killing serpents, on which it feeds. It kills the serpents by inflicting severe injury



SECRETARY BIRD.

with its feet and beak, or by dropping them from a high elevation while on the wing. Though sometimes bitten by venomous serpents, it appears to be entirely fearless. Secretary birds may be domesticated, in which state they serve to protect poultry.

SECRETION (sĕ-krĕ'shŭn), the process by which certain matters are separated from others in an organized body and collected at particular places to be employed for special purposes in the system, as the saliva, bile, gastric juice, and mucus. Secretion is performed in animals by organs of various form and structure, but generally by glandular epithelial cells. It appears that neither the form nor internal arrangement of the parts of a gland have any essential connection with the nature of the fluid secreted, the process of secretion being always performed by the intervention of cells, whose office is to elaborate from the blood substances different than the blood. Certain secretions are to be thrown off the system as useless or injurious, as the urine, which are generally called *excretions*. The process of secretion is carried on under stimuli of the system, but it is materially enhanced or suppressed by mental conditions.

Secretion of plants is the process of separating certain elements from the sap and elaborating them for particular uses. They are produced in the interior of the plants and are made up largely of those known as nutritious secretions, including sugar, starch, albumen, gum, gluten, and lignin. The special or non-assimilable secretions in plants include coloring matters, alkalies, acids, resinous principles, milks, and many others.

SECRET SERVICE, the department of government which is concerned in the detection of crime and fraud, or to collect information of a private nature for the benefit of a state or nation. In some countries the secret service is a distinct department of the government, and the subordinates transmit reports from time to time either direct or through heads of departments to the chief official in this branch of the service. While valuable services are rendered in discovering those who are disloyal or in breaking up unlawful organizations, the chief purpose is to detect counterfeiters of coins and paper currency and to cooperate in enforcing the revenue laws. Smuggling is another form of crime coming under the attention of the secret service.

SECULAR GAMES (sĕk'ŭ-lĕr), the name of a class of performances popular in ancient Rome, so named from a *saeculum*, meaning a generation or the extreme duration of human life. Originally these games took place at short intervals, but it was decreed in 249 B. C. that they should be celebrated every 100th year, and Augustus extended the period to 110 years. The purpose was to celebrate in a fitting manner the close of a period during which all who live at the beginning had passed away. Three days were usually given to the games, and it was a part of the festivities to offer animals as sacrifices to Proserpina and Dis Pater, the Greek gods of the lower world. The last celebration took place in 204 A. D., in the time of Septimius Severus.

SEDALIA (sĕ-dā'li-ă), a city of Missouri, county seat of Pettis County, 88 miles southeast of Kansas City, on the Missouri Pacific and the Missouri, Kansas and Texas railroads. It is surrounded by a fertile farming country, which produces cereals, fruits, and grasses. The noteworthy buildings include the county courthouse, the high school, the public library, the Convent of the Sisters of Saint Joseph, the hospital of the Missouri, Kansas and Texas Railroad, and the George R. Smith College. It has Forest and Liberty parks. Among the manufactures are flour, machinery, farming implements, hardware, railway cars, woolen goods, furniture, and

boilers. It is improved with electric and gas lighting, public waterworks, substantial pavements, and a sewerage system. Sedalia was founded by Gen. George R. Smith in 1861, was captured by the Confederates in 1864, and was chartered as a city in 1889. Population, 1900, 15,231; in 1910, 17,822.

SEDAN (sĕ-dăn'), a city and fortress of France, in the department of Ardennes, 64 miles northeast of Rheims. It occupies an imposing site on the Meuse River and in its vicinity are extensive deposits of coal and iron. The manufactures include cotton and woolen goods, metal ware, pottery, and laces. Sedan is noted as a military and strategic point. It surrendered to the Germans in 1815 and also on Sept. 2, 1870. In the latter year it was occupied by a French army of 86,000 under Napoleon III. and Marshal MacMahon. The German army under King William laid siege to the city and on Sept. 1 began a vigorous attack, which resulted in the surrender on the following day. Napoleon was sent as a prisoner of war to Wilhelmshöhe, and the republic of France was declared at Paris by Gambetta on Sept. 4. Since then the city has been greatly improved by railroads and modern municipal facilities. The Sedan chair, a portable covered vehicle for carrying a single person, borne on two poles by two men, was invented in and so named from the city of Sedan. Population, 1906, 20,408.

SEDATIVES (sĕd'ă-tĭvz), the name applied to any drugs which have a soothing or quieting effect upon the sensory function, either local or general. Drugs that have a local effect act upon different organs, while those included with the general sedatives influence the entire system. Some drugs are sedatives in their effect upon one or more particular organs, but may influence others as irritants. In some cases these drugs are sedative in small doses, but excite or irritate when taken in large quantities. Ether and chloroform are general sedatives, while opium, aconite, and cocaine are classed as local sedatives. Potassium and sodium soothe the nerves and spinal centers; bismuth and sodium bicarbonate, the stomach; and aconite and digitalis, the circulatory system.

SEDGE (sĕj), the common name of an extensive genus of plants, found mostly in swamps and wet places. They are generally distributed in all the temperate and northern parts of the earth. The stems are without joints, usually triangular, and possess little economic value. This genus of plants embraces the bulrushes and the sedges proper, the latter being species of the genus *Carex*. A species of allied plants was used by the ancient Egyptians in making papyrus

paper. The coarse fodder derived from the sedge plant is of no particular value for domestic animals, since only a few species eat it and even those partake of it reluctantly.

SEED, the body produced by the ripened pistils of plants, from which a new plant may spring. It is an ovule fertilized and matured, and has a germ or embryo formed in it. Upon reaching this perfected state, it is separated from the parent plant, and in it are contained all the necessary elements to bring forth a new life similar to the one on which it grew and of which it was a part. It consists of two parts, the *nucleus*, or *kernel*, and the *integuments*, or *coats*. An outer loose covering, generally an imperfect one, is on many plants while the seed is growing, this being called an *aril*. The seed coats proper are commonly two, an outer and an inner; the latter generally is thin and delicate. The outer coat is called the *testa* and the inner is the *tegmen*, or *endopleura*, and the two are known as the *spermoderm*. In some plants the outer coat is close, and even, as in the morning-glory, sometimes it has a tuft of long hairs, as in the milkweed, while in others it is covered with long, woolly hairs, as in the cotton plant, which forms the useful cotton of the market. Some seeds have a fringelike wing or tuft at each end, as the catalpa seeds, while the seeds of maples are winged at one end. These tufts and wings are designed to render such seeds buoyant, so they may be dispersed by the wind when ripe. In some plants the seed is borne on a seedstalk. The *scar*, or *hilum*, is the mark where the seed was attached to the plant, this being particularly plain in the bean, pea, chestnut, and buckeye.

The whole body of the seed within the coats forms the *kernel*. It consists of the *embryo* and the *albumen*, though in some plants the latter is wanting. Seed albumen is a stock of prepared food, which is designed to support the embryo in the early stage of growth, but in some seeds a similar supply is laid up in its cotyledons. The embryo is a plantlet in miniature. The development of the embryo depends upon the seed, fruit, and blossom. It is nourished by the albumen of the seed until it secures sufficient vigor to provide for itself. It is protected by the seed coats. The embryo has the *radicle* or *original stemlet*, from one end of which the roots grow downward, and from the other the stem is pushed upward. It also sends forth one or more cotyledons or seed leaves, and often a plumule or bud for continuing the stem upward. Some seeds may be stored and kept a long time, while others begin growth soon after coming in contact with moist soil. Wheat,

corn, rye, and other cereals begin to sprout immediately after being placed in a moist and warm soil, while the walnut is protected from growth or early decay until the following spring.

Some seeds require time to dissolve their outer covering before they give rise to a new plant, and in others it is necessary for the store of food to be acted on by the ferments lying within the covering. There is much difference in the length of time that seeds may be kept, even under the best of care. Such seeds as those of the poplar and willow must be brought to moist soil within a few days after ripening, while beans, rye, and wheat may be stored for many years. The seeds of plants supply man and animals with wholesome foods, the more important being wheat, rye, oats, corn, barley, buckwheat, coffee, linseed, mustard, nutmeg, cotton seed, rice, beans, peas, etc. Seeds having one cotyledon are called *monocotyledonous*; those having two, are termed *dicotyledonous*; and the seeds of flowerless or cryptogamic plants are designated *acotyledonous*. Cryptogams, or flowerless plants, reproduce by means of spores, which are analogous to the seeds of ordinary flowering plants, but they contain no embryo. They are mostly one-celled and generally produce extensively.

A steady and growing demand for seeds of farm grains, fruits, and vegetables has developed in America from the first settlement of the country. It was originally customary for farmers and others to preserve seed supplies from their own production, but later the demand for purer and better seeds sprang up, which caused the development of regular seed farms. The first of these was established in 1784 by David Landreth, near Philadelphia. With the general development of the country and the growth of cities came a demand for better fruit and vegetables than were reared in the commonplace gardens. Many market gardeners were induced to grow seeds to supply the demand of those producing the materials for the city market. This ultimately led to the establishment of farms at which seed production is the principal object.

At present there are about 600 farms in the United States devoted exclusively to seed production. These utilize about 175,500 acres of land and represent a capital of \$20,500,000. Besides the regularly established farms, quite a large number of agriculturists produce seeds to supply local dealers or customers within the immediate neighborhood. The seed industry has been the means of a general improvement in the nature of the product and a diversification of the crops produced. The seeds grown in this way comprise practically all species of grasses,

grains, fruits, and vegetables. Seed culture is carried on most extensively in New York, California, New Jersey, and Ohio. A demand for northern-grown seeds, especially those of a hardy class of plants, has caused the industry of seed culture to be established in many northern states, particularly in Minnesota, Wisconsin, and Michigan.

SEELAND. See **Zealand**.

SEIDLITZ POWDERS (sěd'līts), a medical preparation named from the saline springs in Seidlitz, a village of Bohemia, used as an agreeable and effective aperient. These powders consist of 35 grains of powdered tartaric acid, inclosed in white paper, and 40 grains of bicarbonate of soda and 120 grains of tartrate of soda and potash, in blue paper. The contents of the two papers are dissolved separately, each in a half tumbler of water, and the two are then poured together. Immediately an effervescence takes place, during which the mixture should be taken. Rochelle salt is a similar preparation and the two names are frequently interchanged.

SEINE (sān), a river of France, which rises in the department of Côte d'Or, a short distance northwest of Dijon, and after a course of 481 miles toward the northwest discharges into the English Channel. It flows through a highly fertile region and has a number of important tributaries, including the Oise, Marne, Aube, and Yonne rivers. Vast canals have been constructed to connect with the Seine, making it the basis of a large interior and foreign trade. The improvements from its mouth to Paris are particularly extensive, while Rouen has been made a seaport by deepening its channel and constructing immense wharves. Among the principal cities on the Seine are Paris, Le Havre, Rouen, Saint Germain, Melun, and Fontainebleau, thus making the river important next to the Thames and the Hudson. The basin has an area of 30,000 square miles. It is navigable for a distance of 350 miles from its mouth.

SEISMOGRAPH (sīs'mō-gráf), or **Seismometer**, an instrument to indicate and record the motions on the surface of the earth during an earthquake. Various instruments are made for this purpose, including the *seismoscope*, which merely leaves a record of the tremor of the earth, either with or without indicating its time. However, the seismograph, or seismometer, records the direction, period, and extent of the shock. Most instruments of this class have an index, which is set in motion by the shock, thus tracing the horizontal and vertical movements on smoked glass or a similarly blackened surface. The newer instruments con-

tain electrical mechanisms, which are set in motion by the movements, and are sufficiently sensitive to record exceedingly mild tremors. They not only indicate the vertical and the horizontal movements, but record each shock, the direction, the maximum intensity, and the duration of each movement. Instruments of this class are used in the observatory on Mount Vesuvius, Italy, and the Leland Stanford Junior University, California.

SELENE (se-lē'ne), in Greek mythology, the daughter of Hyperion and Theia, sister of Helios and Eos, and worshiped as the goddess of the moon. Some writers identify her with Phoebe, the sun god, and in later times she was associated with Artemis. She is represented in statuary as driving across the heavens in a chariot to bring light to men. White horses or cows draw her chariot and in some instances her symbol, the crescent moon, is borne in a conspicuous place.

SELENIUM (sê-lē'nī-ŭm), a nonmetallic element classed immediately between sulphur and tellurium. It was discovered in Switzerland by Jöns Jakob Berzelius (1779-1848) in 1817. Selenium is a rare element, occurring in composition with other minerals, especially silver, gold, copper, bismuth, and lead, but small quantities have been found in a free state in Mexico. When oxidized and dissolved by nitric acid, it yields *selenious acid*. It is obtained as a dark-brown, vitreous and amorphous modification, or as a lead-gray crystalline mass, and is noteworthy for its variations as a nonconductor of electricity. The resistance to electricity is less in the light than in the dark, on account of which it has various uses in electrical contrivances and the photophone. Tellurium is a nonmetallic element of the same group as selenium. It is of rare occurrence and is found either native or in combination with metals. The resistance to electricity is similar to but less marked than that of selenium.

SELEUCIA (sê-lū'shī-à), the name of seven cities in Asia, all of which were built in the early history of the dynasty of Seleucidae. Two of these were particularly famous, both for their commercial importance and political power. The earliest was Seleucia Pieria, founded by Seleucus Nicator in 300 B. C. It was situated near the mouth of the Orontes, twelve miles west of Antioch, of which it was the seaport. During the war between the Ptolemies and the Seleucidae for predominance in Syria it formed an important strategic point, but with the rise of Roman power it declined rapidly. The excellent port is still in a state of preservation, but the walls, temples, amphitheatres, and citadel

are in ruin or entirely destroyed. The only connection between the city and the sea was a tunnel cut through the solid rock, having a length of 1,087 yards.

Seleucia-on-the-Tigris was the most celebrated of these cities, being for many years the eastern capital of the Seleucidae. It was founded by Seleucus Nicator about 35 miles northeast of Babylon and was built largely of material taken from the latter city, after that famous emporium had been ruined. Its growth was remarkable. In its greatest prosperity it had about 600,000 inhabitants and formed the most important commercial center of Asia even to the time of Strabo. When Western Asia was conquered by the Romans, it became the point of attack by the Persians, and was finally burned by Trajan in 116 A. D. At the time Emperor Julian made his expedition to the East he found the city entirely destroyed, and the country surrounding its ruins was the haunt of wild beasts.

SELINUS, an ancient city on the southwestern coast of Sicily, founded by a colony of Greeks about 630 B. C. The Athenians sent an expedition to Selinus in 415 B. C., owing to wars with people native to the island. An army of Carthaginians intervened in behalf of the native people in 409 B. C., when a large number of inhabitants were killed or carried away as slaves. In the First Punic War, about 250 B. C., the city was entirely destroyed and was never rebuilt. Ruins of large Greek temples are still extant, including one about 370 feet long and 177 feet wide. This structure was consecrated to Apollo and contained many sculptures. Several fine specimens of the latter are now in the museums of Palermo.

SELJUKS (sĕl'jŭks), or **Seljuks**, the name of several Turkish dynasties, which descended from one family and governed large parts of Asia from the 11th to the 13th centuries. The dynasty was so named from Seljuk, a chief of a small tribe of Bokhara and the surrounding country, in the early part of the 11th century. His grandson, Togrul Beg, became the chief of a tribe that had migrated to northern Khorasan and established his government at Nishapur. He subdued Balkh and Khaurezm in 1041 and Bagdad in 1055, and became the reigning monarch at the last mentioned city. Togrul Beg was a warm supporter of the Moslem faith, which caused him to build numerous mosques and support pious and learned men. He was succeeded by his nephew, Alp Arslan, in 1063, as ruler of Persia, who soon after conquered Palestine and Syria from the caliphs of Egypt and in 1071 made Diogenes, Emperor of Byzantine, a prisoner. As a ran-

som for Diogenes, he received a large part of Asia Minor.

Alp Arslan was succeeded by his son, Melek Shah (1073-1093), who is noted as the most powerful of the Seljuk monarchs. He not only solidified the empire, but annexed all of Asia Minor and Arabia, thus governing the extensive region lying between Chinese Tartary and the Hellespont. His reign was aided by the influence of his grand vizier, Nizam-ul-Mulk, who is noted for his progressive scholarship and friendship for learning. Many bridges, canals, highways, hospitals, and colleges at Herat, Basora, Ispahan, and Bagdad attest the progressive spirit of that epoch. Smaller kingdoms began to form after the death of Melek Shah, the foundation for which had been laid by that ruler, since he established a number of principalities that were professedly subject to the center state of Iran or Bagdad. Saladin was one of the Seljuk chiefs and as such came in contact with the Crusaders. Others like him began to assert their power until finally the monarchy became dissolved. The Mongols under Genghis Khan pressed the Mohammedans toward the west and their dominion at length fell entirely, the Seljuk dynasty ending with Kaikobad in 1315. The Ottoman princes succeeded the Seljuks, both of whom were Turks, and thus the foundation for the Turkish or Ottoman Empire was laid.

SELKIRK MOUNTAINS, an elevated mountain range in southeastern British Columbia. It belongs to the Rocky Mountains. The range is about 175 miles long by 80 miles wide, and lies immediately west of the Rocky Mountains proper. Mount Sir Donald, height 9,945 feet, is the culminating peak. The Canadian Pacific Railway crosses the range through Roger's Pass, at an altitude of 4,300 feet. It has an abundance of valuable timber to a height of nearly 6,000 feet, but snow lies perpetually on the elevations exceeding 7,000 feet. The presence of vast snow deposits gives rise to large glaciers, which in former times were even more extensive than at present, a fact evidenced by numerous moraines.

SELMA (sĕl'mă), a city in Alabama, county seat of Dallas County, on the Alabama River, 48 miles west of Montgomery. It has navigation facilities and is on the Louisville and Nashville, the Southern, the Western of Alabama, and other railroads. The place is well planned and handsomely built and in the surrounding country are rich cotton, lumber, coal, and iron productions. Among the manufactures are cotton-seed oil, ice, cotton batting, lumber products, car wheels, cigars, fertilizer, machinery, and clothing. The principal buildings include the

county courthouse, the public library, the Y. M. C. A., the Dallas Academy, the high school, and the Alabama Baptist Colored University. It has public waterworks, sanitary sewerage, and substantial street pavements. The place was settled in 1823. Population, 1900, 8,713; in 1910, 13,649.

SELVAS, the name applied to the forest regions of South America, especially to the timbered plains of the Amazon basin. They are located in a vast extent of country where rainfall is abundant, and are characterized by many climbing plants and a great variety of trees of large size. India rubber, lumber, and medicinal barks are obtainable in large quantities, but the greater part of these forests have not been utilized and are still in a primeval condition. The region as a whole may be said to contain some of the largest and most valuable forests in the world.

SEMAPHORE (sēm'ā-fōr), an apparatus for giving signals by lanterns, flags, and oscillating arms. Signals of this kind were formerly very common in the military organizations as well as on railroads, but they have been superseded largely by the use of electrical communication. Railways still employ semaphore signals of various kinds. They consist of posts from ten to twenty feet in height, at the top of which are two forms of arms, one being notched and the other square-ended. The latter are painted red on the side toward the trains they signal and white on the other side, and at night red or white lights are used for the same purpose. In most cases the red signal indicates danger, hence the engineer is cautioned to stop or run slowly. The white signal, or light, indicates that the train is to proceed without stopping. In some cases the arm is dropped to indicate a clear track, is raised to an angle of 45° to signify caution, and is elevated to a horizontal position as a signal that the train is to stop.

SEMINOLES (sēm'ī-nōlz), an Indian nation of Florida, which was composed chiefly of Creeks, from whom they separated in 1750. They aided the British in the War of 1812 and subsequently gathered other Indians and Negroes until, in 1818, they numbered about 4,000. Their invasions of Georgia and the destruction of property and life caused the government to send Gen. Andrew Jackson against them in 1818, who, after defeating them and destroying a number of their towns, captured Ambrister and Arbuthnot, two English adventurers, who were summarily hanged for inciting trouble with the Indians and the Spanish.

The annexation of Florida to the United States, in 1819, caused many Negroes to join the Seminoles, and war ensued, when the gov-

ernment decided to remove them to the West. A treaty in 1823 resulted in ceding most of their lands and, in 1832, the chiefs agreed that the tribe should be removed west of the Mississippi. Osceola stubbornly resisted removal and became the leader in a destructive war that lasted seven years, from 1835 to 1842. He was captured treacherously in the latter year. In 1845 a treaty was concluded by which the Seminoles were removed west of the Mississippi, and in 1856 lands lying west of the region occupied by the Creeks were assigned to them. The Seminoles number about 3,000 and include many industrious farmers, manufacturers, and professional men. They support a large number of churches, mostly Presbyterian, and are devoted to schools and learning.

SEMITES (sēm'īts), the name of a group of nations. They are allied closely in physical features, language, and religion, and are regarded the descendants of Shem, a son of Noah. The peoples embraced in this group are distributed in many countries, but the region of their nativity is in Arabia, Syria, Chaldaea, Abyssinia, Phoenicia, Ethiopia, and Palestine. It is generally assumed that the first representatives were confined to Arabia about 4000 B. C., where they led a nomadic life, but later migrated into Mesopotamia. After dwelling for some time under the priest government of the Turanians then occupying that region, they became identified with the ruling classes, and finally spread over large parts of Western Asia and Northern Africa. The cities of Tyre and Sidon are among the many emporiums founded by Semites, and for centuries they were the predominating power of that region of the world. The language differs from the Aryan and the different Semitic nations have kept closer together and undergone less change than the Aryan peoples.

Properly there are two divisions of the ancient dialects, one being generally known as the northern and the other as the southern Semitic languages. The northern dialects comprise those spoken in ancient Assyria and Babylonia, together with the tongues of the Hebrews, Phoenicians, Carthaginians, Chaldeans, Aramaeans, and Syrians. They are nearly extinct as spoken tongues, Hebrew being the only one used at present in writing. To the southern Semitic tongue belong the Arabic, Amharic, Ethiopic, and Himyaritic. Ethiopic was anciently the language of Abyssinia, but it has given way to Amharic and other modern tongues. The Arabic language is used most extensively of the Semitic tongues and includes the four spoken dialects of Egypt, Barbary, Arabia, and Syria. Among

the marked peculiarities of the Semitic languages is the triliterality of the roots, these consisting of three consonants, and the inflection by means of internal vowel change. It is peculiar for its absence of compound words.

The Semitic people are distinguished for their worship of one God. They are the early teachers of three religions which embrace the doctrine of one Deity; namely, the Jewish, Christian, and Mohammedan. Through them the Bible and the Koran were given to the world. They distinguished themselves in literature, arts, and many of the sciences. It was from Phoenicia that commerce and western colonization spread, while the powerful Carthaginian empire sent forth its Hannibal, and the Babylonians and Assyrians reared mighty empires and cities of great wealth. The Phoenician alphabet is not the oldest, but from it came most of the alphabets of Asia and Europe, while the system of notation in common use is from the Arabic. To them must be credited the preservation of learning while the Dark Ages spread their shadow over Europe, and their sacred books and cities are still the attraction of thousands.

SEMPACH (zēm'pāk), a town of Switzerland, in the canton of Lucerne, on the east shore of Lake Sempach. It has a population of 1,250 and would be of little more than local interest but for the decisive battle that occurred here on July 9, 1386, in which the Swiss gained a decisive victory over the Austrians. The Swiss army of 1,300 was under command of Arnold von Winkelried and the Austrian army of 5,400 was under Duke Leopold. The Swiss army made a desperate attack and totally defeated the Austrians, who lost 2,000 troops and 600 nobles, while the Swiss lost only 200 men. A chapel marks the site of the battlefield. The anniversary of this battle is still celebrated with imposing ceremonies in Switzerland.

SENATE (sěn'āt), the deliberative assembly of the Roman people. Originally it was composed of 100 members, each representing one of the *decuriae* into which the body of the Roman citizens was divided, at the time they comprehended the single tribe known as the Ramnenses. With these the Sabines were incorporated as a second tribe, hence an equal number of senators was added. When the third tribe, the Lucerenses, were added, the number was increased to 300. Subsequently the number varied greatly, exceeding 1,000 during the second triumvirate, but Augustus reduced it to 600. The senators held office for life. They were elected by the *decuriae* during the kingly period; by the consuls and consular tribunes, under the republic; and by the censors, after the estab-

lishment of the censorship. The plebeians as an order were never eligible, but they frequently attained to the senatorial dignity after the quaestorship and curule magistracies were opened to them. Hence the senate, originally a purely aristocratic body, became gradually the real representative of the people. The term is applied to the upper branch of the legislature in many states and countries, as in France, the United States, and some cantons of Switzerland. See **Congress**.

SENECA FALLS, a village of New York, in Seneca County, on the Seneca River, ten miles northeast of Geneva. It is on the Seneca and Cayuga Canal and the Lehigh Valley and the New York Central railroads. The adjacent country is fertile, yielding grasses, fruits, and cereals. In the vicinity are picturesque lakes and deposits of gypsum and building stone. Among the chief buildings are the public library, the high school, the Johnson Home for Indigent Children, and the Mynderese Academy. The manufactures are machinery, flour, cotton and woolen goods, and lumber products. Electric railways furnish communication to Cayuga Lake Park and other points of interest. The place was settled in 1791 and incorporated in 1831. Population, 1900, 6,519; in 1910, 6,588.

SENECA LAKE, an elongated body of water in New York, lying between the counties of Seneca, Ontario, Schuyler, and Yates. The length is 35 miles; width, from one to four miles; and elevation, 247 feet above sea level. The greatest depth is 630 feet and its shores are picturesque and in many places quite abrupt. It is important for its fisheries and navigation facilities, being connected with the Erie Canal. The Seneca River issues from its northern end, which, with the Oswego River, carries the drainage to Lake Ontario.

SENECAS (sěn'ě-káz), an Indian tribe of the Iroquois family, formerly resident in western New York, where they became allied with Pontiac. They favored the English during the Revolution, but made peace with the Americans in 1784. In 1812 they joined the Americans, but a small part became allied to the hostile tribes of the west, though peace was concluded with them in 1815. This band was removed to Indian Territory, now Oklahoma, in 1831, but about 2,750 Senecas are still on reservations in New York.

SENEGAL (sěn-ě-gā'l'), a river of Western Africa, which rises on the northern slopes of the Kong Mountains, near the sources of the Niger, and after a course of about 1,000 miles flows into the Atlantic near Saint Louis. It receives an important tributary at Bafulabe,

which is connected with Kayes by railway to overcome a number of falls, and from the latter town it is navigable to its mouth, a distance of nearly 700 miles. In its lower course are many branches leading from the main channel, forming numerous fertile islands, but materially lessening its importance for navigation by the larger vessels. A large portion of its basin has productive soil. Considerable timber occurs along its banks.

SENEGAL, a French colony in Western Africa, situated in Senegambia, comprising the coast region from a point somewhat north of Cape Verde to the British colony of Gambia. It includes the island and town of Saint Louis, at the mouth of the Senegal River, and a region extending inland from the coast equal to about 200,000 square miles. The population is estimated at 3,200,000. This region was first settled by the French in 1637, and is the base of operations politically and commercially for all of Senegambia, which see.

SENEGAMBIA (sĕn-ĕ-gămb'ă-à), an extensive colonial possession of France, in Western Africa, lying south of the Sahara, west of the Sudan, north of Guinea, and east of the Atlantic. It includes the colony of Senegal and a number of protected states, the whole comprising 415,800 square miles. French claims to this vast territory date from 1637, when they made settlements near the mouth of the Senegal River, and since then have been enlarging their sphere of influence toward the interior. Within recent years their claims have been extended to include the territory from the Mediterranean to the Gulf of Guinea, west of Tripoli and Lake Tchad, except only Morocco and Spanish territory on the west coast and portions of the coast from British Gambia to the Niger Territories. The portion of this region included in Senegambia is governed from Saint Louis, its local capital, where the governor general has his seat. He is assisted by a colonial council and is represented in Paris by a deputy. Saint Louis, Dakar, Kayes, Bakal, and Bafulabe are the principal trade centers.

The region lying along the Atlantic coast is generally low and swampy, the flat country extending inland from 100 to 200 miles. However, the surface rises from these low plains toward the east, terminating in mountain ranges that extend south of the Senegal River and between the headwaters of the Senegal and the Niger. The Kong Mountains are the most important highlands, rising to elevations about 3,500 feet above sea level, and between them and the coast regions is a lofty and more or less undulating plain. Thus, the region may be divided into

Low, Middle, and High Senegambia, all being more or less important commercially. Low Senegambia is noted for its fertility of soil, and produces large quantities of cereals and fruits. Middle Senegambia is inhabited by numerous Negro tribes. It has a hot climate and a fertile soil and yields fruits, timber, and domestic animals. High Senegambia is inhabited largely by Moors, who are adherents of the Mohammedan faith. Many wild animals infest various parts of Senegambia, including antelopes, hippopotami, elephants, lions, panthers, leopards, hyenas, crocodiles, and monkeys. The climate of many sections is unhealthful for Europeans, particularly those lying near the marshy regions. Among the chief exports are yams, rice, maize, bananas, oranges, citrons, timber, and minerals.

The French are pushing vigorously the policy of introducing the rearing of domestic animals and the culture of many kinds of fruits, vegetables, and cereals. They are constructing railroads and improving the rivers by dredging and canals. The more important streams are the Senegal, Gambia, Nunez, Niger, and Rio Grande, all of which are of more or less importance commercially. In their basins are vast forests of palm, mangrove, baobab, teak, and other tropical trees. The most important railroads include a line from Dakar to Rufisque and Saint Louis, and another from Kayes on the Senegal to Bammuku on the Niger. The latter connects the navigation of the two river systems. Moors and Negroes constitute the inhabitants, but the races are intermixed to some extent. Population, 1906, 2,608,600.

SENNA (sĕn'nà), the dried leaflets of several species of cassia, plants belonging to the bean family. These plants are native to Northern Africa, Western Asia, and Southern Europe, particularly to Arabia, Tripoli, and Egypt. Several allied species are native to the Eastern United States, where they are known as wild senna, and the leaflets are used as a mild cathartic. Senna has long been employed in Western Asia as an important medicine. Its use was introduced to Europe by Arabian physicians in the 9th century. The dried leaves are now a staple drug and yield medicinal properties useful in the treatment of numerous ailments, serving as a purgative and as a confection. See illustration on following page.

SENSATION (sĕn-să'shŭn), a cognized affection of the nerves, or a modification of consciousness that results when some organ of sense is excited by external stimuli. The five organs of the senses, namely, the eye, the nose, the ear, the tongue, and the nerves that give rise to the sense of feeling or touch, are the

end organs by which impressions are primarily received and thence transmitted to the brain. By means of these organs we become aware of light, sound, heat, mechanical pressure, color, scent, etc. Besides these some writers, as Professor Bain, add a sixth sense, that of muscular resistance. This sense is more than feeling, as in the case of lifting a weight one not only feels its surface, but experiences the sense of something resisting muscular effort. Perception by the senses is the basis of all our knowledge or mental activity. It is probable that a child deprived of all his senses would give no evidence of possessing a mind. The first mental act is attended or preceded by a cognition of impressions on the nerves; that is, the first thing



SENNA.
Flower and Seeds.

one is conscious of is a sensation. The sense of touch or resistance is the most widely diffused, and the sensations arising from it are most readily perceived by animals. The others follow in the order named—sight, taste, hearing, and smell. See articles on the organs of the senses, *Eye*, *Ear*, etc.

SENSITIVE PLANT (sĕn'sĭ-tĭv), the common name of a shrubby plant of the bean family, which is native to tropical America. It attains a height of about one foot, has pinnate leaves, and bears small purple flowers in heads on long peduncles. This plant is remarkable for possessing a vegetable irritability, causing it to shrink from touch or disturbance. If a leaflet be touched, it folds rapidly, and if a branch is shaken, all the leaflets curl up and the branch bends toward the main stalk. In Panama it has been observed that a railroad train causes the leaves to fold when passing rapidly by a cluster of these plants. Several species possess the

property of folding their leaves on the approach of night, and unfolding them at the return of light. These plants are cultivated quite extensively in hothouses.

SEOUL (sĕ-ōōl'), the capital of Corea, on the Han River, about 25 miles by road from the Yellow Sea. It is situated in a valley between mountains, and around its outskirts is a stone wall. Seoul has only two wide and improved streets, all the remainder being about twelve feet wide and destitute of pavements and sidewalks. The architecture is mostly of wood, the buildings are covered with thatched roofs, and in the narrow streets are gutters for the escape of refuse matter, which is carried off by a shallow stream of water. The most important buildings include those of the government, which are situated within the city but are separated from the remainder by a secure wall. Manufactures are in a rude and very primitive state, the most important being clothing, mats, paper, tobacco, silk textiles, fans, and utensils. Seoul was founded in 1397 and became the capital in the latter part of the 16th century, but was sacked by the Manchus in the 17th century. It was closed to foreigners until within recent years, and there is still a strong prejudice against foreign visitors and modern improvements. Japanese troops occupied it in 1894 as a result of the war between China and Japan. Since 1905 the direction of public affairs has been in the hands of the Japanese. Population, 1906, 203,464.

SEPARATOR (sĕp'ā-rā-tĕr). See **Creamery**.

SEPIA (sĕ'pĭ-ā), the name of a species of cuttlefish, characterized by having an organ known as the ink bag. It is very abundant in the Mediterranean and the waters off the southern shore of Asia. The animal uses the black fluid in the ink bag to darken the water when attacked by an enemy, and it is thus enabled to retreat or escape in obscurity. This product is used extensively in the manufacture of ink. It is taken from the animal and carefully boiled and filtered, and in this form constitutes the sepia of commerce, which is sold in cakes and sticks as India ink. When drawn from the animal it is black, but in the process of manufacture it takes on a beautiful brown color. It is used chiefly by painters, and to some extent as an ink.

SEPOY (sĕ'poi), the name of native Hindu soldiers, which is used to distinguish them from the white or gora soldiers employed by the British. Efforts to train natives of good caste for the army were first made by the East India Company in the 18th century, who allowed them to use the sword and target instead of the musket, and to wear the turban, vest, and

long drawers in place of regular uniforms. It was found that these soldiers rendered good service both in the English and French armies, facing danger with firmness and obstinacy. Soon after their number was increased, until in 1857 the Sepoys in the British service numbered 240,000, and the total army in India was only 300,000. In that year the high caste Hindus in the Bengal army incited the famous Sepoy Rebellion, which cost the British government many lives and fully \$200,000,000. The Sepoy soldiers in the British service at present number 140,000 officers and men, this being about two-thirds of the present British army in India.

SEPTEMBER (sĕp-tĕm'bĕr), the ninth month of the Gregorian year. It was the seventh month in the Roman calendar, the year beginning in March, as did the legal year in England until 1752. The Anglo-Saxons called it Gerst-month, or barley month, since that cereal was their most important crop, and ripens in September where these people dwelt.

SEPTIMIUS SEVERUS, Arch of, the name of a famous triumphal arch in Rome, erected by order of the senate in 203 A. D. It was dedicated to Septimius Severus and his two sons, Geta and Caracalla, and was erected to commemorate the victory over the Arabians and Parthians. Located on the Forum, at the end of the Sacred Way, it is one of the many historic structures of Rome. The arch is 75 feet high, has three passageways, and contains inscriptions and figures to represent scenes in the campaigns of Severus in Western Asia.

SEPTUAGINT (sĕp'tŭ-ă-jĭnt), or **Alexandrian Version**, the name of the earliest Greek translation of the Old Testament. Formerly it was believed that the version was completed in 72 days by that number of men selected by the high priest, six from each tribe, and that the work was done on the island of Pharos. However, this view has been discredited. It is now generally understood that the translation covered considerable time, being completed as late as 100 B. C. The Greek Catholic Church still uses this version, but it has been superseded by other translations in the Roman and in the Protestant churches. However, it is held in high esteem for the criticism of the Hebrew text.

SEQUOIA (sĕ-kwoi'ă), the name of a genus of gigantic trees of the pine family, nearly allied to the bald cypress of the southeastern United States. These trees are so named from the Indian chief Sequoiah, who invented the Cherokee alphabet. Only two species occur, the redwood and the mammoth, both of which are native to California. The *mammoth* may be regarded the

largest of trees, since it attains a height of more than 300 feet and a diameter exceeding thirty feet. Some of the eucalyptuses of Australia attain a greater height, but contain a considerably smaller bulk of wood, since the trunk is much smaller in girth. The sequoia trees are found mostly in groves in the Sierra Nevada Mountains and range from Calaveras County, California, toward the south and southwest about 200 miles. Among the famous groves of these trees is the Mariposa Grove, 16 miles south of the Yosemite Valley. It contains about one hundred giant trees, measuring 40 feet in circumference, and several others measuring about ninety feet. The largest of the trees in this grove is called the Father of the Forest, which has been broken for many years, but its trunk is still 300 feet long and has a diameter of 40 feet. The Mariposa Grove is government property, and these trees are preserved as remarkable wonders of nature. The wood is soft and white when felled, but turns red afterward, and is very durable. It is evident that some of the larger trees now living range in age from 2,000 to 3,000 years.

SERAGLIO (să-ră'lyō), the old palace of the sultans at Constantinople, built by Mohammed II. on the site of the old acropolis. It is situated on an eminence that overlooks the sea, and its inclosing wall has a length of fully nine miles, within which are beautiful gardens, mosques, official buildings, and the harem. It has ample accommodations for 20,000 persons. The Seraglio is not used at present as the residence of the sultan.

SERAPIS (sĕ-ră'pĭs), or **Sarapis**, an ancient god of the Egyptians. This god was introduced in the time of Ptolemy I., who worshiped him with imposing honor. Plutarch and Tacitus



SEQUOIA TREES.

relate that Ptolemy saw the image of a god in a dream, and was commanded to remove it from its place and bring it to Alexandria. Accordingly he sent an expedition to Sinope under the direction of a famous traveler, whence a colossal statue, originally made to represent Jupiter, was brought to Alexandria and declared to personify the god Serapis.

The name Serapis was derived from Osiris and Apis, and is said to have been the appellation given to the bull Apis after death, at the time it was made a god. The statue of Serapis was set up in a splendid temple at Alexandria, known as the Serapeum, to which was afterward joined the celebrated library of Alexandria. This temple was the last place of security held by the pagans when Christianity was introduced, and the worship of Serapis ceased with the destruction of the image by the Christian archbishop in 398 A. D., as ordered by Theodosius. Recent excavations at Memphis and other ancient cities have brought to light numerous remains of statues built to this deity. Various writers recount that 42 temples were built to his honor, but worship in them was largely confined to the Greeks and Romans, the Egyptians as a class never admitting him as a sacred deity.

SERF, a person whose service is attached to the estate on which he lives and with which he may be transferred. Serfdom had a wide foothold in Europe during the Middle Ages under the feudal system, when the condition of serfs was not exactly that of slaves, but resembled it in many respects. Three principal classes of laborers were maintained in most European countries, the freemen, the villeins, and the serfs. Villeins occupied a middle position between the other two classes and could with considerable ease become freemen, but a serf could become free only by purchase or extended military service. However, serfs were not regarded personal or chattel property like slaves, but they could be transferred with the property to other owners. The serfs gradually decreased in number as the conditions of manumission became easier under the general spread of education, and with the adoption of systems that led to social and industrial evolution. Serfdom existed in Scotland as late as the 18th century. The tenant practice prevalent in Ireland is little better than a mild form of serfdom—a condition that may not be overcome until the tillers of the soil become enabled to own the land instead of being required to rent it. Russia abolished serfdom on March 17, 1861, a proclamation being issued at that time by Alexander II.

SERINAGUR (sə-rē'nŭ-gŭr), or **Srinagar**,

a city of India, capital of Kashmir, on the Jhelam River, 175 miles northeast of Lahore. It is situated in a beautiful valley at an elevation of 5,275 feet, on both sides of the river, and has railway facilities and a large river trade. The streets are narrow and poorly improved, and most of the buildings are of brick and timbers. Gardens are cultivated on many of the roofs. The principal buildings include two large mosques, several mission schools, and the central railway station. A short distance east of the city is Lake Dal, about five miles long and three miles wide, made famous in Moore's "Lalla Rookh." This lake and Lake Wular, about 21 miles northwest, are connected by a canal. The natives cultivate vegetables in these lakes on floating rafts, called gardens. Shawls, clothing, utensils, and attar of roses are manufactured in the city. Population, 1906, 124,865.

SEROUS MEMBRANE (sē'rŭs), a delicate tissue in the human body, composed of flattened endothelial cells, normally moistened on the interior side by a serous fluid. It forms a covering or sac around certain organs, serving to allow free-organ action, and is associated with an absorbent system. The chief serous membranes are the two pleurae, inclosing the lungs; the pericardium, surrounding the heart; the peritoneum, lining the abdominal cavity; and the arachnoid, forming the middle of the three membranes enveloping the brain and spinal cord. The diseases to which these membranes are subject include dropsical effusions, morbid growths, hemorrhage, and inflammation, such as pericarditis and pleurisy.

SERPENT CHARMING, the art of influencing vicious and poisonous serpents to the extent that they may be handled without danger. The practice of charming serpents is of great antiquity, and was undoubtedly first practiced by daring persons who sought to inspire awe or gain advantages over the chiefs or their tribe. It is a part of some exhibitions, in which it is practiced to entertain or amuse the spectator. Many people of Asia travel from place to place and make their living by giving entertainments as snake charmers. Those who practice the art influence the serpents by use of the eye, by touch, and in some cases by whistling. In many instances the snakes are first rendered harmless by extracting the fangs, though this is not done by the more skillful serpent charmers.

SERPENTINE (sēr'pĕn-tĭn), a mineral composed of magnesia and silica. It is widely distributed in all parts of the world. Serpentine occurs in all geological ages and forms large beds of primitive rock. The presence of iron

and other impurities give it a great variation in color, which ranges through different shades of purple, red, green, yellow, brown, gray, and sometimes marbled and mottled. It takes a high polish, and is used in making ornamental articles, such as vases, boxes, and pillars. Serpentine may be divided into two general varieties, known as common and precious serpentine. The common class occurs as a rock. It is usually soft, is easily broken, and has serpent-like veins. Precious serpentine is the harder and more beautifully colored, but is of quite rare occurrence. Fine deposits of serpentine rock occur near Baireuth, Germany, in the Shetland Islands, Corsica, and many sections of Canada and the United States.

SERPENTS. See **Snakes.**

SERPENT WORSHIP, or **Ophiolatry,** a form of religious worship. It dates from remote antiquity, and is still practiced to a considerable extent in India and among many savage and semicivilized peoples. Serpent worship is considered quite closely associated with tree worship, which, as a form of religion, rose from the fact that most races of mankind at a certain stage of mental development held the view that trees are the residences or embodiments of spirits or deities. Both are forms of nature worship, against which stern denunciations were made by the Jews, and in classical mythology there is wide mention of sylvan deities, elves, and fairies more or less associated with serpents and trees. Homer mentions the appearance of a serpent at the siege of Troy as an omen of victory to the Greeks, while Plutarch speaks of Alexander as having come from a serpent race. The Zulus of South Africa bring snakes into their homes, giving them the most devoted protection. Many of the American Indians practice serpent worship in various forms. These are only a few instances of many that may be named. The practice of worshiping serpents of different kinds and looking upon them as indicating good or evil, or possessing godlike power, is as old as human history. In India it is connected with Buddhism, even among the higher castes, but as a general rule the practice prevails most extensively among the less intelligent peoples.

SERPULA (sēr'pū-là), a remarkable genus of sea worms. They belong to the tube order. Their tubes are of calcareous formation, by which they are attached to shells or rocks at the bottom of the sea, and some species live in groups with their tubes intertwined. The animal protrudes its head from the wider end of the tube, but on the slightest alarm withdraws completely into the opening. Many species have

been described. Some have highly colored and curiously formed shells. They are extremely sensitive to light, but possess no eyes.

SERUM THERAPY (sēr'rum thēr'à-pÿ), the theory in medical practice which relates to the cultivation of antitoxins in the serum of some animals and its application in the treatment of infectious diseases. The blood of a person suffering with an infectious disease is charged more or less with bacteria, and up to a certain stage their development in the patient increases. Bacteria of this class are known as *toxins*, and the active principles that develop in the serum and destroy the bacteria are known as *antitoxins*. Serum therapy is concerned with preventing the contraction of a disease by a patient as well as furnishing immunity against acquiring it.

Considerable progress has been made in developing the theory within the last few years, especially in the treatment of diphtheria. The antitoxin used in combating this disease is obtained from the serum of animals inoculated with cultures of the Klebs-Loeffler bacillus, and it is applied by injecting it hypodermically into the system of the patient. Treatment in this form is given to render persons immune to the disease as well as to destroy the malignant effect of the bacteria in persons already affected. It has been found that the injection is most effective when made between the shoulder blades. The mortality from diphtheria has been reduced by treatment with antitoxin from 9 to 13 per cent., against 35 to 40 per cent. in cases in which other methods are employed.

Formerly serum therapy was limited to diphtheria, but more recently its field has been extended largely with good results. The mortality from cholera among laborers at Calcutta, India, has been reduced 72 per cent. It has been shown that the application of serum in the treatment of typhoid has been efficient in preventing the contraction of the disease, especially in the army of India and South Africa, where less than one per cent. of the inoculated men contracted the malady, while nearly three per cent. of the uninoculated men fell victims to it. Blood serum taken from horses has been employed with considerable success in combating the bacillus of the plague. According to a report of the Bureau of Animal Industry of the United States Department of Agriculture, it has been possible to largely decrease fatality from swine plague and hog cholera by the use of serum. These contagions result fatally in from 70 to 85 per cent. of the cases, but when treated with serum only 20 per cent. of the animals die.

SERVAL (sēr'val), the name of an animal

found in South Africa, classed as a member of the cat family. The body is from three to four feet long, including the tail, which has a length of fifteen inches. The color is tawny with black spots, the back has two longitudinal bands, and the tail is encircled by rings. It is about the size of the lynx, but not so savage, and the skins are known as tiger cat in the fur trade. The serval may be domesticated if taken when young.

SERVIA (sēr'vī-à), a kingdom in the southern part of Europe, in the northwestern section of the Balkan peninsula. It is bounded on the north by Austria-Hungary, east by Rumania and Bulgaria, south by Turkey, and west by Austria-Hungary. The Drina River forms the western boundary, the Save and the Danube separate it from Austria-Hungary, and it is separated from Rumania by the Danube. The length from east to west is 165 miles, and the breadth from north to south is 150 miles. It has an area of 18,621 square miles.

DESCRIPTION. The surface is generally mountainous, being traversed by ranges of the Carpathian Mountains in the northeast, the Dinaric Alps in the west, and the Balkans in the southeast. The highest elevations are in the Rudnik Mountains, a chain belonging to the Carpathians, which are situated near the center of the country. These highlands have a general elevation of 3,500 feet and culminate in Great Shturaz, height 3,950 feet. Higher altitudes are attained on the southeastern border, where the highlands reach elevations of 7,000 feet above sea level. The country has an abundance of timber, both in the valleys and on the mountain slopes, and the soil is generally fertile. Oak and beech are the predominating forest trees.

The country lies wholly in the basin of the Danube, which carries all the drainage eastward into the Black Sea. Through the central part flows the Morava, the largest interior stream, and its valley contains the largest cultivated area. The Drina, on the western border, receives the inflow from the Jadar. The Timok, which forms part of the boundary of Bulgaria, flows into the Danube. Swampy plains extend along the Save and the Danube in Servia, where the climate is somewhat unhealthful. Rainfall averages 25 inches annually and is sufficient in all sections of the country for the cultivation of crops. In the highlands the climate is considerably colder than in the valleys and lowlands, but as a whole it resembles that of Central Europe rather than that of the region adjacent to the Mediterranean.

AGRICULTURE. Seventy per cent. of the area is productive. Agriculture, though still carried

on without modern processes, is the chief industry. Corn is the principal cereal and the chief food of the people. Practically all the farms are small and tilled by the owners. The principal products, besides corn, are wheat, hemp, flax, tobacco, and fruits, especially pears, prunes, grapes, apples, and peaches. A large majority of the farms have a diversified line of interests, such as fruit growing, general farming, and stock raising. Oxen are used extensively as work animals. Other live stock includes cattle, sheep, goats, swine, and horses. Poultry is grown very extensively. The mulberry tree has been planted in large areas as a means of fostering silkworm culture.

OTHER INDUSTRIES. Though mining is still in a primitive state, some progress has been made in utilizing the deposits of coal, silver, lead, iron, clays, quicksilver, and building stone, all of which abound in considerable quantities. The chief manufactures are carpets, jewelry, embroidery, hardware, wine, machinery, clothing, and utensils. The exports include cereals, wine, wool, live stock, and lumber, and the imports embrace sugar, cotton, and machinery. Austria-Hungary has the greatest share of trade, and next in order are Germany, Russia, and Great Britain. The exports, amounting to \$14,500,000 per year, somewhat exceed the imports. Transportation is facilitated by the Danube and tributary rivers and canals. About 300 miles of river navigation is furnished by the Danube, the Drina, and the Save, and 525 miles of railways are operated, all under ownership and control of the government. The telephone, telegraph, and postal systems are efficiently managed.

GOVERNMENT. The government of Servia is a constitutional monarchy and the king holds his office by right of inheritance. He is assisted by nine ministers, but has large powers in executing the laws and filling the functions of supreme ruler. The national legislature is called the *Skupshтина*, whose membership is elected by the people, and in it is vested the power to approve or reject laws proposed by a council of state. All males over twenty years of age are obliged to serve actively in the army for two years and thereafter to drill short periods annually in the reserve. This gives the nation a total war strength of 225,000 men and a regular army of 20,000 men. It has no navy, but a number of the principal towns are strongly fortified. Greek Orthodox is the state religion, and is controlled by the minister of education and public worship. Practically all Servians belong to the state church, but other faiths are tolerated. A national system of education is maintained,

and attendance at the common schools is compulsory. Admittance is alike free to all in the institutions of higher learning. The school system includes elementary and secondary schools, with articulated higher institutions, including colleges of agriculture, law, medicine, theology, sciences, and military science.

INHABITANTS. The people are Slavs and are known as Serbs or Servians. They are closely related to the Croatians of Austria-Hungary. A large number of these people reside in other countries, including about 250,000 in Montenegro, 1,325,000 in Herzegovina, and 2,340,000 in Austria-Hungary. Belgrade, at the confluence of the Drina and Danube, is the capital and largest city. Nisch, Kragouyévatz, Leskovatz, and ShabatZ are thriving cities. The foreigners include about 35,000 Gypsies and 150,000 Rumanians. Population, 1906, 2,896,785.

LANGUAGE AND LITERATURE. The Servian language is sometimes called the Illyrian, and forms one of the four divisions of the Slavonian tongue, but it is more closely allied to Russian than to Bohemian or Polish. Commercial intercourse with the Italians and adherence to the Greek religion have influenced the language by incorporating a number of Italian and Greek terms, but the dialect has been preserved with remarkable distinctness. It has a considerable literature, mostly poetry and works on theology. Among the most eminent of Servian writers is George Brankovitch (1645-1711), who wrote "History of Servia," a work that records the national events from the origin of the nation to his own time. Little advance was made in the culture of the language until Vuk Stephanovitch, in 1814, published his "Grammar of the Servian Language." He gathered the best poetic productions in the Servian and published them under the title of "Songs of the Servian People." A long list of recent writers may be mentioned in law, lyric and dramatic poetry, jurisprudence, history, and theology. The revival of interest is due to the liberation from Turkish rule and a more general spread of education. The Servians are noted for their love of freedom and personal valor, and they comprise one of the most gifted and progressive classes of the Slavonian peoples.

HISTORY. The history of the region now occupied by Servia dates from the early historic period of Europe. It was anciently inhabited by Thracian or Illyrian races, who became subject to the Romans shortly before the Christian era, and was formed into the province of Moesia. With the decline of Rome it was successively occupied by the Huns, Ostrogoths, and Lombards. About the middle of the 6th century it

reverted to the Byzantine emperors, but in the next century it came into the possession of the Avars. In 638 the Servians moved from the slopes of the Carpathians into Servia and Bosnia, where they became converted to Christianity, and soon after united with the Byzantine rulers to expel the Avars. Their settlements were greatly extended toward the northwest, and about 1060 Michael Bogislav succeeded in expelling foreign claimants and assumed the title of king, receiving at the same time recognition from Pope Gregory VII. Successive wars to maintain independence terminated successfully, and in 1165 Stephen Nemanja founded a dynasty that prevailed two centuries. Stephen Dushan (1336-1356) was the most distinguished monarch of the Nemanja dynasty. He succeeded in defending his dominion against foreign opposition, united under his government the countries of Macedonia, Bulgaria, Thessaly, and Albania, and successfully maintained independence of the advancing Turks. After his death the Turks became more successful, and Lazar I., who had founded a new dynasty in 1375, was not only defeated in the decisive Battle of Kossova in Albania, in 1389, but was slain.

The country kept up a form of independent existence until 1459, when it became a Turkish province under Sultan Mahmud, to remain under Moslem control nearly 200 years. In the meantime it was the scene of many bloody contests between the Turks and Hungarians. In 1718 the greater part of Servia became tributary to Austria by the Peace of Passarovitz, but the Treaty of Belgrade, in 1739, ceded the territory back to Turkey. Turkish oppression was the cause of a number of insurrections. The first of these occurred under the leadership of Czerny George in 1804, who, with the aid of Russia, expelled the Janizaries. The Peace of Bucharest, May 28, 1812, established the independence of the country. War broke out anew in 1813 and terminated successfully for the Turks, while Czerny George became a refugee in Austria.

Milosh Obrenovitch united all of Servia in arms in 1815, and after a long and disastrous war attained victory, being elected prince in 1829. The following year Turkey granted autonomy to Servia and recognized Prince Milosh as hereditary sovereign. He was compelled to abdicate in 1839 in favor of his son, Milan, who was shortly after succeeded by his brother, Michael, but the latter was forced to abdicate in 1842. Alexander Kara-Georgevitch, son of Czerny George, was elected prince, but being a weak ruler he was compelled to abdicate in

1859. Milosh Obrenovitch was recalled, but died soon after and was succeeded by his son, Michael, in 1860, who was assassinated on July 10, 1868, by partisans of Prince Alexander. Milan Obrenovitch, grand-nephew of Milosh, became prince, and in 1876 joined Herzegovina and Montenegro in a war against Turkey, but the Servian forces were defeated in the decisive battle at Alexinatz.

In 1877 Russia declared war against Turkey, and after the fall of Plevna, in the same year, the Servian forces rallied to the support of the Russians. The treaty of peace concluded at Berlin on July 13, 1878, gave Servia its independence, and in 1882 a kingdom was erected with Milan I. on the throne. This sovereign abdicated in favor of his son in 1889 and died in Vienna, Austria, February 11, 1901. His son succeeded him under a regency as Alexander I., and on April 13, 1893, took full charge of the government. He was assassinated in 1903, and Peter Karageorgevitch was proclaimed king. In 1909 the country became involved in a diplomatic controversy with Austria-Hungary, because the latter country proclaimed the annexation of Bosnia and Herzegovina, but Servia finally withdrew the objections.

SESAME (sēs'ā-mē), a genus of plants, many of which are cultivated for their seeds in Asia and Africa. The common sesame, or *Sesamum indicum*, is of the herb order. It grows to a height of from two to three feet, has opposite leaves, and bears pinkish or yellowish flowers. The seeds are valuable, yielding the so-called *gangli oil*. This product has a sweet taste. It is used for food, lighting, and oiling, and will keep for many years without becoming rancid. It is used in some countries as salad oil and in preparing cosmetics. The leaves of the plant yield a gummy substance used for poultices and in preparing a light drink.

SETTER, a breed of dogs originally trained to indicate the presence of game birds by crouching close to the ground, but now usually taught to stand rigid like a pointer. Russian setters have woolly fur and a bearded muzzle, and are noted for their keen scent. The English and Irish setters have narrow muzzles, long ears, silken hair, and a quick, keen eye. The Scotch, or Gordon, setter received its latter name from the Duke of Gordon, who, in 1800, bred a number of these dogs. Its color is a rich black, with tan on the legs, face and chest.

SEVEN PINES. See **Fair Oaks.**

SEVEN SLEEPERS, in legendry, seven Christian youths of Ephesus, who escaped the persecution of Decius by finding safety in a cave. Here they were afterward found by the

enemy, who walled up the entrance to the cave with great stones, that the Christian youths might die of hunger. Instead of succumbing to starvation, they fell into a deep sleep, and in future generations they were entirely forgotten. It is supposed that they were inclosed in the cave in the year 251, and were awakened by some shepherds of Ephesus, who were seeking shelter for their cattle, in 447 A. D. One of their number was immediately sent to buy bread and other articles of food, but on reaching the village he became astonished that the cross had been raised in many places and a different civilization confronted him than he had ever before experienced. On offering to pay the baker with a coin of Decius instead of one bearing the imprint of Theodosius II., who had in the meantime become king, he was placed under arrest, but was released on showing the officers the cave where he and his six companions had slept for 196 years. Theodosius hastened to the spot in order to confirm the report, and was impressed with the truth of the resurrection of the dead. The Seven Sleepers relapsed into a deep sleep immediately after conversing with Theodosius, to be awakened only on the resurrection morn. June 27th has been consecrated to their memory by several Christian churches. A similar legend is current among the Mohammedans.

SEVENTH DAY ADVENTISTS. See **Adventists.**

SEVEN WEEKS' WAR, the name given to the War of 1866 between Prussia and Austria. It was caused by the unsettled conditions in Schleswig-Holstein. Bismarck had wisely planned to consolidate the German states under the leadership of Prussia, and with that end in view concluded an alliance with Italy. When Austria violated the Treaty of Gastian, by which the Schleswig-Holstein question was supposed to have been settled, Prussia was joined by Italy and most of the North German states, while Bavaria, Hanover, Hesse, Saxony, and Württemberg supported Austria. Three armies promptly invaded Austrian territory and defeated an army of Saxons and Austrians in the Battle of Sadowa, or Koniggratz, after which they marched upon Vienna. Archduke Albert, who commanded the Austrian forces in Italy, was compelled to withdraw from Verona to aid in defending the capital. However, the Austrian fleet under Admiral Tegetthoff defeated an Italian fleet under Persano. In the meantime the army of Hanover and the South German states was compelled to surrender, and Austria had no recourse but to sue for peace. The war was ended by the Treaty of Prague,

which incorporated Frankfort, Hanover, Hesse, Nassau, and Schleswig-Holstein with Prussia. By its terms Austria ceased to be a member of the Confederation, and special treaties were made by Prussia with Baden, Bavaria, the Grand Duchy of Hesse, Saxony, and Württemberg.

SEVEN WISE MEN, or **Seven Sages of Greece**, the designation applied to a number of Greek sages, who were devoted to the cultivation of practical wisdom. They lived about 620-548 B. C. Writers attribute to them a number of maxims of prudence and morality, but there is no uniformity among the ancients either as to the names or the sayings of these sages. The list of names and characteristic sayings are usually given as follows:

Bias of Priene in Caria—"Too many workers spoil the work."

Chilon of Sparta—"Know thyself."

Cleobulus of Rhodes—"Moderation is the chief good."

Periander of Corinth—"Forethought in all things."

Pittacus of Mitylene—"Know thy own opportunity."

Solon of Athens—"Nothing in excess."

Thales of Miletus—"Suretyship brings ruin."

SEVEN WONDERS OF THE WORLD, the name applied by ancients to seven monuments, all of which possessed remarkable splendor or magnitude. The term originated in Greece after the time of Alexander the Great, and Philo of Byzantium made them the subject of a descriptive work. These structures included the Hanging Gardens of Semiramis at Babylon, the Pyramids of Egypt, the Temple of Diana at Ephesus, the Colossus of Rhodes, the Pharos of Alexandria, the Statue of Jupiter at Athens by Phidias, and the Mausoleum at Halicarnassus.

SEVEN YEARS' WAR, the famous contest for the possession of Silesia. It was waged by Empress Maria Theresa of Austria against Frederick the Great of Prussia, and continued from 1756 to 1763. Silesia had previously belonged to the Austrian dominions, but was annexed to Prussia at the time of the war for succession to the throne of Austria, and in 1756 the empress took advantage of the circumstance that Frederick the Great was opposed by a number of European powers. She formed an alliance with France and Russia, while Frederick was supported by four of the smaller German states and England. The first decisive battles were fought in Saxony in 1756, when Frederick occupied Dresden and other chief cities of that region. The war continued with varying success, Frederick holding out bravely against an immense opposing army, until the death of Empress Elizabeth of Russia, in 1762, when Peter III. ascended the throne. This sov-

ereign was a great admirer of Frederick. He immediately restored East Prussia to him and sent an army of 15,000 men to his assistance, thus turning the tide in favor of Prussia. The last decisive battle was fought at Wilhelmsthal on June 24, 1762, when the French were defeated and surrendered to the allies of Prussia. War was terminated by the Treaty of Hubertsburg on February 15, 1763, which confirmed the title of the Prussian throne to Silesia. A part of this extended war was carried to India and America by the French and English, the latter phase of it being known in American history as the French and Indian War. The result was that France lost all of Canada and decided advantages in India. See **French and Indian Wars**.

SEVERN (sěv'ěrn), a river of western England, the second largest of that country, being exceeded only by the Thames. It rises in the mountains of Wales, and, after flowing northeast to Shrewsbury, it assumes a circuitous course toward the southwest and flows by a wide mouth into Bristol Channel. The total length is 210 miles, of which 180 miles are navigable, and its basin has an area of 8,575 square miles. Extensive improvements have been made to Worcester, and several canals enlarge its commercial importance. It receives the waters from the Tern, Teme, and Avon rivers. The valley is fertile, and is the seat of many manufacturing cities.

SEVILLE (sě-vil'), a city in Spain, on the Guadalquivir River, capital of the province of Seville, sixty miles northeast of Cadiz. It occupies an imposing site on the east bank of the river, which is crossed by a number of bridges, and is surrounded by walls of Moorish construction. These walls contain 66 towers and may be entered by fifteen gates. Most of the streets are narrow, but in the newer parts considerable improvement has been made by widening them materially and constructing modern forms of architecture. It is an important railroad junction, has substantial pavements in the newer parts, and modern municipal facilities have been introduced to some extent, particularly electric lighting, sewerage, and rapid transit. The chief manufactures are leather, cotton textiles, silk and woolen goods, pottery, tobacco products, machinery, hardware, soap, leather, and utensils. It is important as a port of entry, having a large interior and foreign trade and a moderately spacious harbor.

The city is rich in ancient forms of architecture, the most important being a Gothic cathedral, a handsome Moorish palace, and numerous churches, halls, and hospitals. The bull ring

is a stone structure with a capacity for 15,000 spectators. It has an aqueduct of 410 arches dating from Moorish occupation. Besides the public schools, it has a large number of convents and academies, several institutions of higher learning, and numerous parks and gardens. The cathedral contains the tombs of Ferdinand, the son of Columbus, and Ferdinand III. of Castile, besides a large number of excellent sculptures, carvings, and an organ with 5,400 pipes.

Seville is an ancient city and was called Hispalis by the Romans. No city of Europe contains finer remains of Moorish art and architecture, and none has a more interesting history. In the later part of the Roman period it rose to great importance, and during Vandal and Goth occupation it served as the capital of southern Spain. It fell into Moorish possession in the 8th century, when it rose to a city of 400,000 people, and in 1026 was made the capital of the Moorish kingdom. Ferdinand III. of Castile conquered it in 1248, but it remained the capital of Spain until the reign of Charles V., when that distinction was transferred to Valladolid. The discovery of America gave it an immense trade with the colonies. At that time it rose to the height of its prosperity, but much of its importance was soon after lost by trade centering at Cadiz. The French under Marshal Soult captured the city in 1810 and inflicted much damage, and in 1843 it was forced to surrender to Espartero. Population, 1905, 150,182.

SÈVRES (să'vr'), a town in France, on the Seine River, six miles southwest of Paris. It is noteworthy because of its extensive manufacture of porcelain, being the seat of the large factory removed thence from Vincennes in 1756. Porcelain products of elegant design and beautiful painting are produced here, some of the products being classed among the most valuable in the world. The town was captured by the German army in 1870, when its beautiful porcelain museum was partially destroyed by the bombardment afterward conducted by the French. It was attacked by the troops of the Commune in 1871. Population, 1906, 8,661.

SEWELLEL (sē-wē'lēl'), the name of a small rodent of North America, found in the Pacific coast region from British Columbia to the northern part of California. It somewhat resembles the beaver, but in size is similar to the muskrat. The tail is short, the eyes are small, the body is plump and heavy, and the color is reddish-brown. These animals live in colonies and lay up food for the winter by collecting ferns and the woody parts of plants.

These are carefully dried before being placed in the burrows. Their fur is soft and is used as an article of dress by the Indians.

SEWERAGE (sū'ēr-āj), the method of collecting and removing refuse matter from dwellings and cities. The removal of waste materials and the disposal of them to the best advantage, or with the least possible liability of causing damage, are questions of vast importance. These problems may be solved only by studious investigation of the conditions existing in the locality affected, and the establishment of adequate sewerage systems involves the expenditure of large sums of money. The utility of supplying sanitary and drainage sewers in large towns and cities is apparent, since convenience and health depend upon removing the impurities. This is necessary in order to prevent them from contaminating the atmospheric air and the soil while in a state of decay.

Two general sewerage systems are constructed. In one class both the surface drainage and the sewage are carried in a combined system, while in the other a double system is provided, one for conveying the sewage proper and the other for rain water and surface drainage. Formerly the combined system was used almost exclusively, and where it now exists additional districts are usually drained on the combined plan, since it is difficult to change from one to the other, but towns and cities putting in entirely new systems generally use the separate plan. The advantage arising from the newer mode of construction is that much larger conduits are necessary to convey rain water and surface drainage than are required for the sewage proper, and in many cases surface water can be carried into natural water courses by inexpensive artificial channels. Sewers vary in size from a small pipe to a tunnel large enough to be traversed in a boat, this depending altogether on the size of the district to be drained and the amount of fall that is afforded by the natural aspect of the region. The most common method of sewerage is simple flow by gravity to the nearest river or body of water, but sometimes the configuration of the surface makes pumping necessary to cause or aid the flow. Where such disposition by either of these methods is impracticable the sewage is sometimes filtered on a large scale or is chemically deodorized, or precipitated, the solid part being used in the preparation of fertilizers.

Many of the smaller towns and certain districts in the larger cities employ vitrified clay pipe in constructing sewerage, but where a large quantity of matter must be disposed of tunnels are built of brick or stone. It is aimed to make

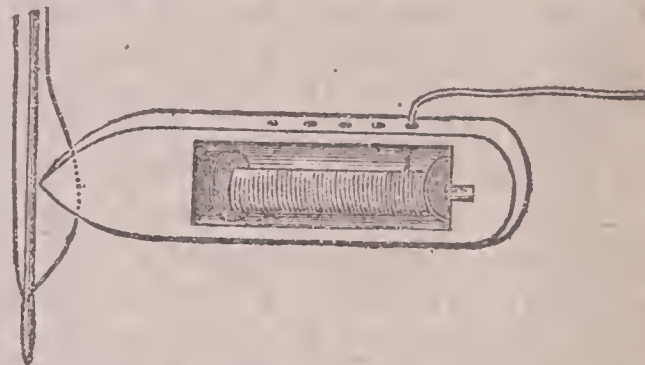
the system proof against leakage, thus preventing a contamination of the soil, for which purpose sealing of asphaltum or some other material is applied. Sewer pipe is usually from 18 to 36 inches in diameter. It is possible to so construct a system with pipes of this kind that practically all leakage can be overcome and provisions usually are made whereby it can be kept clean by flushing with water. Such a system has the advantage that pipes have a greater carriage capacity for a given size than brick sewers, and they may be easily flushed from automatic flush tanks to prevent the formation of gases, by removing sewage before offensive decomposition has time to begin.

In most American cities the sewerage systems are owned by the cities themselves, but there are some under the control of private companies, as in Galveston, Atlantic City, Phoenix, and about twenty others. In many instances the sewage is discharged into the open sea and is carried away by the tides, in others it is discharged into rivers, and in some the sewage is conducted either through channels or carried by conveyance to special localities and utilized for fertilizing, as is the case in Berlin and other European cities. Private ownership of sewerage is not favored to any great extent, since it is thought that the public health may be better protected under public ownership.

SEWING MACHINE, a machine for sewing or stitching fabrics, leather, paper, and other materials. At present many kinds of these machines are sold in the market, all of them having an important use for one or more particular purposes, and serve useful functions in the manufacture of a large variety of products. Formerly all sewing was done by hand with needle and thread, and the first attempt to construct a machine to serve that purpose sought to imitate the hand movements in sewing. The first invention of this class was made by a German named Charles F. Weisenthal, in 1755, who made use of a double-pointed needle, with the eye in the center, and two pairs of pincers alternately seized the needle and passed it above and below the cloth. This principle was utilized later by Heilmann in constructing an embroidering machine that he exhibited in Paris in 1834. Little progress was made in sewing-machine construction until Elias Howe, of Cambridge, Mass., secured a patent, in 1841, for his *lock-stitch* machine. This stitch is now used in most machines, and the royalty received by Howe from manufacturers amounted to about \$2,000,000.

Two threads are used in the lock-stitch, the one being pushed through the cloth by the nee-

dle to form a loop at the lower side, while the other is on a bobbin within a shuttle and is carried through the loop, thus forming a stitch that is securely locked and cannot be undone by pulling. Some machines use a *slide shuttle*, as shown in the illustration, others have an oscillating shuttle, and still others employ a rotating hook that serves the same purpose. Previous to the invention of the lock-stitch, Isaac M. Singer invented a machine that made the *chain-stitch*, but this had the disadvantage that the whole seam became undone if one end of the thread was pulled. To overcome this defect he devised a plan to tie a knot in the seam at every eighth stitch by means of an ingenious mechanism. Allan B. Wilson is the inventor of the rotary hook and bobbin long used in the Wheeler and Wilson machine and he also patented, in 1850, the four-motioned feed, which is now used in nearly all machines. Since then innumerable improvements have been



SLIDE SHUTTLE.

made, and machines are employed for purposes so varied that it is impossible to enumerate more than a few of the more important. These include the sewing of ordinary textiles and carpeting. They embrace machines for sewing buttonholes, stitching shoes, sewing gloves, making satchels and mail bags, and hemming the finest textiles. In the larger clothing factories and book establishments machines are operated largely by electric and steam power. Formerly machines for family use were turned by hand after being fastened to a table by set-screws, but now they are generally mounted on a table, and worked by means of a treadle with the foot. Sewing machines of American manufacture are rated among the best and are sold in all the countries of the world.

SEXTANT (sěks'tant), an instrument used in surveying land and in making nautical observations, especially in measuring the angular distance between two objects. It has superseded the quadrant for observation at sea on account of its greater portability, while for important land surveys the whole circle is preferred. The sextant consists of a frame, usually of metal and ebony, made firm by cross

braces. It has an arc of 60° and by the use of two reflecting mirrors, one silvered entirely and the other silvered over half its surface, it includes a range of 120° . Other parts include an eyepiece, a movable arm to carry the fully silvered mirror and a vernier, and a graduated scale of degrees, minutes, and seconds. This instrument was invented by Sir Isaac Newton in 1672, but many improvements have been made. The arc of a sextant used for astronomical purposes is usually made in the form of a complete circle, when the instrument is known as a *reflecting circle*. In this form greater precision in the observations can be obtained.

SEYCHELLES (să-shĕl'), a group of small islands in the Indian Ocean, about 675 miles northeast of Madagascar. They include about 80 islands and islets, with a total area of 148 square miles. Mahé, the largest of the group, contains 55 square miles. These islands are mountainous, the highest summits being about 3,000 feet above sea level, but coral reefs surround them. The climate is equable, with temperatures ranging from 74° to 88° , and the rainfall is quite excessive, ranging from 90 to 100 inches. Cotton, sugar cane, coffee, rice, tobacco, and fruits are the leading productions. Salt fish, cacao, coffee, and fruits are exported. These islands have been a British possession since 1794, but previous to that time they were colonized by France. Port Victoria, on Mahé, is the seat of government. Only four of the islands are inhabited and the people consist chiefly of Negroes and French Creoles. Population, 1907, 19,834.

SEYMOUR (sĕm'ôr), a city of Indiana, in Jackson County, sixty miles south of Indianapolis. It is an important railroad junction, has a large local and jobbing trade, and is surrounded by a fertile agricultural and dairying country. The principal buildings include the high school, the public library, the Saint Ambrose Academy, and many churches. Electric lighting, pavements, and waterworks are among the improvements. The manufactures include furniture, carriages, harness, ice, flour, woolen goods, and machinery. It is the seat of important railroad machine shops. The place was settled in 1852 and incorporated in 1865. Population, 1900, 6,445; in 1910, 6,305.

SEYMOUR, the name of a noble family of England, so called from Saint-Maur in Normandy, whence the ancestors came to England. In the 13th century they acquired holdings in Monmouthshire and later added to these estates by conquests and by marriage. Sir John Seymour, the head of the family, in 1497, aided in suppressing the Cornish Rebellion. His daugh-

ter, Lady Jane Seymour, became the third wife of Henry VIII. in 1537, the day after the execution of Queen Anne. She was the mother of Edward VI. and was prominent as a sympathizer of the Protestant Reformation. Thomas Seymour, fourth son of Sir John Seymour, married Catherine Parr, the widow of Henry VIII. His brother, Edward Seymour, was rapidly promoted and became Duke of Somerset in 1546. Subsequently he was made protector and governor of the king, but became unpopular and was beheaded on Tower Hill in 1551.

SHAD, a genus of fish of the herring family, but differing from the herrings proper in having a longer and deeper body and notches in the upper jaw. Writers have described a number of species that are more or less widely distributed and all are esteemed for food. They inhabit the sea near the mouths of rivers and ascend the current in the spring to spawn. The *American shad* is caught off the Atlantic coast from the Gulf of Mexico to Newfoundland and has been successfully naturalized and planted in the Pacific. It attains a length of twenty inches and a weight of two to ten pounds. The best known species of Europe are the *allice shad* and the *throat shad*. The former attains a weight of about eight pounds and has fine-flavored flesh, while the latter is smaller, weighing about two pounds, but its flesh is coarser than that of the allice. The shad is bred extensively by the fish commission.

SHADDOCK (shăd'dŭk), a tropical tree of the citrus or orange genus, sometimes called *pompelmoose*. It is cultivated for its fruit. The fruit resembles the orange, having a pale yellow color and a juicy interior of a slightly acid taste. The shaddock is native to Eastern Asia, whence it was brought to America by Captain Shaddock, from whom it was named. Many species have been obtained by propagation, several of which are cultivated in Florida, California, and the West Indies. The *great fruit*, or *pomelo*, bears a fruit about the size of a large orange, while the fruit of the *pompelmoose* has a diameter of about eight inches.

SHADOW, the obscurity of light within an illuminated region, caused by intercepting the passage of light by an opaque body. The depth of a shadow depends upon the distance from the object upon which it is thrown, since the rays of light, by virtue of the properties of reflection, refraction, and dispersion, incline to bend around the opaque object; thus, an increase of the distance between the object and its shadow proportionately increases this action. Shadows also depend upon the intensity of light, as contrast is decidedly more marked in a strong

than in a dim light. It is not infrequent to apply the term *shadow* to an interference of any kind of radiation, as sound shadow and electric shadow. A *sound shadow* is produced by any object that prevents the free passage of sound waves, as the interposition of a wall between the source of the sound waves and the ear. *Electric shadows* are produced in the same way, but it must be borne in mind that interposed objects have a varying effect. For instance, glass forms no material obstruction to light, but interferes with the radiation of heat, while a stone or brick wall obstructs sound waves, but does not hinder the free passage of an electric current.

SHAG, the name frequently applied to several species of the cormorant. It has special reference to the bird which is known as the *crested cormorant*, which has a crest of feathers. See **Cormorant**.

SHAGREEN (shā-grēn'), a kind of leather or parchment prepared from the skins of horses, camels, and other animals. The skins are first cleared of the hair and scraped, after which they are stretched on a frame and covered with the seed of the goosefoot. After moistening and covering with a felt, pressure is applied to sink the seeds into the skins. Subsequently they are shaved down to the level of the depression thus made, and afterward the compressed parts are made to swell by soaking. Prepared in this way, the leather has a peculiar granular appearance, which is often imitated in a common style of bookbinding cloth. It is frequently dyed red with cochineal or green with sal ammoniac and copper filings. A kind of shagreen is made from the skins of various fishes covered with closely set papillae, such as the sharks, rays, and others. These skins are prepared like parchment and are finished by dyeing and smoothing. This class is used in making cases for spectacles, watches, cigars, and edged instruments.

SHAHJEHANPORE (shā-jū-hān'pōor), or **Shahjahanpur**, a city of India, in the North-west Provinces, 96 miles west of Lucknow, with which it is connected by railroads. It is situated on an imposing site near the Gurrah River, contains a number of stately mosques and castles, though these are largely in ruin, and is the center of a large export trade. An American Methodist mission station is located here, by which a number of schools and churches are maintained. Large quantities of sugar, cereals, and live stock are produced in the vicinity. The city was founded in 1647 by Shah Jehan, in whose honor it was named. Population, 1906, 78,963.

SHAKERS (shāk'ērz), a communistic re-

ligious sect, whose official title is United Society of Believers in Christ's Second Appearing. It had its beginning in Manchester, England, where it was first advocated by Ann Lee. She married a blacksmith at an early age and had four children, who died in infancy, and it is perhaps due to this circumstance that she became an advocate of celibacy instead of the marriage state. Her first connection with ministerial work followed soon after coming in contact with Jane Wardlaw, the wife of a tailor, who professed to be a prophetess and that she had received a call to testify to and spread the truth. The Wardlaws were originally Quakers. Claiming a special revelation in regard to the second coming of Christ, they became estranged to some tenets of that faith and found an able advocate in Ann Lee.

The chief doctrine preached by these people was that the end of all things is near at hand, and that Christ would appear in the form of a woman and reign upon the earth. The meetings held in various parts of England attracted such crowds that the Wardlaws and Ann Lee were imprisoned, and, after being released, the latter claimed to have received the important revelation that she had been accepted as the female of Christ. Hence she became recognized as the head of the Shakers and was called Mother Lee. She claimed to be the bride of the Lamb and that she was the queen mentioned by David in the Psalms, but these pretensions were met with ridicule. Subsequently she claimed to have received a revelation to the effect that America was to be the foundation of the coming kingdom and that she and her followers should seek a home there. Accordingly she and seven disciples came to New York, and in 1774 made a settlement at Watervliet, near Albany. Subsequently many other settlements were made.

Among the chief tenets held at present by the Shakers is the dogma that the old law has been abolished and the new dispensation has begun. They believe that the Holy Ghost makes immediate revelations to mankind, that the kingdom of God is now at hand and intercourse between earth and heaven has been restored, that man is freed from all errors except his own and the sin of Adam is atoned, and that heaven is in fact upon earth and will be brightened into its primeval state by labor and love. They hold several tenets in common with the Quakers and with them object to taking oaths, reject sacraments, and refrain from the complicated courtesies of society. Jesus Christ is regarded a divinely inspired man, representing the fatherhood of God, while Ann Lee was

inspired to reveal to mankind the motherhood of God. Worship is conducted in churches, in which the worshippers step in uniform movements while singing hymns and listen to discourses on doctrine and duty. Celibacy is observed strictly. The society is recruited mostly by young men and girls, but married persons may join, who on entering are enjoined to live as brother and sister. The Shakers are noted for their industry, the men engaging in gardening, farming, building, and various arts, while the women attend to the work of education and household duties. All property is held in common and at present is valued at \$10,000,000. The organization has sixteen churches and a membership of 1,650 persons. The members are divided into about thirty families, ranging from five to one hundred persons in each, but the Mount Lebanon, N. Y., society is by far the most important. Most of the communities are in the New England states, but there are families of Shakers in Ohio, New York, Georgia, and Kentucky.

SHALE, a class of rock, so named from its tendency to scale into thin sheets. These rocks were formed from sediments deposited by waters and afterward hardened, and are found in any age depositing silt that has not been disturbed by metamorphic action. A wide range is found in the color and composition of shale. Among the chief kinds are the calcareous, sandy, carbonaceous, and bituminous. The last mentioned yields naphtha, alum, paraffin, and other oils of importance commercially. Many finely preserved fossil remains are found in shales, especially those occurring with coal deposits.

SHAMANISM (shä'män-iz'm), the religion of a large number of people in Asia and the eastern part of Europe, usually classed with idol worship. Though it has no fixed idols, it embraces a number of fetishes and ancestral images. The priest, known as the *Shaman*, has charge of certain ceremonies, such as sacrifices and incantations. These are practiced for the purpose of securing oracles and to purify the houses from defilement. The Shamanists believe in one God, whom they worship as the Supreme Being, and they hold to the view that the evil spirits of the lower world are sufficiently powerful to injure man, hence they regard it necessary to use magical rites and spells to avert their harmful influences. Shamanism is practiced most extensively in the northwestern part of Asia and the adherents consist chiefly of Tunguses, Turks, Finns, Hungarians, and Mongolians.

SHAMOKIN (shä-mō'kin), a borough of

eastern Pennsylvania, in Northumberland County, about twelve miles south of Danville, on the Pennsylvania and the Philadelphia and Reading railroads. The surrounding country produces cereals, fruits, and anthracite coal. The noteworthy buildings include the public library, the high school, a parochial school, and many fine churches. Waterworks, electric railways, and sanitary sewerage are among the improvements. Among the manufactures are powder, earthenware, machinery, cigars, and dairy products. It was platted in 1835 and incorporated in 1864. Population, 1910, 19,588.

SHAMROCK (shäm'rök), a plant bearing three leaflets, held memorable as the national emblem of Ireland. Some think it is the wood sorrel, but the white clover is the one more generally used. It is said that Saint Patrick selected a trefoil plant, that is, one having a three-parted leaf, to illustrate the doctrine of the Trinity, hence the shamrock was made the national emblem. The plant commonly sold in Dublin on Saint Patrick's Day, March 17, is the yellow trefoil. A green-colored imitation is sold on that festival in many cities of America.

SHANGHAI (shäng-hä'í), a seaport city of China, on the Hwangpoo River, twelve miles from the mouth of the Yangtse-kiang. The city is divided into two parts, the Chinese city proper and the portion occupied by foreigners. Walls 24 feet high inclose the Chinese part of the city, which may be entered by six gates. Many of the streets are quite narrow and dirty, while the architecture is generally of an inferior kind. The part of the city occupied by foreigners lies north of the Chinese walls. It is well paved, is lighted by gas and electricity, and has numerous other modern facilities, including rapid transit. Many nationalities are represented in the part occupied by foreigners, but the majority are Italians, Americans, Germans, English, and French, and the government of this portion of the city is distinct from that of the Chinese part. It has a number of excellent buildings, including a fine cathedral, consular and municipal offices, hospitals, churches, and several educational institutions.

Shanghai has manufactures of clothing, wearing apparel, sailing vessels, earthenware, utensils, fans, and textiles. The harbor is safe and commodious, having many extensive quay improvements and dry docks. It has an immense interior and foreign trade in rice, silk, tea, cotton, hemp, wheat, paper, sugar, chemicals, fruit, oils, tobacco products, wool, metals, and opium. A large share of the export trade is transacted with America, Japan, Germany, Great

Britain, France, and Russia. The total annual value of the export and import trade is about \$275,000,000. Shanghai dates from remote antiquity, but its importance as a trade center began in 1843, when it was opened as one of the five treaty ports and for unrestricted settlements. The first railroad of China was opened here in 1876, but it was soon after purchased and torn up by native authorities. Population, 1908, 615,580.

SHANNON (shän'nün), the largest river in Ireland, which rises at the western base of the Cuilcagh Mountains, and after a southwesterly course of 250 miles enters the Atlantic Ocean. It flows through a number of loughs or lakes, among them Allen, Doburg, Bofin, Ree, and Derg, and from Limerick it forms a broad estuary 70 miles in length. The Shannon is navigable for large vessels to Limerick and for small craft as far as Athlone. It is connected with Dublin by two canals. Among its affluents are the Suck, Foyle, Fergus, and Brosna.

SHANS (shänz), or **Laos**, a group of native tribes occupying a region of Asia that lies between China, Siam, and Burmah, and who maintain a semi-independent form of government. The Shans and Laos are closely related to the Siamese. They so nearly resemble each other that little distinction is usually made between them. They are early descendants from the Chinese, their ancestors having settled in the valley of the Irrawaddy about the 6th century. The region occupied by them is formed of numerous fertile valleys which contain productive fields and valuable forests, while the intervening ridges are noted for their deposits of petroleum, copper, coal, gold, silver, and other minerals. Their country embraces a number of states, which are governed by a chief and a council, the northern states being tributary to Burmah and the southern to Siam, but there is a considerable Shan population in the adjoining region of China. The people are skilled as manufacturers of jewelry, metalware, carpets, and various textiles. They carry on a considerable trade in these products, timber, and live stock. The Shans are quite industrious, giving marked attention to the cultivation of rice, sweet potatoes, the poppy, maize, melons, pepper, and fruits. They are adherents to the Buddhist faith. Serfdom is an extensive institution and slavery of a mild form exists in some of the states. Xieng Mai is the principal city and the chief center of political influence. The Shan population included in Siam is estimated

at 1,500,000. Probably an equal number resides in China and Burmah.

SHARI (shä'rê), a river of Central Africa, the most important flowing into Lake Tchad. It rises north of the Congo Free State by several branches and, after a course of 700 miles toward the northwest, enters the lake by several mouths. The Shari flows through a region containing fine forests. In its vicinity are many wild animals, such as birds and hippopotami.

SHARK, an extensive genus of fishes of the ray family, found widely distributed in the ocean, but most abundantly within the tropics.



1, Hammerhead Shark; 2, Great Blue Shark.

The body is elongated in most species, the tail is thick and fleshy, and the teeth are generally large, sharp, and formed for cutting. The skin is scaleless, but usually is very rough with thornlike tubercles, and is used in making shagreen. They swim with great rapidity at long distances, often pursuing ships for the sake of securing the offal and waste materials thrown overboard. Some deep-sea species attain an enormous size and are noted for their voracity in devouring other forms of sea life. All species are more or less destructive of food fishes and do immense damage to the fisheries. The most powerful of the man-eating sharks is the *white shark*, or *man-eater*, of the warm seas. It is found in the waters off the southerly coasts of the United States, where it attains a length of forty feet. It scents food for some distance and is readily attracted by blood or decomposing bodies. Other large species of sharks are the *tiger shark*, the *blue shark*, the *hammerhead shark*, and the *common dusky shark*. The flesh of some species is eaten, the liver yields an oil, and the hide is serviceable in polishing fine-grained wood and in covering the hilts of swords to make the grasp firmer.

SHARON (shâr'ün), a borough of Pennsylvania, in Mercer County, on the Shenango

River, 75 miles northwest of Pittsburg. It is on the Erie, the Pennsylvania, and the Lake Shore and Michigan Southern railroads. Large interests are vested in coal mining and iron manufacturing. The principal buildings include the high school, the public library, the Hall Institute, and the Saint Scholastica Academy. Among the products of the factories are flour, boilers, nails, lumber products, furnaces, and machinery. Sharon was settled in 1795 and incorporated in 1841. Population, 1910, 15,270.

SHARPSBURG (shärps'bûrg), a borough of Pennsylvania, in Allegheny County, five miles northeast of Pittsburg, on the Allegheny River. It has communication by the Pennsylvania and the Pittsburg and Western railroads and is surrounded by a productive coal and iron mining region. The manufactures include brick, glass, machinery, and lubricating oil. Electric lighting, waterworks, and a public library are among the public utilities. It has several fine public schools and churches. The region was first settled in 1826 and the borough, so named from James Sharp, was incorporated in 1841. Population, 1900, 6,842; in 1910, 8,153.

SHASTA (shäs'tà), **Mount**, an elevated peak of California, near the northern boundary of the State in the Sierra Nevada Mountains. It has a height of 14,380 feet. Mount Shasta is an extinct volcano and has several craters, the largest of which is 2,500 feet deep and a mile in diameter. Other features include several glaciers, a number of hot springs, and an abundance of snow at the summit. The lower slopes are well wooded.

SHAWL, a garment or wrap worn as an outside covering of the person, generally used by women, but in some countries also by men, as among the Scotch Highlanders. Garments of this class have been used as apparel from remote antiquity, but they were not generally introduced until about the middle of the 16th century, when the celebrated cashmere shawls became an important article of commerce. They are usually made of a square of cloth or as a large, broad scarf, and the materials consist of wool, cotton, silk, hair, lace, or a mixture of fibers. Cashmere shawls made of the under wool of the cashmere goat of Tibet were the first worn in Europe, and their designs have been imitated in woven shawls. The cashmere shawls made in Tibet and India are often valued as high as \$1,500, the price being high because of the fine material used and the work being done with the greatest care by hand, some requiring six months or more for completion. At present there are extensive manufactories producing shawls in Canada and the United

States, particularly at Lowell, Mass., and other cities of the eastern and middle states. They are an important product in many countries of Europe.

SHAWNEE (shā-nē'), a city of Oklahoma, in Pottawatomie County, 38 miles southeast of Oklahoma City. It is on the Missouri, Kansas and Texas, the Chicago, Rock Island and Pacific, and the Atchison, Topeka and Santa Fé railroads. The surrounding country is fertile, producing cereals, grasses, and fruits. Among the noteworthy buildings are the high school, the public library, and many churches and business houses. It has a large trade in live stock, grain, and merchandise. The industries include grain elevators, stock yards, cotton-seed oil mills, and machine shops. Population, 1907, 10,955; in 1910, 12,474.

SHAWNEES, an Indian tribe of North America, belonging to the Algonquin family. They were driven westward from New York by the Iroquois, but joined the French against the English, and later aided Pontiac until the peace of 1786. Subsequently they took part in the Miami War, but were reduced by General Wayne and concluded peace in 1795. In 1812 a part of the tribe joined the English, but later they moved to Missouri and finally to Kansas, whence a number entered Indian Territory, now Oklahoma, in 1854.

SHEARS, an instrument used for cutting various materials, such as cloth, cardboard, and metal. It consists of two blades, commonly with bevel edges and connected by a pivot, or has blades joined to a spring handle. Small instruments of this kind are usually called *scissors* and are intended for cutting thinner or finer substances. The wool is cut from sheep by means of shears. Instruments of this kind intended for cutting heavy rods or metal flakes are operated by steam or electric machinery.

SHEARWATER (shēr'wā-tēr), or **Hagden**, a genus of web-footed birds of the petrel family, found widely distributed over the seas. They are about the size of a pigeon, have a brownish color above and white beneath, and are usually seen at no great distance from land, to which they resort only in the breeding season. A single white egg is laid in a hole underground and the young are clothed with thick, long down. Among the different species are the *sooty shearwater* of the North Atlantic, the *great shearwater* of Greenland and Iceland, the *manx shearwater* of Western Europe, and the *dusky shearwater* native to the West Indies. The young are usually fat and considered a favorite food. The great shearwater is about 20 inches long and has an alar extent of 45 inches.

It associates with the fulmars and in walking has the shambling movement of the duck.

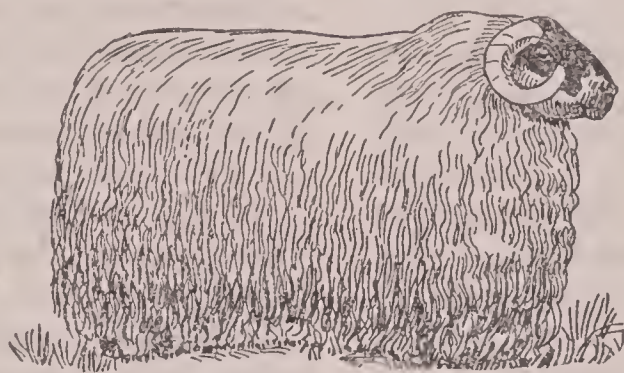
SHEBOYGAN (shê-boi'gan), a city in Wisconsin, the county seat of Sheboygan County, 50 miles north of Milwaukee. It occupies a fine site on Lake Michigan, near the mouth of the Sheboygan River, and has communication by the Chicago and Northwestern Railroad. Lines of steamboats communicate with the leading ports on the Great Lakes. Among the principal buildings are the county courthouse, the Federal building, the public library, the Saint Nicholas Hospital, the Sheboygan Home for the Friendless, an insane asylum, and Lutheran and Roman Catholic parochial schools. The manufactures include furniture, leather, flour, earthenware, lumber products, machinery, wagons, and shoes. It has a large wholesale trade in manufactures, lumber, fish, and agricultural products. The surrounding country is fertile, yielding cereals, grasses,

they were introduced into Western Europe before the historic period, but it is thought that their nativity is in the mountain regions of Asia. Wild sheep are essentially mountain animals, several species being still found in many sections of Central Asia and various parts of Africa, but animals of the wild stock are much smaller and have greatly inferior wools to the native and cultivated species. They are gregarious both in the wild and domesticated state. The ram is noted for its strong forehead, with which it is able to butt with considerable force against a foe.

Sheep culture was first introduced into America in 1609, and rapidly developed as an extensive industry, largely for the reason that sheep may be kept profitably on rough lands of little service except for pasturage, and because they are able to endure extremes of temperature. The ewe frequently brings forth twins, but usually only one at a birth, and the lambing



MERINO RAM.



BLACKFACED HIGHLAND RAM.



CHEVIOT EWE.

and vegetables. It was settled in 1836 and incorporated as a city in 1853. Population, 1905, 24,026; in 1910, 26,398.

SHEEP, an important and useful class of ruminant animals, which are closely allied to the goat, but differ from it in having somewhat twisted horns with transverse ridges. The horns are hollow, and sometimes they are wanting in the females. They are destitute of a beard and the strong odor in the male goats. Few animals possess greater value to man than do sheep, since their flesh is a nutritious food, the skin is useful for leather, parchment, and robes, the wool is of value in making staple clothing, and the milk is used for making butter and cheese in some countries. The flesh of the young is *lamb*, of the adult, *mutton*. The male sheep is called a *ram*, the female is designated a *ewe*, the young is termed a *lamb*, and a company is called a *flock*.

Sheep have been domesticated from remote antiquity, Abel being mentioned in Genesis as a keeper of flocks of sheep. It is impossible to ascertain whence the domestic stock came, since

season occurs generally in the early spring. About 90 per cent. of the sheep reared in the United States are Merinos, this grade being noted for its silky and fine wool. It was first introduced from Spain in 1801. Other grades of sheep include the Southdown, Shropshire, Cheviot, Delaine, Dorset horn, Leicester, Hampshire down, Lincoln, Cotswold, Rambouillet, Silesian, and Saxon. The *broad-tail sheep* of Asia is remarkable for its large tail, which often weighs from seventy to eighty pounds, and is considered a great delicacy for food. It is protected by the shepherd, who attaches to it a small board on rough wheels to prevent it from being injured by dragging on the ground. The *Wallachian sheep* is noted for the size of its horns, and the *Iceland sheep* for having from three to five horns. Among the most valuable species are the *Astrachan* and *Circassian* sheep, which yield the famous Astrachan wool. The most extensive development of the sheep industry in the United States is in the arid regions of the West, but there are large interests in sheep rearing in New York, Ohio, Pennsylvania,

and other central states. About 9,250,000 head are slaughtered annually in the United States. Ontario, New Brunswick, and Alberta have large interests in rearing sheep. The number of head in Canada is reported at 2,750,500. Australia, Central Asia, and various parts of Europe are among the principal sheep-growing regions of foreign countries. See **Wool**.

SHEEPSHEAD, a spiny-rayed food fish common to the Atlantic coast of North America. It is so named from the shape and color of its head, is highly esteemed for the table, and is caught by nets. The size is from twenty to thirty inches and the weight ranges from eight to ten pounds. The food of the sheepshead consists of shellfish and crustaceans, which it crushes with its teeth. Among the allied species are the butterfish, the moonfish, and the freshwater drum. The moonfish has a light gray color, a short and thick body, and a length of about twenty inches. It is caught chiefly in nets, since it is skilled in biting off the line with its sharp incisors.

SHEEPTICK, an insect belonging to the family of horse flies, often troublesome to sheep. It is wingless, has a flattened body and a long proboscis and broad head, and is parasitic on the body of sheep. The female attaches its eggs to the wool of the sheep, from which the young develop in a short time. They soon begin to extract blood by fixing the head in the skin of the sheep, often forming a large tumor. These pests are destroyed by dipping the sheep into various poisonous solutions. Sheep louse is another name for the same insect.

SHEFFIELD (shĕf'fĕld), a city of England, in Yorkshire, at the confluence of the Don and Sheaf rivers, 145 miles northwest of London. It is important as a railroad junction, has regularly platted and well-improved streets, and occupies an imposing site. Sheffield has extensive canal connections; the Don River was made navigable as early as 1751. Among the notable buildings is the Church of Saint Peter, dating from the reign of Henry I., Saint Mary's Church, Saint George's Museum, Wesley College, Firth College, Rannoor College, and the Church of England Educational Institute. The city is beautified by many fine monuments, statues, and gardens. It has a large number of public schools, numerous hospitals and charitable institutions, and many institutes devoted to arts, sciences, and secondary learning. Among the manufactures are cotton textiles, woolen and silk goods, vehicles, buttons, hardware, cutlery, armor plate, railroad supplies, and engines. The most noted manufactured products are different forms of cutlery, these having existed

in the city since 1620, when Cutler's Company was organized.

Sheffield was founded by the Saxons, but its site had been used as a Roman station for many years. Edward I. granted a charter in 1296. Chaucer mentions the town as an important center for the manufacture of cutlery. Mary, Queen of Scots, was imprisoned for fourteen years in the castle maintained in the time of Queen Elizabeth, when the castle was known as the Sheffield Manor house. However, its importance as a trade and manufacturing center dates only from the early part of the last century, being greatly augmented by the building of railroads and other improvements. It was chartered as a city in 1893. Five members represent it in Parliament. Population, 1907, 455,453.

SHEIK (shĕk), meaning the *eldest*, the title of the chief of an Arab tribe and of various dignitaries among the Mohammedans. It has special reference to the heads of monasteries and to the higher order of religious preachers, as the mufti of Constantinople, who is sometimes called *Sheik ul-Isma*, which signifies chief of the true believers. Many sheiks claim a long line of ancestors, including the sheik of Mecca, who receives presents from caravans in consideration of his supposed descent from Mohammed.

SHEKEL (shĕk'1), the Hebrew unit of weight and of money. It was probably equal to about half an ounce avoirdupois, or about 218 grains. The value of the silver shekel is usually stated to have been from 50 to 60 cents, while the golden shekel was of half this weight and had a value of \$4.55. Both as money and as a weight the shekel was divided into the *beha*, *reba*, and *gerah*, valued respectively one-half, one-fourth, and one-twentieth of a shekel.

SHELBYVILLE (shĕl'bĭ-vĭl), a city in Indiana, county seat of Shelby County, on the Big Blue River, 25 miles southeast of Indianapolis. It is on the Pittsburg, Cincinnati, Chicago and Saint Louis, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads, and is surrounded by a fertile farming and dairying country. The notable buildings include the county courthouse, the public library, the city hall, the high school, and many churches. Forest Hill Cemetery is a fine burial ground. Among the manufactures are flour, ice, carriages, tobacco products, bicycles, machinery, and furniture. Natural gas is obtained in its vicinity. It has a large trade in farm produce and merchandise. Population, 1900, 7,169; in 1910, 9,500.

SHELDRAKE (shĕl'drāk), the common name of a class of ducks usually regarded a

connecting link between geese and ducks. They are native to the Eastern Hemisphere. The head and neck are dark glossy-green with a white collar beneath, and under this is a chestnut color that extends over the upper part of the back. The rest of the plumage is white with black and greenish markings. They frequent sandy coasts, breeding in a burrow, often that of



SHELDRAKE.

the rabbit. They lay about twelve or fourteen eggs, which are nutritious food. The sexes are quite alike in plumage, but the male is somewhat the larger. These ducks, though quite shy, are capable of being domesticated. Large numbers are hunted

for their eggs and down in the Black, Caspian, Mediterranean, and other seas. Besides the *common sheldrake*, there are the *ruddy sheldrake* of Barbary and the *chestnut sheldrake* of Australia. An allied species common to the United States is sometimes called sheldrake, but it is more properly a *red merganser*.

SHELL, the hard covering of many invertebrate animals. It serves to encase the soft and vulnerable bodies of certain invertebrates, but the term is also applied to the covering of some part of it and to the outer envelope of an egg. Many classes of shells occur in the animal kingdom, varying in size from minute microscopic organisms to large formations weighing 500 pounds. All shells possess a more or less distinct organic structure, which in some animals resembles true skin, while in others it is quite like the epidermis of the higher animals. The shells of many groups of mollusks differ so materially that it is often possible to determine the family, and in some cases even the species, by examining small fragments of their shells, this being true both in fossil and recent specimens. Their composition consists usually of calcium carbonate and albumen, and the shell formation gradually thickens by the addition of successive layers as the animal grows from infancy to maturity.

Shells are known as porcelain or pearly, according to their constituency. Those having more lime than albumen form the hard *porcelain shells*, while those having consecutive layers of albumen and lime constitute *pearly shells*, so called from their resemblance to mother-of-pearl. The two classes as to form include the univalve and bivalve shells. *Univalves* are those which have only one part, such

as the shells of snails; *bivalves* are formed of two parts joined together by a hinge, like those of the clam and oyster. Many forms are included in both classes, but bivalves are largely pearly shells and univalves are mostly porcelain. Shells are useful for many purposes, among them for ornaments, buttons, and handles for edged tools. In some countries they are burned into lime and used for fertilizing land.

SHELL, a hollow metallic projectile filled with an explosive, which is fired either by a time fuse or by percussion. Shells were first invented in 1480, when they were made largely of cast iron and fired as bombs from mortars, and as such were successfully employed by the Turks at the siege of Rhodes in 1522. They came into general use by the middle of the 17th century, but since then many new and useful improvements have been made. Those of cast iron, intended for mortars and smoothbore cannon, are spherical in form, but elongated and cylindrical shells are generally used in rifled guns. When fired from a rifled gun, they take a rotary motion from the grooves, thus insuring truer carriage. The *common shell* is a hollow projectile charged with powder and used to destroy masonry and earthworks, but *Shrapnel shells*, so named for the inventor, contain bullets and fragments of iron in addition to a charge, and when set on fire release the contents with great destruction. Various modifications of these two classes are made, such as *segment shells*, containing iron segments and powder, and *carcases*, containing material designed to set on fire the buildings or objects against which they are thrown.

SHELL-LAC (shě'lăk). See **Lac**.

SHENANDOAH (shě-nā-dō'ā), a borough of Pennsylvania, in Schuylkill County, 138 miles northwest of Philadelphia. It is on the Lehigh, the Pennsylvania, and the Philadelphia and Reading railroads. The anthracite coal region in the vicinity produces annually about 1,500,000 tons. The notable buildings include the public library, the high school, the townhall, the Greek Catholic church, and many fine churches. Among the manufactures are machinery, utensils, spirituous liquors, hats and caps, hardware, and vehicles. It has sanitary sewerage, public waterworks, and electric street railways. The place was platted in 1862 and incorporated in 1866. Population, 1900, 20,321; in 1910, 25,774.

SHENANDOAH, a river of Virginia, which rises by two branches in Augusta County and flows toward the northeast, joining the Potomac at Harper's Ferry. The Shenandoah valley lies between the Blue Ridge and the Alleghenies, and is one of the richest sections of the

State. The river has a total length of 170 miles and is navigable for a hundred miles from its mouth. Many notable events occurred in the valley of the Shenandoah during the Civil War. General Sherman devastated it in 1864.

SHEOL (shē'ōl), a word used frequently in the Old Testament and by some writers, being equivalent to the word *hell*, or the *Hades* in classical Greek literature. The words *pit*, *grave*, and *hell* take its place in the Revised Version of the Bible, but the last term is used only once. Sheol signifies a cave or tomb for the departed spirits. See **Hades**.

SHEPHERD DOG, a breed of dogs, usually classed with the wolf species. The size is medium, the tail is long and bushy, and the muzzle is quite sharp. Dogs of this breed are noted for their bright eyes and high grade of intelligence. They may be trained to watch and drive flocks and herds without being accompanied by the master. Dogs of this class are used extensively to attend sheep in mountainous countries, and are popular as farm dogs to drive cattle. The *Scotch collie* is a celebrated species of this breed.

SHEPHERD'S PURSE, a widely distributed weed of the Temperate zones, where it prevails in abundance along roadsides and in fields and pastures. The plant is an annual, has simple leaves and small white flowers, and bears its seed in a pod resembling a purse, hence its name.

SHERBROOKE (shēr'brōok), a city in Quebec, capital of Sherbrooke County, eighty miles east of Montreal, at the confluence of the Magog and Saint Francis rivers. It is on the Canadian Pacific, the Grand Trunk, the Quebec Central, and the Boston and Maine railways. The principal buildings include the county courthouse, the public library, the post office, the high school, and the Eastern Township Bank. It has manufactures of woolen goods, flour, cigars, hardware, clothing, and lumber products. In the vicinity are iron, asbestos, copper, and chrome deposits. It has a large trade in lumber, paper pulp, asbestos, minerals, and merchandise. A large proportion of the inhabitants are French-Canadians. Population, 1907, 15,286.

SHERIDAN (shēr'i-dan), a city of Wyoming, county seat of Sheridan County, 175 miles northwest of Newcastle, on the Chicago, Burlington and Quincy Railway. It is surrounded by a fertile farming and coal-mining region and has a large trade in merchandise and live stock. The principal buildings include those of the county, the high school, and a college. It has manufactures of brick, clothing, and farm machinery. Population, 1910, 8,408.

SHERIFF (shēr'if), the chief administrative officer of a county, both in Great Britain and the United States. The duties relate to the execution of civil and criminal processes. They include the maintenance of peace and order and the attendance upon courts as administrative officer. In most cases the sheriff is elected by direct vote of the people, but in some instances this officer is appointed. He is required to give a bond for the faithful performance of his duties. In the more populous counties he has one or more deputies, for whose official acts he is civilly liable. The sheriff originally exercised judicial authority in England and Scotland, where he presided over the common-law county court, and twice a year he made a circuit to the subdivisions of his shire, known as the *sheriff's tour*.

SHERMAN (shēr'man), a city in Texas, county seat of Grayson County, 65 miles north of Dallas and 12 miles south of the Red River. Communication is furnished by the Missouri, Kansas and Texas, the Texas and Pacific, the Atchison, Topeka and Santa Fé, and other railroads. It is surrounded by a rich cotton, grain, and live-stock country. The manufactures include flour, cotton-seed oil, cordage, furniture, tobacco products, vehicles, ice, brooms, machinery, and farming implements. It has electric lights and street railways, public waterworks, pavements, and numerous schools and churches. Sherman is the seat of Austin College, Sherman Institute, North Texas Female College, Saint Joseph's Academy, and several other institutions of learning. It has a fine courthouse, built of brick and stone. The place was settled in 1848 and incorporated in 1895. Population, 1900, 10,243; in 1910, 12,412.

SHERRY (shēr'rŷ). See **Wine**.

SHERWOOD FOREST, a hilly region of England, in Nottinghamshire. Formerly fine forests covered the region, which is about twenty-five miles long and seven miles wide, but it is now largely cleared and occupied by farms, gardens, and pastures. Sherwood Forest is the region where Robin Hood and his followers enacted many marauding exploits.

SHETLAND (shēt'land), an island group north of Scotland, situated about fifty miles northeast of the Orkney Islands, forming a county of Scotland. About 100 islands are included in the group. All are more or less rocky, with precipitous shores in many places. They have an area of 325 square miles. The three chief islands are Mainland, Yell, and Unst, but 26 others are inhabited. Dry and extreme cold characterize the winter, when the days are only a few hours long, but the summers are warm.

and moist. The total population of the group is 28,695. Lerwick is the principal town and seaport. It has the public offices, law courts, a customhouse, and a population of 4,154.

Native timber is not found in the islands, but forestry is promoted. Fishing is the principal industry. Considerable interests are vested in rearing cattle, horses, sheep, and poultry. The soil products include oats, turnips, hay, potatoes, and garden vegetables. Among the chief exports are salted fish, sheep, eggs, and cattle. The islands are particularly famous for the rearing of Shetland ponies. Deposits of iron, copper, sulphur, and sandstone abound. The manufactures include woolen goods, fishing supplies, fish oil, cured fish, and utensils. These islands were known to the Romans as the Ultima Thule, and long formed a possession of Scandinavia. The people still speak a dialect largely mixed with Norse words. They are a sober, intelligent, and industrious class.

SHIBBOLETH (shĭb'bō-lĕth), a test word mentioned in Judges xii., 6. It was used as a criterion by Jephthah and the Gileadites to test the Ephraimites after their victory over the latter. The Ephraimites were easily known by omitting the sound of *sh*, and pronouncing the word *sibboleth* instead. It is still used in several modern tongues to test the speech and manners of certain social classes.

SHIELDS (shĕldz), **South**, a city in England, at the mouth of the Tyne River, eight miles northeast of Newcastle-on-the-Tyne. Opposite the city are North Shields and Tyne-mouth, with which it is connected by steam ferry. It has railroad and steamboat facilities, and an extensive trade in coal, earthenware, and food stuffs. Among the noteworthy buildings are the townhall, the public library, the marine school, and the public museum. The manufactures include cordage, sailing vessels, anchors, earthenware, chemicals, glass, steamboilers, and machinery. The harbor is protected by an extensive breakwater and has large docks for repairing ships. A military post was established on its site by the Romans, but its prosperity dates from the development of its salt works in 1489, and its modern enterprise from the building of railroads in the middle of the last century. Population, 1907, 113,640.

SHIITES (shĕ'īts), a denomination of the Mohammedan religion, constituting the most numerous branch in Islam. They reject the *Sunna*, the law held by the Sunnites, and are followers of Ali, the son-in-law of Mohammed, whom they look upon as the first lawful successor of the Prophet. Persia is the only nation in which the Shiites predominate, but they are

quite numerous in India, the southern part of Arabia, and among the Tartars. In practice they are superstitious, and their ministers are of the dervish type. They are inclined to separate religion from ethics, and are less orthodox than the Sunnites, but the two sects stand together as Moslems against the Unbelievers.

SHILLING, a British silver coin, equivalent to 24.3 cents in the money of Canada and the United States. The shilling consists of 12 pence, or one-twentieth of a pound sterling. The shilling was equal to a certain number of pennies prior to the time of Henry VII., but the number was fixed at twelve as early as the time of the Conqueror. In the colonial times of America the value varied greatly. At present the term shilling is applied locally in the United States to 12½ cents, two being equal to 25 cents, popularly called *two bits* in some sections.

SHILOH (shĭ'lō), an ancient town of Palestine, in the region occupied by the tribe of Ephraim. It was the sanctuary of the ark in the priesthood of Eli and Samuel, when it formed a religious center of influence. The Philistines destroyed it after the disastrous Battle of Ebenezer. Its site is thought to be occupied by the modern village of Seilun.

SHILOH, Battle of, an important engagement of the Civil War, so named from a church about two miles west of Pittsburg Landing, on the Tennessee River. The Union army of 40,000 men was commanded by General Grant and the Confederate of 45,000, by Generals Johnston and Beauregard. General Grant reached Pittsburg Landing with his army, and on April 6 was attacked by the Confederates, the latter driving divisions of the Union army under Generals Sherman and McClernand back with great loss, but in the afternoon General Johnston was killed and the Confederates retreated. General Buell joined Grant with 7,000 men the next morning, when the Union army assumed the offensive, and in the afternoon began to rout the Confederates and force them to make a final retreat. The Federals lost about 13,500 and the Confederates about 14,000. This engagement is also called the Battle of Pittsburg Landing.

SHINTOISM (shĭn'tō-izm), one of the chief religions of Japan, formerly the universal religion of that country. In 552 A. D. Buddhism was introduced from Corea, and the two now form the religions of the Japanese. Shintoism is primarily concerned with the worship of nature, but since its first introduction it has partaken largely of a form of hero and ancestor worship. The Mikado is regarded the direct descendant and representative of the sun god-

gess Amaterasu. Worship implies implicit obedience to him.

SHIP, the name applied in a restricted sense to a large vessel with bowsprit and three masts, each of which carries square sails, but in an extended sense to vessels adapted for navigation, including all kinds except boats. The restricted application of the term was formerly observed with marked care, but its use has been modified by the increase of size in sailing vessels and the



SHIP.

enlarged use of steam power as a propelling agency. Ships are now applied to many uses, and the construction and name vary according to the purpose they are to serve; thus have arisen such terms as transports, barks, luggers, schooners, sloops, brigs, galleys, xebecs, merchantmen, man-of-war ships, and many others.

The *bowsprit* is a spar projecting forward and usually slightly upward from the bow of the vessel, resting upon the stem and apron, and supporting the boom. The *masts* are named in consecutive order from the fore, including the foremast, the mainmast, and the mizzenmast; and the fourth, if present, is called the jiggermast. Each mast is made up of a lower mast, a top mast, and a gallant mast, and the main sails, carried on each of the masts are named according to the particular one to which they belong. The *brig* has two masts with square sails and is smaller than a *ship*, while the *schooner* has two or three masts, and the *sloop* has only one. A *cutter* is formed quite like a schooner, and a *barkentine* combines the features of a schooner and a ship proper. The different parts of a ship include the *sails*, made of stout fabric and designed to propel the vessel; the *rigging*, *ropes*, and *chains*; the *spars*, including the timber above the hull; and the *hull*, the part that glides in the water. There are three general divisions of the hull: the *bow*, or for-

ward part; the *waist*, or middle part, and the *stern*, or after part. The raised sides are *bulwarks*, and the part open to the sky is the *upper deck*.

SHIPBUILDING. *Ancient.* It is probable that the construction of vessels to move on water was first suggested by floating logs in rivers and lakes. Later rafts were made by fixing planks and spars together to form a floating surface, thus constituting a strong, buoyant support for a cargo, and later large tree trunks were hollowed out and sharpened at the ends to form primitive canoes. It is known that two modes of propulsion, those by oars and sails, are practically as old as the early stages of constructing sailing vessels. The Mediterranean Sea is the noted scene of much activity by ancient nations in the construction and use of vessels of different kinds, and in shipbuilding these nations made use of both means of propulsion, as in the galleys and triremes. However, as barbarism overthrew the ancient civilizations, it materially retarded shipbuilding. Consequently it became necessary for the people of medieval times to draw largely upon their own resources in planning and building ships. After the decline of Rome no people possessed stronger galleys and more fearless sailors than did the Norsemen, who cruised along the Atlantic coasts of Europe and Africa and penetrated all parts of the Mediterranean.

The discovery of the compass did much to introduce better methods of navigation. This circumstance and the establishment of sailing routes to India and America were epoch-making events in the construction and use of vessels fitted to brave the high seas in regions far from land. Spain was long the foremost naval power and marine nation, but it met an active competitor in Holland in the 16th century. France, Denmark, and England in the meantime made rapid strides toward building powerful navies. Shipbuilding was one of the foremost branches of the manufacturing industry in the colonial period of America, especially in the New England states. The first American ship was built in 1607 near the mouth of the Kennebec River and was called the *Virginia*, and in 1698 a law was enacted that all vessels of more than thirty tons should be built under the supervision of a shipwright. American ships began to enter into active competition with those of Europe in the early part of the 18th century, American manufacture being facilitated by the cheapness of large and valuable timber. Consequently sailing vessels long formed a chief product of manufacture for export.

Modern. Shipbuilding was modified remark-

ably after the introduction of steam as a propelling force. The first vessel to apply steam as the motive power was built by Robert Fulton in 1807 and was named the *Clermont*, which plied successfully on the Hudson River. In 1811 was completed the first steam vessel of European construction, the *Comet*. It was the earliest steam vessel to be constructed on a plan fitted for service on the sea. Captain Ericsson, in 1837, completed a small steam vessel driven by a screw, with which he sailed successfully off the coast of England, by which an epoch was marked in shipbuilding. The *Great Western* was the first vessel to commence regular Atlantic passage under steam, in 1838, but its propelling power was by paddles. Soon after wood began to give way to iron as a material in construction and then to steel, and the screw began to be generally adopted in 1845, its importance being recognized by efficient service in several ships of war. It has been found that an iron vessel is lighter than one of the same size built of wood. Besides, iron is much more durable, has greater strength, and can be bent into the required shape.

All the largest vessels are now propelled by steam, and, in fact, sail ships are practically discarded from the important freight and passenger service. The reason is to be found in the circumstance that a steam-propelled vessel can make material progress in spite of unfavorable wind, and its capacity for rapid sailing is greatly in excess under all circumstances. The largest steam-propelled vessels are very large, having a capacity up to 32,500 tons, with machinery of from 25,000 to 70,000 horse power, and in many cases four masts are added to further facilitate progress in sailing. An immense vessel called the *Great Eastern* was built in England in 1852, having a length of 692 feet. It was the largest vessel built up to that time, but did not prove practical.

In modern shipbuilding attention is directed particularly to the safety of vessels, which depends upon strength, stability, water-tightness, and floatability in case of injury. The employment of steel and iron in construction has revolutionized naval architecture, and by the use of these materials it is possible to devise framing and plating to insure great strength. Water-tightness depends upon calking the seams between plates or planks, for which purpose oakum is driven into the slight spaces until it is hard, and the calking is made secure by laying the planks with a slight bevel outward and covering it with hot pitch or marine glue. In modern construction floatability, when vessels are injured, is dependent upon compartments made

water-tight, which are secured by bulkheads constructed to extend at intervals across the ship. In most merchant vessels there is but one compartment, while warships are provided with a number, some running across the vessel and others being longitudinal.

The first armored battleships built in the United States were the *Maine* and *Texas*, begun in 1889, and in 1891 work was commenced on the *Massachusetts*, *Oregon* and *Indiana*, which carried four six-inch, four eight-inch, and four thirteen-inch guns and were considered among the most powerful vessels at the time of their completion. Work on the *Iowa*, an armored vessel of 11,340 tons, was commenced in 1893, and soon after the *Kentucky* and *Kearsarge*, each 11,525 tons, were ordered. The *Alabama*, *Wisconsin* and *Illinois* have the same capacity, while the *Missouri* and *Ohio*, completed in 1903, have a capacity of 12,500 tons. In 1901 the *Georgia*, *Virginia*, *Nebraska*, *New Jersey*, and *Rhode Island*, each 15,000 tons, were commenced, and in 1902 work was begun on the *Louisiana* and *Connecticut*, capacity 16,000 tons. The *Tennessee* and *Wisconsin*, commenced in 1902, are 502 feet long and have a displacement of 14,500 tons. These vessels, besides automatic and machine guns, carry 22 three-inch, 16 six-inch, and four ten-inch guns. The *Idaho*, with a displacement of 14,400 tons, was launched in 1905.

In the construction of iron and steel vessels the United States holds second rank, being exceeded only by Great Britain. Below is shown a comparison of the tonnage of iron and steel vessels constructed in the two years named:

COUNTRY.	1902.	1908.
Great Britain.....	1,581,406	1,692,430
United States.....	270,932	490,854
Germany.....	252,719	410,360
France.....	55,345	115,682
Norway and Sweden.....	27,572	68,690
Denmark.....	12,542	30,640
Austria-Hungary.....	9,679	61,285

Modern naval architecture is a matter of novelty when compared to pioneer shipbuilding. From primitive construction to the present is a long space of time and an equally great difference in strength and capacity. Such vessels as the German steamer *Kronprinzessin Cecilia* and the English steamers *Lusitania* and *Mauretania* are larger than the famous *Great Eastern*. Modern ocean steamers can safely carry a crew of 300 men and 1,500 passengers, besides 5,000 tons of coal, 8,000 tons of water, and 4,500 head of cattle. The following shows the gross tonnage of a few of the large steamers:

VESSELS.	DEPTH.	BRDTH.	LGTH.	TONS.
Campania.....	37	65	601	12,950
Kaiser Wilhelm der Grosse	39	67	627	14,350
Deutschland.....	40	67	662	16,530
Oceanic.....	40	68	685	17,275
Kaiser Wilhelm II.....	38	72	678	19,400
Celtic.....	42	75	700	20,175
Kronprinzessin Cecilie....	43	76	702	20,200
Baltic.....	49	75	725	23,000
Lusitania.....	51	88	760	32,500

SHIP RAILWAY, the name applied to a railway constructed for the transportation of ships from one body of water to another, the object being to overcome long tours by water. These means of transportation are not numerous in modern times, but were used quite extensively by the natives. The Greeks operated a railway of this kind across the Isthmus of Corinth as early as 425 B. C. and transported vessels 150 feet long in this way. De Lesseps proposed such a railway across the Isthmus of Suez in 1860, but he finally substituted for it the present Suez Canal. Captain Eads projected a ship railway across the Isthmus of Tehautepec, in Mexico, in 1879. He proposed to transport ships 350 feet long in cradles running on 1,380 wheels at the rate of six to ten miles an hour. Congress failed to give financial support to the project and it was abandoned after the death of the promoter.

A ship railway was proposed across the neck of land between Chignecto Bay and the Gulf of Saint Lawrence, a distance of fifteen miles. Work was commenced on this road in 1888, but was abandoned after three years on account of a lack of funds. The purpose was to run cars under the ship, into the water, and carry it on steel cradles at a speed of about ten miles an hour, the cars to be drawn by locomotives. No modern ship railway of material size has been successful, and the project has been displaced either by the construction of canals or the operation of railways.

SHIPWORM, or **Teredo**, the name of a wormlike mollusk, so called from its boring into the timbers of vessels below the water line. It is from one to three feet in length and the body is covered with a shell consisting of two valves. The shell is not large and only covers a part of the body and in some species is reduced to mere appendages of the foot. These mollusks attack wood immersed in sea water, whether of ships or piers, and bore in the direction of the grain. They carefully avoid the tube or opening made by their neighbors and swallow the dust of the rasped wood. Reproduction takes place through an ovoviviparous process, and the young attach themselves to the wood and begin to bore at an

early age. These mollusks are highly detrimental to piles, wharves, wooden ships, and fish traps.

SHIRAZ (shē'rāz), a city in Persia, capital of the province of Farsistan, 164 miles north-east of Bushire. It occupies an elevated site 4,500 feet above sea level and is surrounded by magnificent orchards, vineyards, cypress groves, and rose gardens. The city dates from 697 A. D., when it was founded on a favorite site as a resort for Persian princes, and through all the succeeding centuries its fame has been proclaimed in Persian poetry. A wall four miles in length surrounds the city, inclosing many beautiful mosques, palaces, and institutions of learning. It has manufactures of wine, rose-water, cutlery, silk, cotton and woolen goods, firearms, glass, and earthenware. The trade is extensive and it is visited by many large caravans. Tamerlane captured Shiraz in 1387. In 1812 and 1853 it suffered greatly by destructive earthquakes, fully 12,000 people losing their lives. Among the eminent poets and scholars who claim it as their birthplace are Hafiz, Sibuyah, and Saadi. The tombs of Hafiz and Saadi are in its neighborhood, and 35 miles northeast are the ruins of the ancient city of Persepolis, which was occupied as the capital of Persia under Xerxes and Darius. Alexander the Great destroyed Persepolis, but remains of their palaces may still be seen. The population of Shiraz is estimated at 48,460.

SHIRE (shē'rā), a river in the southeastern part of Africa, the outlet of Lake Nyassa. It has a southerly course of 250 miles, entering the Zambezi about 90 miles above its mouth. The upper course is obstructed by many rapids and cataracts, where the fall is 1,200 feet in a distance of 35 miles, but the lower part is navigable for large vessels.

SHISHAK (shī'shāk), the name of a number of monarchs of Egypt, classed in the twenty-second or Bubastite dynasty, thought to have been of Semitic descent. Shishak I. is mentioned in the inscriptions placed on the portico of the great temple of Karnak by the Bubastite dynasty and on several statues to the goddess Pasht. When Solomon pursued Jeroboam, the latter fled to Shishak for protection, but after the death of Solomon he became sovereign of the newly formed kingdom of Israel, which was separated from Judah at that time, and Rehoboam was made king of the latter. It is evident from monumental inscriptions that Shishak marched to Jerusalem against Rehoboam in the fifth year of the latter's reign, and after taking the city carried the treasures of the temple to Egypt. Scenes from this conquest of

Jerusalem are recorded on the monuments of Karnak.

SHITTIM (shīt'tim), the wood of the shittah tree, which is mentioned several times in Exodus and Deuteronomy. This wood was used principally in building the tabernacle and is identified with the *Acacia seyal* found in the vicinity of Sinai and the Dead Sea. It is hard, has a fine orange-brown color, and is not attacked by insects. The tree has small leaves and grows to a height of twenty feet.

SHODDY. See Rag Trade.

SHOES, articles of wear for the feet, made mostly of leather, but also of several other materials. The Egyptians, Greeks, and other

tians wove a kind of shoes with strips of papyrus, which they painted and ornamented with remarkable skill. It was customary to wear the sandal in Rome, but later coverings were provided for the whole foot. Subsequently the Roman footwear was made more durable for army service by protecting the soles with nails and metallic plates. The manufacture of shoes is an important industry in Canada and the United States, and those produced are manufactured almost exclusively of leather. They are largely made by machines, but the best kinds are hand-sewed. In shoemaking it is necessary to use several kinds of machines, some fitted to stitch the sole and others designed to sew the upper parts. Ingeniously constructed machines are employed for pegging the soles. The American Indians made buckskin shoes called *moccasins*.

Boots are a modified form of shoes, having the upper leathers lengthened to form a protection for a part of the leg, while *slippers* are a low form used largely for indoor wear. In Holland, France, and other countries of Europe shoes are made to some extent of wood; in Japan, of paper and plaited straw; and in many tropical countries, of plaited grass and hemp. It would be difficult to enumerate all the different kinds of shoes worn, since the art of dressing the feet for comfort, convenience, and fashion is quite as notional as the apparel fitted for other parts of the body. In China the foot of the females of certain classes is compressed from early youth, and the shoe worn by the adult of those classes is only five or six inches long. Among the remarkable matters of interest to be observed in the shoe trade is the fact that there has been a wonderful revolution in the art of making and repairing shoes, the factory-made product having almost entirely driven the boots and shoes of the hand manufacturers from the market.

SHOGUN (shō'gōon), or **Tycoon**, a military title of Japan, first employed in the 1st century before the Christian era, when Emperor Suijin divided the empire into four divisions. The power of the four military rulers was gradually enlarged until 1603, when they became the ruling element in the country. However, the office of shogun was abolished after the revolution of 1608. In that year the emperor, or Mikado, was restored as the central power of the nation.

SHOOTING, the practice of competing in marksmanship with the rifle, pistol, and other small arms. It is an exercise of value in securing proficiency and accuracy in the use of firearms. Contests with the military rifle have



SHOES.

1, Italian Sandal; 2, 12th Century; 3, Italian Shoe; 4, 15th Century; 5, Catherine de' Medici; 6, Venetian; 7, 17th Century; 8 and 9, 18th Century; 10, Louis XVI; 11, French Shoe, 18th Century; 12, 19th Century; 13, 14 and 15, Modern.

ancient peoples wore a rudimentary shoe, consisting mainly of a sole held on the feet by straps. Any one of this class of footwear is known as a *sandal*. For centuries the Egyp-

been in vogue for many years, and several associations are maintained to promote the exercise both for sport and to secure development in accuracy. The first annual competition was held in the State of New York in 1873, and since that time national and international contests have been numerous. The Palma trophy has been the object in competitive tests at various times. It was won by an American team in Ireland in 1880, by a Canadian team in 1901, by a British team, at Ottawa, in 1902, and by an American team, at Bisley, England, in 1903. The American team won the international Palma medal at Ottawa, Canada, in 1907. Shooting is a part of the competitive tests at the international Olympia games. The Olympia contests held at Bisley, England, were won by American rifle shots in 1908.

SHORTHAND, or **Phonography**, any system of handwriting that reduces the number of muscular movements required to keep pace with uttered speech. It differs from longhand in that characters are used to represent words, parts of words, or sounds instead of all the elementary sounds of words. The art is of great antiquity, having been employed by the ancient Greeks and Romans, both to secure brevity and secrecy, but all traces of ancient systems were lost in the Middle Ages. At present four distinctively different systems are in use, including *phonography*, or sound writing; *stenography*, or compressed writing; *tachygraphy*, or quick writing; and *brachygraphy*, or short writing. The underlying principles of these processes have led to the publication of fully 300 different methods or systems, all possessing more or less value in writing the various languages now spoken. Timothy Bright published the first modern system of shorthand in 1588, which made use of marks instead of letters of the alphabet. The system published by Peter Dales in 1590 used characters to denote words. These were superseded in 1602 by a system of shorthand devised by John Willis, who adopted arbitrary signs, thus introducing to some extent the elements employed by the more practical systems now in use.

Isaac Pitman published his work on shorthand in 1837 and was the first to use the word *phonography*. His system is based on the sounds of the English language. It rapidly superseded other systems and was adapted to be employed in many foreign languages, among them the German, Dutch, French, Italian, Japanese, Spanish, and many others. He used 41 letters to represent the elementary sounds, six long and six short vowels, five diphthongs, and 24 consonants. Double and treble consonants for ab-

breviating the writing were made by hooks and circles at the beginning and end of the consonant strokes. This system rapidly revolutionized shorthand writing, being well adapted to secure legibility as well as the greatest degree of brevity. Since its publication many other systems have been either modified from Pitman's or originated independently, but the Pitman system is still a standard.

Shorthand is now taught in all the business and commercial schools and has found a place in many of the secondary, special, and public and private high schools. It is employed largely in reporting speeches, in newspaper and court reporting, and in general office work. Among the leading systems in America are those of Cross, Gregg, Pernin, and McKee. The first mentioned, originated by J. G. Cross and known as *Cross's Eclectic Shorthand*, is based largely upon strokes and their position. This work has been published in more than sixty editions. Another system, called *Longley's Eclectic Phonography*, is in extensive use. The number of words and syllables uttered by a speaker in a specified time varies largely in individuals and in different languages. Usually from 75 to 180 words per minute may be taken to represent the extremes in the English language, while the average number of words is about 100 per minute. In competitive tests the record is from 200 to 280 words per minute, but this pace can be maintained only for ten or fifteen minutes in succession. A skillful reporter is able to take fully 150 words in a minute and usually transcribes that number on the typewriter in three minutes, thus averaging about fifty words per minute in the completed manuscript.

SHOSHONE FALLS (shō-shō'nē), a remarkable cataract in Idaho, on the Snake River. The current is about 950 feet wide and falls in the form of a semicircle, the height being about 210 feet, exceeding the Niagara Falls 40 feet. Precipitous walls of rock fully 1,000 feet high form barriers on both sides of the river, and four miles up the river are the Little Shoshone Falls, thus giving the region a remarkably interesting aspect. See **Snake River**.

SHOSHONES (shō-shō'nēz), or **Snakes**, an American Indian tribe, formerly resident in the region now occupied by Utah, Idaho, and Nevada. They include a number of bands, among them the Buffalo Eaters and White Knives. Lewis and Clark first came in contact with them while penetrating the regions beyond the Rocky Mountains in 1805 and found them a peaceful class of natives. The advancement of settlers was the occasion of hostilities near the Humboldt River and Great Salt Lake in

1849, and these were succeeded by battles in 1863. A treaty was made with them in 1867, when the government assigned them land in sections of Nevada, Utah, Idaho, and Wyoming. They include about 5,750 at the present time, numbering among their membership many of considerable advancement in education and the arts. Christian missions have been conducted among them with some degree of success.

SHOT, the general name applied to pellets and bullets used in firearms of various kinds. Round stones were first employed for shot when powder came into use, but it was soon found that a regularly formed ball made of metal is more convenient and far more effective for all purposes. Solid shot is not used as extensively as formerly, but hollow projectiles are employed instead. The size of the shot varies materially with the kind of guns from which it is to be thrown, ranging from very small pellets to projectiles weighing about a ton. The material used is cast iron or steel, but the missiles are prepared differently, depending upon the purposes for which they are to be employed. They include canister, grape, shrapnel, bar, and numerous others.

Canister shot is made up of small iron or lead balls placed in a sheet-iron can, and is designed to burst on leaving the gun. *Grapeshot* is made of a number of small cast-iron balls, so adjusted that they may be thrown in a body from the gun. *Shrapnel shot* is made by placing a number of musket balls in a cast-iron shell and filling the intervening spaces with sulphur or resin. This material is added to harden and form the balls into a solid mass, and powder is afterward placed within to burst the shell on striking the object against which the shot is thrown. *Bar shot* is employed to destroy the rigging of a ship. It consists of discs of iron joined by a bar, but a chain is sometimes used for a like purpose.

Sportsmen use pellets of lead of various sizes, this depending upon the kind of game hunted. The finer grades are more serviceable for small animals, as they are less likely to damage the flesh, while larger classes are needed to kill more bulky game, such as geese and brants. Shot of this kind is made by melting the lead and dropping it through sieves from a high tower into water. The dimension of the shot depends on the size of the hole of the sieve or colander through which the metal passes. As they fall through the air they become cooled and hardened. Shot towers vary in height from 100 to 150 feet. After dropping the shot from the top, it is separated according to the different sizes and polished. A newer process is to mold

the metal by running it in a molten state into a trough and allowing it to drop through little holes into molds, which discard the pellets as soon as formed and drop them into a bed of graphite.

SHOTGUN, the name of a weapon used for hunting small game, such as squirrels, rabbits, grouse, and waterfowls. Weapons of this class formerly had a single barrel and were loaded by passing the ammunition into the muzzle, for which purpose a ramrod was attached to the lower part of the barrel. Later it was superseded by the double-barrel shotgun, in which two loads were entered from the muzzle, and both styles were fired either by the flint-lock or by percussion caps. The first breech-loading gun was invented in 1836. This weapon consists of one or two barrels that open at the breech, working on a hinge, and the charge is placed in shells made of brass or partly of brass and partly of paper. These shells contain the powder and shot and in the rim is the percussion cap, which is ignited by means of a hammer or a mechanism in the breech. The newer shotguns have a single barrel with a magazine beneath. They are loaded and fired in the same way as the repeating rifle. The best barrels are made of Damascus twist, or laminated steel, and the sizes usually are 10 or 12 bore. Some shotguns have a metallic stock or shoulderpiece, but most of them are of a fine grade of wood, and some contain a small cavity in which to carry shells. See **Gun**.

SHOVELER (shŭv"l-ēr), or **Spoonbill**, the name of several species of duck, so called from the form and size of their bill. The common shoveler, though smaller than the mallard, is highly esteemed for its flesh. The female has dull plumage, but the male is finely decorated, having a white breast and greenish tints on the tail coverts and the head. It is not related to the true spoonbill, which is a wading bird of the heron family.

SHOWERS OF FISHES, a peculiar occurrence sometimes seen in various regions, particularly in tropical latitudes. Among the instances of this kind is a shower that fell near Merthyr-Tydvil in Wales, where shall fishes were found over an area of several square miles shortly after a rainstorm. Another instance occurred in the Isle of Mull, in which herrings were found 500 yards from the sea, and when first seen they were still alive. The phenomenon is due to the circumstance that large columns of water are often taken up by whirlwinds and carried at a considerable elevation some distance from the sea, where the water falls to the ground accompanied by the fishes taken

up from the sea. In tropical countries many bodies of water dry up, and fish and other living forms remain alive at some distance below the surface of the dried mud, but revive fully when the basin is again filled with water. This explanation accounts for the rapid population of these water beds with fish, instead of falling from the clouds, as some suppose.

SHREVEPORT (shrēv'pōrt), a city in Louisiana, capital of Caddo Parish, on the Red River, 300 miles northwest of Baton Rouge. It is on the Kansas City Southern, the Texas and Pacific, the Saint Louis Southwestern, the Queen and Crescent, the Missouri, Kansas and Texas, and other railroads. The site consists of elevated and gently rolling ground. Among the features are the parish courthouse, the Federal building, the Charity Hospital, the opera house, the First National Bank building, the high school, and the Cooper building. It has a large trade in cotton, lumber, fruit, and produce. Natural gas is found in the vicinity. The manufactures include cotton goods, cigars, ice, lumber products, cotton-seed oil, carriages, hardware, and machinery. The utilities include gas and electric lighting, sanitary sewerage, pavements, waterworks, and electric street railways. It was settled in 1833 and incorporated in 1839. Population, 1900, 16,013; in 1910, 28,015.

SHREW (shru), a genus of animals resembling the mouse and the dormouse, but distinguished from them in having soft fur and an



WATER SHREW.

elongated muzzle. A large number of species have been enumerated, of which the *common shrew* is the best known. It is about the size of a mouse, but has a prolonged muzzle, small eyes, and a four-sided tail. The ears are short and the color is brownish-black. The food consists of insects, worms, and the smaller mollusks. These animals come out in search of food at night and are noted for their tendency to fight, the stronger often killing and eating

their weaker opponents. The *shrew mole* of North America includes several species and is very nearly allied to the moles. Several species are common to Europe, all more or less similar to the American species, but differing from them in various respects, especially in being larger and having longer legs. The *water shrew* is larger than the American shrew mole and the snout is quite pointed. It is frequently seen on the banks of streams and lakes, often entering the water. Some species burrow in the fields and gardens in search of worms, which is true of the American shrew mole.

SHRIKE, a genus of birds of the insectorial family, widely distributed in America, Europe,



AMERICAN SHRIKE.

and other continents. The food consists of insects, frogs, mice, and small birds, receiving from their habit of killing other birds the name of *butcher bird*. The *great American shrike* is about ten inches long. It has a grayish color with whitish markings, and is able to imitate the voice of other birds. About thirty other American species have been described, some of which are native to South America. The *red-backed shrike* of Europe is about eight inches long, and the *great gray shrike* of Asia and North America approaches the thrush in size.

SHRIMP, an extensive genus of ten-footed crustaceans. They resemble the lobster and crawfish, but differ from them in having an elongated, tapering, and arched form. The claws are small, the rostrum is short, and the tail is long and fanlike. Their whole structure is delicate, many species resembling in hue the objects near which they develop, thus escaping easy observation. They burrow in the sand by a peculiar motion when alarmed, or seek safety by hiding under rocks and pebbles. The size is from two to three inches in length. Shrimps are a favorite food in many European countries, and on boiling assume a brownish color. They are widely distributed, but are most abundant in tropical waters, and are used chiefly as bait

for fishing in the United States. The common shrimp is caught by large nets with a semi-circular mouth.

SHROVETIDE (shrōv'tid), the days immediately preceding Ash Wednesday, at which time Roman Catholics were accustomed to confess their sins as a preparation for Lent. Shrove Tuesday was made a season for feasting and merriment, and is still called *Mardi Gras* by the French.

SHUFFLEBOARD (shūf'f'l-bōrd), or **Shovelboard**, a game played by two or four persons with iron weights, on a board sprinkled with fine sand. Two sets of four weights, weighing about eight pounds each, are used in the game. The board is thirty feet long and has raised edges. A line is drawn across the



COMMON SHRIMPS.

surface about five inches from each end. A set of weights is used by the players, who divide into opposing sides, and the game consists of sliding the weights in rotation along the board. Twenty-one points comprise the game. One score is given for the piece nearest the line; two, for the piece between the line and the end; and three, when the weight projects partly over the edge of the board. On the deck of ocean steamers the game is played on a figure chalked on the deck. In that case wooden weights are used, and they are pushed by a long staff with a curved end. Exactly fifty points are required to win the game, and if more scores are made they are deducted instead of added.

SIAM (sī-ām'), an independent kingdom in Southeastern Asia, including a part of the Malay Peninsula and a part of the Indo-Chinese Peninsula. It is bounded on the north by Burma and French Indo-China, east by French Indo-China, south by Cambodia, the Gulf of Siam, and the Straits Settlements, and west by the Indian Ocean and Burma. The long and narrow strip extending south is known as Lower Siam, which comprises about one-fourth of the country, and the compact region in the north is termed

Upper Siam. Within recent years the British have encroached upon the northwest and southwest, while the French have made acquisitions in the east. The total area is given at 236,000 square miles.

DESCRIPTION. A large part of the country lies in the basin of the Menam, which has many navigable tributaries, forming a drainage system of considerable importance. Much of the surface consists of alluvial deposits of great fertility, especially in the region of the Lower Menam, where the river divides into numerous channels that overflow in August and bring a fertility exceeding that of the Lower Nile. The Menam valley proper is about 450 miles long. It has an area of about 23,000 square miles, of which fully one-half is directly influenced by the inundations. This river has its source among the mountains of China, the upper region being considerably elevated and arid. Ranges of hills extend along the western border, but the general elevation of the country does not exceed 600 feet. Extensive jungles and briny swamps characterize a portion of the coast bordering on the Gulf of Siam.

A small part of the western boundary is formed by the Salwin River and the eastern section is drained by the Nam Mun, which flows east and joins the Me-kong in French Indo-China. Along the Gulf of Siam are a number of important inlets, which enlarge the total coast frontage to 1,100 miles. The surface rises gradually toward the source of the rivers, forming in the north an elevated and more or less hilly tableland. Tonle Sap Lake, in the southeast, extends into Cambodia. Much of the surface is covered with extensive forests, including teak, sappan, aloes, rosewood, palms, mangosteen, and ebony.

The climate of Lower Siam is influenced favorably by the sea breezes and is highly salubrious and equable. Toward the north the summer heat is quite oppressive and from November to May very little rain falls. At Bangkok the precipitation is 50 inches, but in some sections it amounts to 235 inches per year. The temperature ranges from 65° to 90°, but in the northern part it falls to 40°. Monsoons sometimes sweep across the country with considerable force.

INDUSTRIES. Agriculture is the chief occupation and rice is the principal product and the national food. It is grown extensively in the lowlands of the south, where large areas are sufficiently moist to yield abundantly. Considerable interests are vested in growing coffee, tobacco, pepper, hemp, rice, and sesame. Other productions include rattan, mangoes, bamboo,

and many species of tropical fruits. The country is rich in mineral resources, especially in coal, iron, copper, gold, and precious stones. Other minerals include antimony, tin, zinc, lead, granite, and limestone. The live-stock industry is confined largely to the rearing of sheep, elephants, camels, buffaloes, and poultry. Siam is noted for its large and beautiful elephants, including the tawny and white species, both of which attain points of superiority. Wild animals are abundant, including the otter, leopard, tiger, crocodile, rhinoceros, wild hog, and orang-outang. Birds of fine plumage and song are abundant. The fisheries yield many marketable species.

The manufacturing enterprises are managed largely by European capital, principally by British, Germans, and French. Rice mills are numerous and considerable capital is invested in the manufacture of sugar from cane, fine textiles, glassware, pottery, jewelry, and lumber. Great Britain, Germany, and China have the largest share of foreign commerce. The exports include rice, teak wood, fish, hides, pepper, and fruits. Among the principal imports are cotton manufactures, gunny-bags, hardware, machinery, opium, silk goods, and merchandise. The transportation facilities are chiefly by water, including coastwise communication and navigation on the Menam, the Salwin, and the Me Ping, a branch of the Menam. About 650 miles of railroads are in operation, the larger part of which is owned and operated by the government. Electric railways are operated in Bangkok and several other cities.

GOVERNMENT. Siam is an absolute monarchy, but the king is aided by ministers of state, who in part compose a legislative council. The ministers are appointed by the crown and constitute the heads of national departments, including those of foreign affairs, justice, finance, war, interior, marine, police, public works, and public instruction. Fifty-one members constitute the legislative council, whose members, including the ministers, are chosen by the king. For the purpose of localizing the government, the country is divided into eighteen provinces and these are subdivided into districts. A certain degree of independence is maintained by the Malay States, which are governed by rajahs under the direction of commissioners. Certain forms of slavery and feudal land ownership are maintained.

Siam is considered next to Japan in adopting modern methods and progressive educational reforms. The government has extended encouragement to the development of industries by Americans and Europeans. Both the dress and

customs of Europeans have been largely adopted and many young men are sent to Europe for their education. European teachers and officers are employed in large numbers by the government. The higher classes are considerably advanced in learning, while elementary education is practically universal. No restrictions have been placed upon the construction of railroads, canals, and electric lines, and the general adoption of European machinery and educational ideas. All Siamese between the ages of 18 and 21 are required to serve in the military or naval forces.

INHABITANTS. The Siamese are classed with the Mongolian family and show a close relationship to the people of Anam and Burma. Their skin is darker than that of the Chinese, but lighter colored than that of the people native to Western Asia. In stature they average about five feet four inches. They are kind-hearted, tolerant, and polite, but are inclined to be indolent, vain, and superstitious. Bangkok, on the Menam, is the capital and largest city. Other cities include Paknam, Chantabon, Ayuthia, and Korat. A large part of the inhabitants is composed of Chinese and Malays. Population, 6,125,000.

HISTORY. Little is known of the early history of Siam, the popular traditions dating back only to the 5th century B. C. The credible history begins with 1350, when Ayuthia was made the capital. Commercial intercourse was established between Siam and Portugal in 1511, but soon after the Dutch came into control of its foreign trade. Cambodia was annexed in 1532 and the present dynasty, that of Yaut Fa, ascended the throne in 1782. The Burmese captured the capital about the middle of the 18th century, but were expelled by a general named Phya Tak. The country was opened to general trade in 1856 and since then the educational and industrial progress has widened constantly.

Buddhism was introduced into Siam in the 7th century B. C. and is still the principal religion, but a large per cent. of the people profess Confucianism. Christianity is gaining some foothold under a number of missions, which consists mainly of American Protestants and French Roman Catholics. The language spoken may be classed between the Malay and the Chinese, and the written characters appear to have been derived from the Sanskrit. Within recent years material progress has been made in printing in the Siamese language, which is leading to the development of an independent literature. Extensive translations from other languages, especially European and Japanese, have been made.



WILLIAM HOWARD TAFT.

The President of the United States, William Howard Taft, was born in Cincinnati, Ohio, September 15, 1857. He studied at Yale University and Cincinnati College, after which he practiced law in his native city. In 1890 he was made Solicitor-General of the United States, serving until 1892, when he became Judge of the United States Circuit Court for the sixth circuit. He was chairman of the commission to devise and establish civil government in the Philippines, of which islands he became the Civil Governor in 1900. President Roosevelt appointed him to succeed Elihu Root as Secretary of War, of which office he took charge in 1904. He was elected President as a Republican in 1908.

Chulalongkorn I., the present king, succeeded to the throne on the death of his father, in 1868. He is fifth in descent from Yaut Fa, who gave rise to the present dynasty. While he has been progressive in promoting the development of material enterprises, his government has been somewhat complicated by advances upon his territory by the French and British: In 1893 the French established a protectorate over Cambodia and later extended their sphere of influence over a large part of Upper Siam. Several provinces were ceded to France in 1907. In the same year the British established a sphere of influence on the border of Burma and another between the Gulf of Siam and the Indian Ocean.

SIAM, Gulf of, an inlet of the China Sea, lying within the confines of Siam, Cambodia, and the Malay Peninsula. The width at the entrance is 240 miles, and it extends inland 400 miles. The Menam and several other navigable rivers flow into it, thus forming an important water surface for navigation.

SIBERIA (sĭ-bĕ'rĭ-à), an extensive region of Russia, occupying the northern part of Asia. It is bounded on the north by the Arctic Ocean, east by Bering Sea and the Pacific Ocean, south by China and Russian Central Asia, and west by the Ural Mountains, which separate it from Russia in Europe. A large part of the southern boundary is formed by natural characteristics, such as the Amur River, which separates it from Manchuria; the Yablonoi Mountains, in the east central part; the Altai, in the center; and the Thian-Shan, in the west. The area is 4,832,350 square miles, which exceeds in size all of Europe.

DESCRIPTION. Three principal divisions have been made for the purpose of government, each under a governor general. They are Western Siberia, with an area of 860,020 square miles; Eastern Siberia, area 3,069,750 square miles; and the Amur region, area 903,580 square miles. The surface of this vast expanse is diversified by valleys and mountains, but the drainage is almost entirely toward the north into the Arctic Ocean and the Sea of Okhotsk. In the west are ranges of the Ural Mountains; in the south, the Altai and Yablonoi mountains; in the central east, the Verkhogansk Mountains; and in the east, the Stanovoi Mountains. Many of the rivers are vast water courses of importance in commerce, but the cold and long winters interfere notably with their general use in transportation. The larger of these rivers are the Obi, Irtish, Tobol, Yenisei, Khatanga, Lena, Indigirka, and Amur.

Lake Baikal, in the south central part, is the

largest of many inland lakes. Other sheets of water include lakes Yege, Chang, and Balkash. In the Arctic and the adjacent seas are a number of islands belonging to Siberia, the most important being Saghalien Island, in the Sea of Okhotsk, and the New Siberia Islands, in the Arctic Ocean. The vast coast line is diversified as to contour and outline, ranging from sand dunes to precipitous cliffs, but the Arctic Ocean is ice-bound about ten months of the year. On the other hand, the Sea of Okhotsk is generally wrapped in dense fogs and endangered by icebergs, thus making navigation impossible during most of the year. The summers are warm and pleasant, but the winters are extremely cold. However, the climate is generally healthful. It is quite agreeable to Europeans in the southern portions. Much of the surface possesses fertility of soil. Siberia has much deposits of minerals, and in the southern portion of the country are valuable forests. Between the Obi and Irtish rivers and in several other sections are vast marshes, and in the north are the tundras, which are made up of frozen swamps that thaw only on the surface in the summer. The forests gradually decrease toward the north, where they assume the form of small shrubs and vegetable forms, and finally merge into small plants and mosses.

RESOURCES AND INDUSTRIES. Siberia has a diversity of products. They are being developed rapidly under the vigorous policy of the present reigning monarch of Russia, who is fostering the building of railroads and canals and the development of its mineral and other natural resources. Fur-bearing animals are numerous. The country has valuable fisheries and vast swarms of wild fowl. The wild animals include sables, reindeer, ermines, elks, foxes, deer, bears, lynxes, wolves, antelopes, and marmots. Among the minerals are iron, copper, gold, silver, mercury, tin, lead, coal, graphite, sulphur, salts, mica, petroleum, and precious stones. Siberia has vast and valuable forests of northern species, including the oak, pine, fir, cedar, and many others. Agriculture and stock raising are the principal industries.

Siberia is regarded by many economists as the future source of wheat and beef for Europe. The leading soil products include wheat, corn, oats, barley, hemp, vegetables, and small fruits. Horses, cattle, swine, sheep, mules, and poultry are reared in abundance. Manufacturing has developed remarkably since the building of the Trans-Siberian Railway. The chief manufactures are furniture, flour, hardware, lumber, paper, cured fish, leather, machinery, and products connected with the mineral deposits. It

has a vast trade with European Russia, the latter receiving large quantities of fish, furs, grain, tallow, hides, and lumber. Russia transports to Siberia such products as machinery, clothing, chemicals, and other manufactured wares. Considerable trade is carried on with China, Corea, Manchuria and Japan.

GOVERNMENT. The vast region of Siberia is politically organized on a somewhat diversified plan. In general the divisions are governed like the provinces of Russia in Europe, but some are grouped under imperial viceroys. Eastern Siberia has its seat of government at Irkutsk and is under an imperial viceroy. The Amur territory, located northeast of Manchuria, is governed from Vladivostok, on the Sea of Japan. Western Siberia is divided into the two provinces of Tobolsk and Omsk, of which the two cities of Tobolsk and Tomsk, respectively, are the capitals. The national government maintains a system of education for instruction in the elementary and industrial branches. Several colleges and universities receive national support, the most important university being at Tomsk, located on a branch of the Trans-Siberian Railway.

INHABITANTS. About 60 per cent. of the inhabitants are Russians. This element includes a large number who descended from exiles who were transported to Siberia for political offenses. A small element of other Europeans is in the country, including chiefly Poles, Finns, and Germans. The natives consist largely of Turks and Mongols, the former predominating in the southwestern and the latter in the southeastern sections. Many Tartars inhabit the region in the vicinity of Lake Baikal, and native Yeniseians are scattered more or less generally in the basin of the Yenisei River. Tunguses inhabit a large section of Eastern Siberia. An element known as Pale-Asiatics is scattered more or less throughout the region of Lake Baikal, and these peoples include the Koriaks and the Kilyaks.

The Russians generally adhere to the Greek orthodox church, but a number of Protestant communities thrive. The Asiatics adhere chiefly to the Moslem and Buddhist faiths. The principal cities include Tobolsk, Omsk, Tomsk, Irkutsk, and Vladivostok. A majority of the inhabitants reside in Western Siberia, but the construction of railways has influenced settlements farther east. In 1897 the population was 5,627,090. No reliable statistics have been published by the government, but a heavy immigration from Russia in Europe has been going on the last decade. In 1908 the population was estimated at 7,842,000.

HISTORY. The primitive inhabitants of Siberia

are known as Yeniseians, so named from their occupation of the Yenisei basin. They were succeeded by tribes invading the region from the south. The advancement of early Siberians in civilized arts is attested by numerous earthworks and mounds. In the 11th century the Turks conquered the region, but they were driven from the country by the Mongols in the 13th century. Russian Cossacks made invasions from the west in 1580 and established trading posts, but soon turned their possessions over to Ivan the Terrible. The country became a productive furring region for Russian hunters, who penetrated east to Kamchatka by the 18th century. It was long the hope of Russian czars to direct emigration into Siberia, for which purpose it was made a penal colony, and for centuries thousands of exiles and convicts were sent there, a practice continued until 1899. The Amur territory and the coast region of Manchuria were finally ceded to Russia by China in 1860. Other extensions have been made in recent years toward the south of West Russia, including portions of Turkestan and Afghanistan. The abandonment of Siberia as a penal colony resulted from the intention of the Czar to develop it into a region of vast enterprise tributary to the western part of the empire, and since then fully 200,000 emigrants have made settlements annually. The Trans-Siberian Railroad, extending from Saint Petersburg to Vladivostok, a distance of 4,950 miles, is considered the most gigantic railroad enterprise in the world. Other important railroad lines include the Trans-Caspian and branch lines from each of the two great railways. By the construction of these railways Siberia has been connected with Berlin, Paris, Vienna, and other great cities of Europe. It is a means of competition with the traffic carried by the Suez Canal.

SIBYLS (sīb'īlz), in Greek and Roman mythology, the name applied to several maidens gifted with power of prophecy, who were reputed as living to an incredible age. Writers generally place their number at ten, but one known as Cumaean is the most famed from her mention in the sixth book of Aeneid. She is the reputed writer of nine books in the Greek, generally known as the "Sibylline Books," which she offered to sell to Tarquin the Proud. Not knowing who she was, Tarquin refused to buy them, upon which she burned three and returned with six, demanding the same price as before. Tarquin again refused to purchase and she burned three more, returning with the remaining three, for which she asked the same price as at first. Amazed at her inconsistency, Tarquin consulted the Augurs, who advised him to

buy the remaining three at whatever price they were to be had. He found the volumes to contain predictions of great importance to the Romans, but the Sibyl vanished after the disposal of the books.

The Sibylline books were subsequently consulted on occasions of national danger. They were carefully preserved in the temple of Jupiter Capitolinus, but were destroyed when that structure was burned in 83 B. C. Later the senate sent delegates to different cities of Italy and Greece to collect and, if possible, restore the Sibylline verses, but it was possible to secure only about 1,000, which received a place in the new temple of Jupiter Capitolinus. Stilicho burned this collection in 408 A. D. Another collection of so-called Sibylline oracles was written by Jews and Christians in Alexandria, Egypt, in the period between the advent of Christ and the 6th century A. D. This collection is entirely distinct from the Sibylline verses of the Greeks and Romans. It was published in fourteen books and had 4,000 lines. A revised edition was published by Gallaeus in 1689.

SICILIAN VESPERS (sī-sīl'ī-an), the name of a famous insurrection against the French in Sicily, which began on March 30, 1282, at the signal of the vesper bell on Easter Monday. Sicily and Naples had been conquered by Charles of Anjou, brother of Louis IX. of France, but his severe and oppressive rule greatly displeased the people. They applied in vain for relief to the Pope, but at length King Pedro of Aragon undertook the conquest of Sicily and took advantage of the proposal to surprise the French occupants at the ringing of the vesper bells. The inhabitants of Palermo rose against the French at the appointed signal, while other towns soon followed, resulting in the overthrow of the French and the transfer of the island to the Spanish. Men, women, and children were massacred without reserve, fully 8,000 losing their lives. In 1882 the 600th anniversary of the Sicilian Vespers was celebrated at Palermo, the aged Garibaldi being present at the time.

SICILIES, The Two. See **Sicily.**

SICILY (sīs'ī-lŷ), an island in the Mediterranean, the largest and most populous tract of land in that sea. It belongs to Italy, from which it is separated by the Strait of Messina, a channel about two miles wide. The island is triangular in form and has an area of 9,700 square miles. On the northern coast are the important gulfs of Palermo and Castellamare and on the eastern is the Gulf of Catania. The coasts of these inlets are quite steep, but the southern coast is generally flat and quite reg-

ular. The surface is diversified with mountain ranges apparently extending from the southern part of Italy, reaching heights from 4,000 to 6,000 feet, but Mount Etna, in the eastern part, has an elevation of 10,865 feet above sea level. Orange groves, vineyards, and mulberry gardens cover the mountain slopes, while forests abound in the higher altitudes. The valleys and plains bear wheat, maize, flax, cotton, hemp, corn, tobacco, oats, barley, and vegetables.

The climate of Sicily is healthful, especially in the region of Mount Etna, which is densely populated, although it is exposed to earthquakes and volcanic eruptions. Fogs prevail along the coasts in the autumn and the summer heat is quite intense. Rainfall is abundant for the production of cereals and fruits, and snow and ice are of rare occurrence, except on Mount Etna. Among the fruits are oranges, lemons, dates, almonds, figs, olives, grapes, and pomegranates. It has a corresponding production of dried fruits and wines. The principal manufactures are wine, macaroni, soap, earthenware, dairy products, cotton and silk goods, clothing, sugar, hardware, and machinery. Sardine and tunny fisheries take a high rank. The domestic animals include cattle, horses, swine, sheep, and poultry.

Sicily has a large export and import trade, mostly with Italy, but also with other European countries and Northern Africa. Railroad building has made rapid progress. At present the island has about 500 miles of railways in operation. The principal seaports are Palermo, Messina, Syracuse, Girgenti, Marsala, and Termini. The rural population is still in a rude condition educationally, only a small per cent. being able to read and write, and brigandage and the vendetta still prevail. Caltanissetta, population 25,500, is the capital, but Palermo is much the largest and most important city of the island.

HISTORY. Two classes of people, known as the Iberian Sicani from Spain and the Siculi from Italy, were the earliest inhabitants of Sicily, but they were pressed toward the interior by colonies of Phoenicians and Greeks. The cities of Messina, Syracuse, and Agrigentum were founded by the Greeks in the 8th century B. C. These Greek settlements became so powerful that the Phoenicians were driven to the western part, and Grecian art, literature, and industry attained a preponderance of influence in the island. In the early part of the 5th century B. C. the Carthaginians became a powerful influence in conjunction with their kinsmen, the Phoenicians, and a prolonged struggle finally ended in favor of the Greeks in 480 B. C., in

which the Carthaginian commander, General Hamilcar, was slain. Hannibal next led an army of Phoenicians and Carthaginians against the Greeks, and the First Punic War gave a part of Sicily to the Romans. In 212 B. C. the entire island became a Roman province. After the decline of Rome, Sicily was invaded by the barbarian tribes from the north, the Vandals conquering it in 440 A. D. The Goths under Theodoric had possession of Sicily until 535, when it became a part of the Byzantine Empire. The Saracens conquered it in 827, holding possession for more than a century, but they were finally driven from the island by the Normans under Roger de Hauteville. His son assumed the title of King of Sicily and Italy as Roger II. in 1130, calling his dominion the kingdom of the Two Sicilies.

The *Two Sicilies* included the island of Sicily, the kingdom of Naples, and a number of islands in the Mediterranean. The line of kings became extinct in 1189 and Henry VI. of Germany, of the house of Hohenstaufen, secured the kingdom by virtue of his marriage to Constantina, daughter of Roger II., and the crown remained in the German emperors until 1264. Pope Urban IV. bestowed the sovereignty on Charles of Anjou, brother of Louis XIV. of France, in the latter year. A long contest for the throne followed. It ended favorably to the French and brought about the execution of the legitimate heir, Conradin of Swabia, in 1268. Sicily became freed from the French by the aid of King Pedro of Aragon in 1282, the contest being known as the *Sicilian Vespers*, and a separation from Naples took place, the latter coming under the Angevin dynasty and Sicily under the kings of Aragon.

Sicily remained in possession of the Aragonese sovereigns until 1505, when it was placed under Spanish dominion in the persons of Ferdinand and Isabella. Ferdinand also secured possession of Naples, and both countries remained under Spanish dominion until the War of the Spanish Succession in 1700-13, when Sicily was given by the Peace of Utrecht, in 1713, to the Duke of Savoy, and Naples became a part of Austria. In 1720 Sicily also was annexed to Austria. The Two Sicilies remained under Austrian dominion until 1734, when both Sicilies were annexed to Spain. They were a Spanish possession practically all the time until 1860, the only exception being the brief French rule in Naples from 1806 to 1815 under Joseph Bonaparte. Garibaldi gave rise to a revolution in 1860, taking Palermo on May 11 of that year and following his successes on the island with an invasion of southern Italy. He met little opposition, the people rallying to his standard, while Francis II. fled from Naples.

At that time the Two Sicilies ceased to exist as a government by that name, and both joined in the new kingdom of Italy under Victor Emmanuel.

SICKLE (sĭk'k'1), an implement for cutting grain or grass. It consists of a steel blade which is curved in the form of a hook, and on one end is a handle fitted on a tang. In some sickles the blade is notched on one side so it has a serrated edge for cutting. The sickle is held in one hand, while the other hand is used to grasp a quantity of standing grain, which is held firmly as the sickle is applied to cut the stems. Reaping machines utilize the sickle, but it is made by attaching steel sections to a metallic bar, which is driven rapidly by the driver through the effect of geared wheels.

SIDEREAL TIME (sĭ-dĕ'rĕ-əl), a measured portion of duration, based upon the apparent motion of the stars. A sidereal year consists of 366.2563612 sidereal days. The sidereal day contains 23 hours, 56 minutes, and 4.098 seconds. See **Day**.

SIDNEY (sĭd'nĭ), a city of Ohio, county seat of Shelby County, 40 miles north of Dayton. It is on the Miami River, the Miami and Erie Canal, and the Cleveland, Cincinnati, Chicago and Saint Louis and the Cincinnati, Hamilton and Dayton railroads. The surrounding country is fertile. Among the chief buildings are the county courthouse, the high school, and several churches. It has a public library, electric lighting, and a municipal system of waterworks. Saddlery, machinery, flour, carriages, and clothing are among the leading manufactures. The vicinity was settled about 1800 and the place was incorporated in 1819. Population, 1910, 6,607.

SIDON (sĭ'dŏn), or **Zidon**, anciently an important city of Phoenicia, on the eastern coast of the Mediterranean, about midway between Tyre and Beyrout. It occupied an imposing site between Mount Lebanon and the sea, and its importance was such that the entire region surrounding it was commonly spoken of under its name. It is thought that the city was founded in 1600 B. C. and that its greatest prosperity was from 1600 to 1200 B. C. For 350 years it ranked as the principal city of Phoenicia, extending its colonies and commerce to all the lands of ancient times. The city was able to withstand the assaults of the Israelites under Joshua, and never came wholly under the dominion of the Jewish nation. At length it was conquered by Tyre, but under the Assyrians, Persians, and Chaldeans retained local independence. At the time Alexander the Great invaded Syria, in 333 B. C., it enjoyed much prosperity and willingly surrendered to that conqueror. Subsequently it lost prestige

under the Syrians and Romans, and in the Middle Ages was taken by the Crusaders. The site of this renowned city is occupied by Saida, a seaport of considerable enterprise. It has manufactures of cotton and silk textiles, glass, dyes, and pottery, and a considerable export and import trade. Population, 11,685.

SIEGE (sēj), the location of an army before or around a fortified place for the purpose of compelling the garrison to surrender. The forces that invade a country resort to a siege not only to capture a stronghold of the enemy, but with the additional purpose of preventing the receipt of supplies and reinforcements. Sieges are either by the army or navy and sometimes by both military and naval forces, though where ships are employed the investment partakes of the nature of a *blockade*. An assault is usually made instead of resorting to a siege, unless it is apparent the former would be impossible or result in an unusual loss of life. The besieging party usually approaches a fortified place by passages and advanced works, which cover the besiegers from the fire of the enemy. In many cases bombs are thrown at intervals against or upon the fortified position. Those within the fortification, in anticipation of a siege, frequently locate mines at convenient intervals, to be exploded by electric wires on the approach of the enemy. On the other hand, the besiegers frequently tunnel under the walls and attempt to destroy them by firing mines.

The siege of La Rochelle under Cardinal Richelieu, in 1628, which covered a period of fourteen months, is a notable investment of the Middle Ages. The French and Spanish besieged the rock of Gibraltar for four years, beginning in 1779. The German army besieged Metz during the Franco-German War, in 1870, and after a blockade of seventy days received the surrender of 173,000 men. The siege of Plevna, in 1877, was a prominent feature of the Russo-Turkish War. Port Arthur, though considered impregnable by the Russians, was captured by a combined siege of the Japanese navy and army in 1904.

SIENA (sě-ă'nà), or **Sienna**, a city of Italy, in Tuscany, 58 miles south of Florence. It occupies a site on three hills, has narrow and tortuous streets, and is surrounded by a wall. A railroad line connects it with Florence, Pisa, and other cities. It is surrounded by a fertile country, which produces fruits, cereals, and dairy products. Among the larger structures is a Gothic cathedral dating from the 13th century, which contains fine frescoes of scenes in the life of Pope Pius II. and sculptures by Donatello and other noted artists. Other noteworthy buildings

include the university, the Church of San Giovanni, the Oratorio di San Bernardino, the institute of fine arts, the public opera, the municipal library, several Gothic palaces, and a number of convents and secondary schools. Among the manufactures are lime, hats, clothing, olive oil, cotton and woolen fabrics, earthenware, and musical instruments. Though founded by Julius Caesar, it contains no remains of antiquity and appears to have obtained its greatest importance in the Middle Ages, when it had about 200,000 inhabitants. Siena produced a school of artists, which included Guido da Siena, Simone Martini, and Baldassare Perruzzi. Population, 1906, 38,665.

SIERRA LEONE (sĭ-ěr'ra lě-ō'ně), a colony of Great Britain, on the west coast of Africa. It is situated northwest of Liberia. The colony is separated from the French possessions on the north by the Great Scarcies River and has a coast line of 180 miles on the Atlantic. The total area of Sierra Leone proper, including its newly added dependencies, is about 30,000 square miles. The coast regions are largely lowlands, which portion has a hot and malarial climate, and there is a gradual rise toward the northwest to the vicinity of the Kong Mountains. Among the products are India rubber, coffee, palm oil, copal, cotton, hides, maize, and fruits, all of these being exported. It has recently developed considerable exports of lumber and various minerals. The region was first discovered by the Portuguese under Pedro de Cintra in 1462, who gave it its present name, but efforts to colonize were not made until in 1786, when the English planted a settlement and built a fort. It was made the seat of government of the British settlements on the west coast of Africa in 1866, these including Sierra Leone, Lagos, Gambia, and the Gold Coast.

The government is administered by a resident governor, assisted by executive and legislative councils. Freetown, the capital and principal city, has a population of 30,000. It was long the most important trade center of West Africa and is now the headquarters for the British military forces in West Africa, but its trade has been diminished considerably by the activity of the French in building up their possessions, particularly Senegal. Several lines of railway have been built inland. The government is giving encouragement to schools and a number of secondary institutions. The colony proper has a population of 78,809, including about 45,000 Christians. Sierra Leone Protectorate, organized in 1896, has a population of 998,500.

SIERRA MADRE (mä'dră), the name generally applied to the great chain of Cordilleras,

or Rocky Mountains, in Mexico. They extend north into Arizona and New Mexico. The slopes toward the east are gradual, but there is an abrupt descent on the Pacific side, thus forming marked precipices and grand scenery. In these mountains are silver mines of much value. They rise to heights approximating about 10,000 feet above sea level.

SIERRA MORENA (mō-rā'nà), a mountain chain in Spain, separating Andalusia from New Castile and forming the watershed between the Guadiana and Guadalquivir rivers. The highest peaks rise 5,500 feet above sea level. In these mountains are deposits of lead, quicksilver, lignite, and sandstone. They are mentioned as the scene of several incidents in "Don Quixote."

SIERRA NEVADA (nē-vā'dà), a chain of mountains in California, traversing the east central part of that State. It extends from southeast to northwest for 450 miles. The highest peaks are in the southern part, including Mount Whitney, 14,978; Mount Tyndall, 14,386; and Mount Lyell, 13,217 feet. Mount Shasta, in the northern part, is 14,551 feet above sea level. The mountain range has valuable deposits of gold, silver, and other minerals. It is penetrated by many valleys and passes. These include the Tehachapi Pass, in the south; the San Juan Pass, in the central part; and the Truckee Pass, which is traversed by the Southern Pacific Railroad to reach the valley of the Sacramento. Extensive forests of deciduous trees abound in the lower slopes and fine coniferous timber is found in the higher sections, extending to a height of 8,000 feet. Among the mountains are numerous valleys of great fertility, especially the Yosemite.

SIERRA NEVADA, an elevated mountain chain of southern Spain, stretching from near Cape Gata westward into Granada. It has the highest peaks of the Iberian Peninsula. Mulhacen, 11,675 feet, is the culminating peak. Its summit is covered with snow perpetually. The scenery is picturesque and there are numerous fertile valleys and deposits of valuable minerals.

SIGNALS, the means of communicating intelligence by sound or sight. Signals are utilized principally in military operations and for heralding prospective changes in the weather. The first signals used for conveying information to a distance consisted of torches and beacon lights, which served to convey information at night, while flags and other signals were employed in daytime. Ultimately an elaborate system of signals came into general use among the civilized nations in connection with commercial navigation, and in 1857 the international code of signals was devised, which has since gone into general use. In this system are eighteen flags. They are

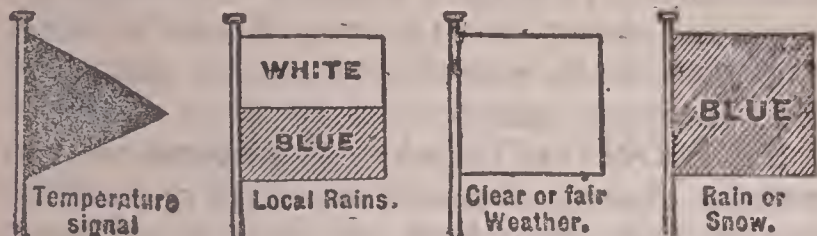
so ingeniously colored and arranged in groups, and there are such well-contrived plans for displaying them, that 78,000 different signals are possible, though only four flags may be used at once. The flags are colored blue, yellow, red, black, and white. The last two mentioned are used chiefly, as they are most easily distinguished at a distance.

Each flag used in the code of signals is designated by a letter. It is suitably colored and designed so that words and terms may be represented. In extremely windy weather figures of wood or iron are drawn up instead of flags, the figures used chiefly being spheres, cones, cubes, and cylinders. Signal books, containing a full exhibit of all the signals and their meaning, are published in the different languages of the nations making use of them, thus supplying a very practical system for ships in international trade and communication. Electric lights displayed in different colors are used for long distances at night, while five fireballs are shot into the air for short range, green and red being the common colors. It is necessary to signal vessels in fogs and snowstorms, when whistles or horns are blown or bells are rung.

Signals of various kinds are employed in the army and navy, thus facilitating communication between different parts of the army and between warships. Plans of this kind were employed from remote antiquity among the Greeks, Romans, and Phoenicians, and throughout the Middle Ages. The value of a systematic use of signals was recognized in America in colonial times, and signal systems have since been put in a very efficient condition. Congress authorized the purchase and equipment of signal apparatus in 1860, and after the beginning of the Civil War schools were instituted to instruct those who were to accompany the army in the field. Albert J. Myer originated a system of signals of much value. He was given the supervision of field signaling, with the rank of major. Congress provided for reorganizing the signal service in 1866 and in 1870 added a meteorological division, but in 1891 the Weather Bureau was transferred to the Department of Agriculture. The government maintains a school of instruction in military signaling at Fort Riley, Kansas, where instruction is given in photography, electricity, and topography, as well as in the practical use of flags, telephones, lanterns, searchlights, rockets, the heliograph, and other apparatus.

Weather signaling is carried on by the Weather Bureau, which is under the Department of Agriculture. The central station at Washington receives telegraphic communication from all parts of the country three times a day, and from these

forecasts for the next 24 hours are made and sent to all sections. Signal flags are displayed in thousands of cities and towns as soon as forecasts are received from Washington, or some other distributing center. In the accompanying illustration are shown the flags used to indicate



WEATHER SIGNALS.

the forecasts of weather and temperature. It will be observed that a black triangular flag serves as a temperature signal; a white-blue flag, local showers; a blue flag, rain or snow; and a white flag, clear or fair weather. To indicate the approach of higher temperature, the black triangular flag is displayed over the weather flag, while a lower temperature is predicted by placing it below the weather flag. Warning of a cold wave is signaled by displaying a white flag with a black center. The press furnishes valuable means for warning the public, and through it the reports become generally circulated by means of the daily newspapers. Similar systems are maintained in all the leading countries, which, in many instances, communicate with each other.

SIGNAL SERVICE, the branch of the public service of any country as a means to transmit intelligence by signals, especially in the army and navy. Experienced signalists consider that signaling at five miles is at a short range. A rod twelve feet long is sufficient to transmit messages by signals a distance of ten miles. In the military service it is possible, by means of a well-understood code, to communicate with an army at a distance of 25 miles. The invention of serviceable balloons has greatly extended the usefulness of signals, and these means have been greatly added to by the use of electric lights and wireless telegraphy. It is well understood that the signal corps plays an important part in a battle, especially if the line of action extends over a distance of 80 to 100 miles. The British signal service is under the jurisdiction of the Royal Engineers Telegraph Corps, which consists of about 250 men and officers. In the United States the Signal Corps consists of 800 men. They are supplied with flags, balloons, signal lights, and various instruments, such as the telephone, heliograph, and the telegraph. More recently wireless telegraph apparatus has been added to the equipment. A school of instruction in signals is maintained at Fort Riley, Kansas.

SIGN LANGUAGE. See **Deaf-mutes.**

SIKHS (sēks), meaning disciples, the name of a religious sect of northwestern India, whose tenets include the worship of one invisible God. It was founded by Nanak Shah (1469-1539 A. D.), who conceived the laudable plan of unifying all the Hindu castes. His preaching favored universal toleration, encouraged acts of benevolence and self-denial, and advocated equal social and political rights to all men. The Sikh state was founded by Guru Govind, the tenth teacher after Nanak Shah, who made his followers a military power, chiefly to defend the faith against persecutions by the Mohammedans and other religious classes. His adherents were allowed to wear long hair and beards. They had equal recognition in all social and political affairs, and their diet was left largely to the individual taste of each. This teacher compiled the sayings of Nanak and his immediate successors in the two works entitled *Adi Granth* and *Dasema Padshah*, which he intended should supersede the *Puranas* and the *Vedas*.

The Punjab became the seat of their influence, which they freed from the Mohammedan government in 1792, and Runjeet Singh was made the ruler of the Sikhs, assuming the title of Maharajah. Multan and other regions were annexed and the territory under Sikh control included about 70,000 square miles, but after the death of Runjeet the Sikh empire came into collision with the British government of India, and the Sikhs were successively defeated in decisive battles in 1845-46. A rebellion occurred in 1848, but they were finally conquered the following year and their possessions were annexed to British India. They supported the British in the mutinies of 1857, chiefly from fear that a Mohammedan empire might be restored. The Sikhs number about 1,875,000 at present, thus forming much the larger part of the inhabitants of the Punjab. They are mainly of Jat origin and engage chiefly in agricultural pursuits.

SI-KIANG (sē'kyāng), a river in the southwestern part of China. It has its source in the province of Yun-nan, has a tortuous course toward the southeast, and, after flowing about 985 miles, discharges into the China Sea near Canton. Several important rivers flow into it, including the Yü-kiang, and it has been improved for navigation by a network of canals. It has an estuary about 75 miles wide and is navigable for some distance by the largest vessels, but extensive rapids obstruct the upper course.

SILAGE (sī'lāj). See **Ensilage.**

SILENUS (sī-lē'nūs), in classical mythology, the son of Hermes or Pan and the companion of Dionysus. Originally he was the god

of flowing water, but later came to be regarded a jovial man with a bald head and a tendency to become intoxicated. It is said that he despised the gifts of fortune and preferred to practice the arts of wisdom. A temple at Elis was dedicated to him.

SILESIA (sĭ-lĕ'shĭ-à), in German *Schlesien*, a German province of Europe, now belonging to Germany and Austria. It has a total area of 17,554 square miles, of which 15,566 square miles belong to Germany and 1,988 square miles to Austria. The former is a province in south-eastern Prussia, lying south of Posen and Brandenburg, and is divided by the Oder River. The soil is exceedingly fertile and there is an abundance of timber and pasturage. It has deposits of various minerals, including coal, sulphur, lead, copper, iron, and silver. In several sections are mineral springs. Among the soil products are chicory, beet roots, flax, hops, hay, corn, tobacco, wheat, and fruits. The manufactures embrace leather, wine, hardware, glass, sugar, machinery, cotton textiles, woolens, linen and silk goods, and clothing. Breslau is the capital and principal city. The total population of the province in 1905 was 4,942,611. Austrian Silesia is quite mountainous. It has valuable mineral deposits, extensive forests, and manufactures of textiles, machinery, and lumber products. The population in 1906 was 618,405.

Silesia was occupied by German tribes at the beginning of the Christian era. They moved westward in the 6th century and the region became populated with Slavonians. After belonging to Moravia and Bohemia, it became part of Poland in the 10th century. In the 14th century it was divided into a number of small states that were annexed to Austria in 1526. Frederick II. of Prussia laid claim to it in 1740 by virtue of an agreement made by the Duke of Liegnitz in 1537, to the effect that the Elector of Brandenburg should secure sovereignty over it in case the former left no direct heir. Three destructive wars between Prussia and Austria followed. The first occurred in 1740-42, the second in 1744-45, and the third in 1756-63. The last mentioned is generally termed the Seven Years' War (q. v.).

SILICA (sĭl'ĭ-kà), a compound formed of oxygen and silicon. The latter is an abundant nonmetallic element and enters into the composition of many rocks. Silica is one of the most widely distributed materials, occurring either in amorphous masses or in a crystallized form. It forms a constituent part of rocks and enters largely as a productive element into many soils, serving as an important food for various plants. Though not soluble in pure water, it is held in solution by water, and enters into the structure

of animal and vegetable tissues. It is known as *rock crystal*, when it is in a native crystalline state, and as *amethyst*, when its crystals are of a delicate purple color. Silica occurs in the form of carnelian and chalcedony and as a constituent of opal, mica, agate, feldspar, serpentine, and hornblende. In various forms it is valuable as a stone and enters into the manufacture of porcelain, glass, and a number of hydrates which yield salts known as *silicates*.

SILICON (sĭl'ĭ-kŭn), or **Silicium**, a non-metallic element, the most abundant one, next to oxygen, that abounds in the crust of the earth. It is insoluble in water, but dissolves readily in hydrofluoric acid or a warm solution of potash. Powdered silicon is a nonconductor of electricity. When heated in air or oxygen, it burns brightly and with such intense heat as to fuse the external crust of silica. It is obtained in a dull brown powder by passing the vapor of chloride of silicon over heated potassium contained in a glass tube, or from the aqueous solution of the gaseous fluoride of silicon.

SILK, a delicate fibrous substance produced by many insects, but especially by the larvae of silkworms to form their cocoons. The silk of commerce is obtained chiefly from the common silkworm (q. v.). To obtain the silk, the cocoon is taken from the twig to which it is fastened before the moth commences to eat its way out, and is placed in warm water. This not only kills the moth, but also softens the gum that holds together the threads of silk. The silk is spun backward and forward to cover the whole cocoon, not wound around it like thread on a spool, and after being soaked can be easily loosened and placed on a reel. The vat containing the hot water usually has four parts, in each of which a quantity of cocoons is placed, and from each part one thread is taken, thus joining the ends of four different threads. Connected in this way, they are drawn through guides to large reels moved by machinery and wound as one thread. When one of the filaments has been taken from a cocoon, another is put in its place, thus forming a continuous thread. The silk on the outside of the cocoon, called *floss silk*, is of poor quality, but when about one-half is unwound the thickness decreases fully 50 per cent. and the silk assumes the finest quality. Much of the gummy matter is taken off when put on the reeling machine, but the part still remaining is afterward removed, and the threads are wound on bobbins.

Silk is ready for the weaver when it has undergone a process called *throwing*. This involves unwinding it from the bobbins, twisting it in a machine, and preparing threads for spinning and weaving. The process depends largely

upon the articles to be manufactured, for which purpose the silk is carefully selected and the threads are variously made. Singles are used in weaving plain silk and ribbons, and double-twisted is employed in making warps. Raw silk obtained from the cocoon is of a bright yellow color, but it is variously dyed in the process of manufacture. Formerly the waste materials accompanying the unwinding of the cocoons and the twisting of the threads were considered useless, but a process was discovered in 1857 by which the outer silk of the cocoons, defective cocoons, and ordinary waste resulting from handling may be utilized profitably. Silk weaving from the prepared thread is a process quite similar to the weaving of woolen and cotton fabrics.

It is thought that the manufacture of silk fabrics originated in China, whence it was introduced into Europe and finally brought to America. The wife of a Chinese emperor is credited with unwinding the first cocoon in 2600 B. C., and for centuries the industry was guarded carefully lest other countries should enter into competition. Several Persian monks are said to have carried the eggs of silkworms from China to Constantinople in a hollow cane about 530 A. D., and soon after marked interest was given to silk culture in Southern Europe. Spreading rapidly from Constantinople into Greece, Sicily, Italy, Spain, and France, it has continued to form an important industry in Southern Europe until the present. Little progress was made in Great Britain until in 1685, when the Edict of Nantes caused many silk weavers to leave France and seek refuge in England. An effort to introduce silk culture into the American colonies was made by James I., who sent eggs to Virginia and offered rewards for the production of raw silk. However, tobacco proved more profitable and little progress was made until about the middle of the last century, when several associations were formed to promote silk culture in New Jersey, the Carolinas, Florida, California, and other states. Large quantities of raw silk have been imported into the United States for many years, which, aided by home production, have greatly stimulated domestic manufactures. In 1860 only 13 per cent. of the silk used in the United States was of American manufacture, but in 1880 it reached 30 per cent.; in 1890, 55 per cent.; and in 1900, 85 per cent.

The importations of silk goods into Canada and the United States are now chiefly fine products. They come principally from the hand looms of Crefeld, Zurich, and Lyons. China alone produces about one-half the raw silk of the world, and Japan and Italy take the next rank. Considerable quantities are manufactured in

France, Germany, Austria, Turkey, Greece, Spain, India, and Persia. It is estimated that about one-third of all the raw silk produced in the world is handled in the mills of the United States, the largest importations being from China, Italy, Austria, France, India, and Japan. At present there are about 650 silk factories in that country, most of which are in New Jersey, New York, and Pennsylvania. They produce products annually that have a value of \$115,526,500. The annual importations of raw silk are valued at \$35,500,000 and the amount annually consumed is correspondingly large. The present rate of progress in sericulture gives reasonable assurance that the United States will within a comparatively short time produce the greater portion of raw silk consumed in its factories.

SILK, Artificial, a manufactured product which resembles pure silk, now used to some extent as a textile. It is made chiefly of cellulose prepared from cotton and the pulp of soft woods. The cotton is carefully carded into wadding before being treated with a mixture of nitric acid and sulphuric acid, in the proportion of 15 parts of the former to 85 parts of the latter. By this process the cotton is converted into nitro-cellulose of a clear blue color, after which it is pressed and carefully washed, and is then formed into collodion by dissolving in a preparation of ether and alcohol. After standing in this form for several weeks, it is run between steel rollers and forced through minute tubes into greatly diluted nitric acid, which causes the streams of collodion to be converted into fibers. The fibers are then reeled, are dried by warm air, and are subjected to several washing and drying processes, after which the threads are ready to be spun and dyed like pure silk. This product, though elastic and lustrous like natural silk, is less durable. It can be produced at about one-third the cost of real silk.

SILKWORM, the larva of a moth that produces a dense silken cocoon of value commercially. The silkworm cultivated almost universally came from northern China, being a moth of the family *Bombycidae*, but there are about 400 species, though some are not valuable in silk culture. The body of the silkworm is thick and hairy. In a mature state it is about an inch long and has stout legs, and the large wings are marked with dark lines. The body of the female is larger than that of the male, and both die soon after the female deposits its eggs. These are about the size of a mustard seed and are fastened to the leaf of a mulberry tree, or some other object, by a gummy substance. The eggs may be kept a long time in a dry, cool place. They

hatch soon after coming into a warm place, and the young insects feed with remarkable greed on the leaves of the mulberry tree. They remain in the caterpillar state from six to eight weeks, in which time the skin changes four times, and the body finally assumes an ashy color and a length of nearly three inches. In the body are twelve segments, six anterior or forelegs, ten fleshy

are required to complete the cocoon, and after finishing it the insect assumes a waxy-white color and soon forms the second stage of life, or the pupa state. In this pupa or chrysalis stage it remains about three weeks, when it emerges as the imago, or perfect moth. Insects designed to supply silk material are not allowed to develop into the perfect moth, but are thrown into warm water and killed, while the silken threads are unwound and used in the manufacture of thread and fabrics. The moth produces from 300 to 500 eggs. One ounce of eggs produces 100 pounds of cocoons, while twelve pounds of cocoons yield one pound of raw silk. Among the conditions necessary for successful silk culture are pure air, warmth, and suitable food. Thrifty mulberry trees are essential, the most valuable being a species of the white mulberry. The annual production of raw silk in the world is estimated at 48,500,000 pounds. See **Silk**.

SILKWORM GUT, a material prepared from the viscid secretion found in the body of a young silkworm, immediately before it begins to spin the cocoon. The insect is submerged in vinegar for several hours, and the substance is then extracted from the dead body. By soaking in a caustic solution the thread becomes loosened and may be removed easily. It is used for the manufacture of *gut*, which is employed extensively in making lines for anglers.

SILURIAN SYSTEM (sī-lū'rī-ān), a division of the rocks of the Paleozoic group, preceded by the Cambrian and followed by the Devonian systems. It is so named from the Silures, a people of ancient Britain, the name being first applied by Murchison. Two more or less clearly defined formations make up the division, known as the Lower Silurian and the Upper Silurian, but the former of these is usually designated as Ordovician by English geologists. Silurian rocks are found in all the continents. They are especially abundant in the

eastern part of North America, extending from Quebec southward through New York, Maryland, and Tennessee. They are especially prominent at Niagara Falls, at the Delaware Water Gap, and in the Kittatinny Mountains. Other deposits occur in Georgia, Nevada, and the Black Hills. Although fossils of seaweeds are abundant, the land plants are not well represented. Invertebrate animals were very numerous and of large size during the time these rocks were formed. Many minerals occur within the deposits, such as rock salt, gypsum, and hematite iron ore.



SILKWORM.

1 Male Moth; 2, Female Moth; 3, 3, Silkworms; 4, Chrysalis; 5, Cocoon.

legs in the hind part of the body, and a large mouth.

The young insects stop eating about the fifth week and find a suitable place to spin their cocoons, which they prepare from silk threads produced by their own bodies. These threads are made from a glutinous substance secreted by two tubular glands near the mouth, one on each side of the body, the gum being drawn through a single tube at the upper lid and spun into silk. In this way the thread of silk is made to consist of two strands and varies in length from 250 to 300 yards. From three to five days

SILVER, a precious metal. It is found in the native state and in combination with many other elements, among them gold, sulphur, arsenic, antimony, chlorine, lead, and copper. Early writings make it certain that silver was known to the ancients as early as gold. This is due probably to the circumstance that silver is often associated in a natural state with gold, and that both may be fused at an ordinary heat. Pure silver is the most brilliantly white metal and is exceeding malleable and ductile. It is softer than copper, but is harder than gold, and takes a fine polish. Silver may be beaten into sheets of only one-hundred-thousandth of an inch in thickness, and drawn out into a wire finer than a human hair. As a conductor of heat and electricity it excels all other metals. It has a specific gravity of 7.14 and a density of 10.5. The melting point is about 1,832° Fahr.

Silver does not tarnish on being exposed to the air, thus forming an important metal for plating articles and in the manufacture of jewelry and tableware. It is employed extensively in coinage and glass staining, in making compounds useful in photography, and in forming many alloys. When the silver ores do not contain lead, the silver is extracted by amalgamating it with mercury and driving off the latter by the action of the heat. Several complicated processes are utilized in extracting silver. In all of them the silver is first converted into silver chloride, and the metal is set free from the chlorine by amalgamation. When the silver ores contain lead, it is extracted by smelting. This method is based on the affinity that silver has for lead; the latter, acting as a solvent, serves to extract the silver from baser metals united with it. Later the silver is separated from the lead by cupellation, the silver remaining intact while the lead is formed into an oxide.

Silver was secured almost entirely from regions producing it in the native state, or nearly pure, up to about the middle of the 19th century, but since then newer discoveries of silver in combination with other minerals have led to the adoption of methods of mining and extracting that resulted in utilizing the silver ores of much lower grade than were formerly thought to be of utility. The world's supply of silver was secured chiefly from Mexico and South America prior to that time, but since then Canada and the United States have become important in the production of silver. Germany is the largest silver-producing country of Europe. Its mines have taken high rank since 1623, and large bulks of native silver have been secured from its deposits. Considerable quantities of silver are obtained in Bohemia, Norway, Spain, and Hun-

gary, but the most important mines in the world are those of North and South America.

A silver mine in Nevada, known as the Comstock Lode, is one of the first great silver mines of the United States and ranks as one of the most valuable. Since its discovery, other vast veins and deposits of silver have been found, including those at Leadville, Colo.; the Coeur d'Alene, Idaho; Granite Mountain, Mont.; Eureka, Nev.; and Kingston, N. M. Besides these are many other noteworthy deposits and mines, all containing more or less gold, iron, sulphur, and other elements in connection with the silver. The rank taken by the leading silver-producing states is usually in the following order: Colorado, Montana, Utah, Idaho, Arizona, Nevada, California, New Mexico, Texas, Washington, South Dakota, and Oregon. Canada is now one of the leading silver-producing countries, the most extensive mines being in Ontario and British Columbia.

Mexico has first rank in the production of silver, producing more than any other country in the world. The most important mines are in the state of Zacatecas, which have been worked about 200 years. Large masses of silver are secured in the Andean countries of South America, particularly Peru, and in New South Wales and other provinces of Australia. The world's output varies greatly in value, owing to the fluctuations in the price of silver. Australasia produces almost 14,500,000 ounces per year. In 1908 the total value was \$130,360,980, which is about the annual average. In that year the world's output was 198,399,288 ounces. The eight leading silver-producing countries were:

	OUNCES.		OUNCES.
Mexico.....	70,608,487	Bolivia.....	6,892,500
United States.....	58,826,650	Peru.....	5,008,705
Germany.....	11,846,298	Spain.....	4,876,076
Canada.....	11,658,865	Japan.....	3,208,690

SIMCOE (sĭm'kō), a lake of Canada, in Ontario, situated between Georgian Bay and Lake Ontario. It is 30 miles long and 18 miles wide. The surface is 128 feet above Lake Huron, into which it discharges through the Severn River and Georgian Bay. The area is 160 square miles. Within the lake are many islands, and fine forests occur in the vicinity. Fishing and boating are good. In the winter it freezes over so firmly that it can be crossed with teams.

SIMILE (sĭm'ĩ-lē), a figure of speech, consisting of a word or phrase by which anything is likened to something else, in one or more of its aspects. The comparison in a simile is pointed out by certain words, such as *like* or *as*. Similes please because we are disposed to compare objects with one another, and statements are

embellished and impressed more forcibly on the mind. They should not be drawn from things which have too near an obvious resemblance to the object compared, nor from objects which present a likeness too faint and remote. Metaphor resembles a simile, but differs from it in that we directly substitute the action or operation of one object for that of another. The sentence, "He is the pillar of the state," is a metaphor; while, "He upholds the state, like the pillar which upholds an edifice," is a simile.

SIMOOM (sī-mōom'), or **Simoon**, a name of Arabic origin, applied to the hot, suffocating winds that frequently occur in the desert regions of Africa and Western Asia. These winds are caused by ascending currents of air due to the extreme heat over the sandy surface and to the influx of colder air from all sides, thus forming movements of air similar to a cyclone. In many regions of Arabia and Africa the surface becomes heated to 200° Fahr., thus giving it a peculiar dryness. The winds resulting from this greatly diversified temperature bear with them intense heat, choking dust, and even coarse gravel. They often prove destructive to animal life and vegetable forms. In some regions vast mounds of sand are transported and, when coming in contact with a storm of this kind, many persons accompanying caravans lose their lives. It is supposed that a simoom overtook the army of Cambyses, when crossing the desert to secure the riches from the temple of Jupiter Ammon, and that he and 50,000 of his troops perished. Simooms are most common in the spring and summer. They are greatly modified by the character of the surface of the region over which they pass. When of vast extent, they remarkably affect the movement of the air in neighboring regions.

SIMPLON (sīm'plōn), a pass in the Alps of Switzerland, near the boundary between Valais and Piedmont, Italy. The highest point is 6,592 feet above sea level. It was made famous by Napoleon I., who constructed a military road through it in 1800-06. This road was 42 miles long by 30 feet wide and contained several tunnels and 610 bridges. In 1898 the Simplon Tunnel was commenced between Brig and Isella, and was fully completed for use in 1905. It is about 12 miles long and has two passageways, each containing a single railway track. This tunnel surpasses the Saint Gotthard by about two miles and is the longest railroad tunnel now in use.

SINAI (sī'nā), a mountain region of north-western Arabia. It occupies a peninsula in the Red Sea, its western shore being washed by the Gulf of Suez and its eastern by the Gulf of

Akabah. The highest peak rises 8,552 feet above sea level, but there are three general groups, all of which cover a region that extends about seventy miles from north to south. These mountains are formed of granite, sandstone, and limestone, and in many places are extensive caves with inscriptions dating from various periods in history. The whole region has a peculiarly desolate appearance when viewed from the higher altitudes, but in some places are valleys containing fine pasture lands and palms and other trees. The inhabitants are principally Arabs, who lead a nomadic life and engage chiefly in rearing goats and sheep and cultivating fruit and vegetables. In the eastern part is Mount Jebel Katherine, height 8,160 feet. It towers considerably above the surrounding mountains in two peaks, the southern being known as the Mountain of Moses and the northern, as Mount Horeb. It is thought that the former peak is the one on which Moses received the Ten Commandments and the other laws by which the Israelites were bound to the obedience of God and the observance of rites. The Church of Saint Katherine was founded at its foot by Emperor Justinian about 527, and besides it there are several other chapels and churches at which pilgrims worship.

SINDH (sīnd), or **Sind**, a province in the western part of British India, adjoining Baluchistan, forming part of the Bombay Presidency. It has an area of 47,066 square miles. Agriculture is carried on almost entirely by means of irrigation, the water being secured by means of canals connected with the Indus River. In most places the soil is sandy and impregnated with alkali, but the delta of the Indus is sufficiently watered and highly fertile. The inhabitants consist largely of Baluchis and Juts, a race of Hindus, and settlements of Afghans are maintained in the northwest. Karachi is the capital. Population, 1906, 3,612,238.

SINDIA, or **Scindia**, the name of a ruling family of India, constituting a powerful line of Mahratta princes. The rulers of this line descended from Ranoji Sindia, a native of low caste, who rose to a high rank and received as a fief half of the province of Malwa in 1743. He died in 1754 and was succeeded by his son, Madhoji Sindia, who became the virtual ruler of India. His army was disciplined by Frenchmen and he captured Gwalior, Delhi, and Agra. He was succeeded by a number of powerful princes, but the influence of the dynasty rapidly declined.

SINGAPORE (sīŋ-gā-pōr'), meaning Lion City, a seaport of Asia, situated on a small island off the southern shore of the Malay

peninsula. The island is separated from the mainland by a narrow strait, and is one of several forming the British Straits Settlements. These islands have a generally fertile surface and a hot climate and produce sugar cane, nutmegs, pepper, cloves, ginger, tropical fruits, and vegetables. Formerly the island was the site of the capital of a Malayan kingdom, but it was captured and destroyed in the 13th century. Singapore was founded in 1819 to facilitate trade in the East Indies and now ranks as an important commercial center. The streets are regularly platted and well improved. It has a fine and safe harbor. Among the principal buildings are several cathedrals, Hindu temples, Mohammedan mosques, and Chinese joss houses. It has a number of hospitals, secondary schools, a museum, and zoölogical and botanical gardens. The newer improvements include electric lighting, pavements, public waterworks, sewerage, and rapid transit. On its streets may be seen a peculiar medley of Chinese, Hindus, Malays, Jews, Armenians, and Europeans. Population, 1906, 198,864.

SINGING, the art of uttering musical inflections or modulations of voice, or to produce music with the human voice. It depends in part upon training in the musical art, but to a considerable extent upon the physical development of certain organs of the body. The muscles of the chest and diaphragm are called into a complexity of action by singing, and the character of the tones is modified by the nasal chambers and the cavity of the mouth. However, the larynx, which contains the vocal cords, is of primary importance, since the length and form of the cords give pitch and some shades of quality to the voice. Air is taken in and expelled by the lungs through the muscles, and by this means sound is produced as the currents of air pass through the throat and act upon the vocal cords. No single individual is able to embrace the entire compass of the human voice, which ranges from C below the bass clef to F above the treble. Four parts are generally recognized in singing, these being the soprano, alto, or contralto, tenor, and bass.

The *soprano* begins at about E on the treble clef and includes the highest tones; the *alto*, or *contralto*, ranges from G on the bass clef to C on the treble clef; *tenor* extends somewhat lower than the contralto; and *bass* begins about C above the bass clef and includes all the lower tones. The average human voice has an extent of about twelve tones, but in trained singers the range is from two to three octaves. Two general divisions have been made of women's voices, the soprano and contralto, and three of men's,

the tenor, barytone, and bass, these ranging from the highest to the lowest pitch.

SINGLE TAX, a term used by Henry George in his "Progress and Poverty" to describe a theory of taxation. It embraces the economic reform of raising all municipal, county, state, and national revenues by a single tax on land values. The author of the work contended that other taxes should be abolished gradually until at length all the expenses of the government will be derived from the single tax. He maintained that such a system, when once understood and applied, would greatly simplify government as well as provide that the burden of public expenditures be borne equitably by all individuals. The claim of its supporters is that it will operate to lighten taxation on the agricultural districts, where land has a comparatively small value in relation to that of towns and cities, in which the real property rises to an enormous value without bearing the proportion of taxes properly to be derived from such districts. It is argued that a large number of officers and taxgatherers who are now employed could be dispensed with, and that they would naturally seek to develop some wholesome enterprise in their respective communities. On the other hand, it is claimed that fraud and inequality would be abolished, trusts and monopolies would be avoided, and trade would be given perfect freedom to expand as the communities develop, instead of being restricted by a multiplication of taxes.

The single tax is to be levied on the land in proportion to its utility and without regard to its improvements, thus making it unprofitable to hold vacant tracts at enormous prices for speculative purposes, and as a result all such tracts in cities and agricultural districts would be thrown open to labor. Another contention is that private ownership of land inclines to hold mankind in a condition of slavery, this view being taken because wealth is the result of labor applied to land, thus bringing the laborer to the mercy of the landowner. Hence, lands are not to be owned by individuals, but they are to be used at specified terms by the occupants. With this change in our economic system the supporters of the single-tax theory include the government ownership and operation of telephones, telegraphs, street railways, railroads, waterworks, and all similar enterprises. Besides, all excise and tariff taxes are to be abolished. The theory of a single tax has never been practically tested, but it has been partially applied in New Zealand and several other countries. Adherents to the single-tax theory have found their way into the Congress of the United States

and the legislative bodies of other countries, and their views have been attracting greater interest from time to time, either in whole or in part.

SING SING. See **Ossining.**

SIOUAN (sōō'an), the name of a group of Indians found in North America. These natives occupied the greater portion of the plains at the time North America was discovered, but scattered bands had settlements which extended to the Gulf of Mexico and eastward to the Alleghenies. They penetrated far into Canada, from central Ontario to the Rocky Mountains, but were represented by the largest numbers in the south central part of the Dominion. The Siouan Indians were hostile to the whites, resisting encroachment upon their territory with marked bravery and determination. Among the principal tribes may be mentioned the Sioux, or Dakota, the Winnebago, the Ponca, the Osage, the Omaha, the Flathead, the Assiniboin, and the Mandan Indians.

SIOUX (sōō), or **Dakota**, one of the largest tribes of Indians in North America, originally inhabiting the region west of the Mississippi, from the Arkansas River to Lake Winnipeg. They joined the British in 1812, but soon after concluded peace with the United States. In 1837 they ceded lands along the Mississippi and made further grants in 1851. Hostilities arose soon after because the government failed to keep its treaties with them, and in 1862 about 1,000 whites were killed in the vicinity of New Ulm, Minn. The public authorities promptly reduced them and executed forty of the leaders, but the uprising and damages inflicted cost the government about \$40,000,000. Several bands fled to the Territory of Dakota, while others found refuge in Canada. The government established a reservation near Yankton, S. D., and provided facilities to enable many of the Indians to engage in farming and stock raising. Sitting Bull remained dissatisfied and went to Washington, D. C., to secure a settlement of the differences, and afterward headed an uprising that terminated in the defeat and death of General Custer in 1876. The Sioux Indian tribe is still one of the largest, numbering about 25,000, and they are noted for their physical strength and skill in horsemanship. Many have made material advancement educationally and in the industrial arts.

SIOUX CITY, a city in Iowa, county seat of Woodbury County, on the Missouri River, 158 miles northwest of Des Moines. It is on the Illinois Central, the Chicago and Northwestern, the Great Northern, the Union Pacific, and the Chicago, Milwaukee and Saint Paul rail-

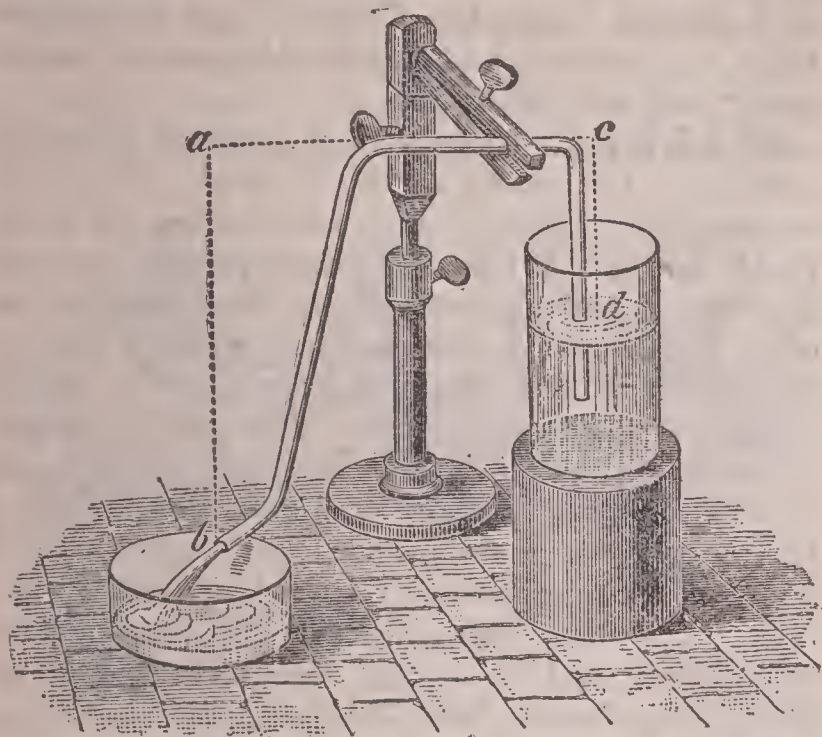
roads. It occupies a beautiful site on the bluffs of the river, which is spanned by several bridges, connecting it with South Sioux City, Neb. Among the principal buildings are the high school, the county courthouse, the Union Depot, the Federal building, the Lutheran Hospital, the city hall, the public library, the Saint Joseph's Mercy Hospital, the Y. M. C. A. building, the public library, and many fine churches. It is the seat of the Morningside College and of the Sioux City College of Medicine. Floyd Memorial Park, a tract of twenty acres, extends along the river.

Sioux City has a large jobbing and commercial trade. It has extensive railroad shops, foundries, breweries, and meat-packing establishments. Among its general manufactures are agricultural implements, furniture, starch, flour, stoves, soap, hardware, clothing, brick, and cured meat. The streets are well graded and many have been paved with brick, asphalt, or macadam. Waterworks, sanitary sewerage, and electric street railways are among the public utilities. The place was platted in 1854 and incorporated in 1857. Population, 1910, 47,828.

SIOUX FALLS, the largest city of South Dakota, county seat of Minnehaha County, on the Big Sioux River, sixty miles northeast of Yankton. It is on the Illinois Central, the Great Northern, the Chicago and Northwestern, the Chicago, Milwaukee and Saint Paul, and the Chicago, Rock Island and Pacific railroads. It is surrounded by a fertile farming and stock-raising country. In the vicinity are deposits of red granite and from quarries shipments are made to many points in the central west. Among the noteworthy buildings are the county courthouse, the high school, the State and Federal prisons, the public library, the post office, and many churches. It is the seat of the Norwegian-Lutheran College, the Sioux Falls University, the All Saints' School, and the State school for deaf-mutes. Immense water power is supplied by the falls on the Big Sioux River, which descend about 100 feet. It has manufactures of machinery, flour, stone products, and farming implements. It was settled in 1867 and incorporated as a city in 1883. Population, 1905, 12,283; in 1910, 14,094.

SIPHON (sī'fōn), a bent tube with limbs of unequal length, used for drawing liquids from one vessel into another. A common siphon is shown in the illustration. When the shorter limb (c, d) is immersed in the water of the glass vessel and the tube is filled with the liquid by suction or otherwise, the water flows out of the vessel because of the greater weight in the longer limb (a, b) until the liquid in the lower

vessel is at a level with the surface of that in the vessel from which it is drawn. The shorter limb is kept full by atmospheric pressure, and thus the height over which the liquid may be raised is restricted, lessening as the liquid decreases. It is possible to siphon water to a height of 32 feet, but denser liquids cannot be



SIPHON.

successfully siphoned to that height, unless pressure is put on the surface containing the shorter limb. The siphon is used for various purposes, especially in racking wines and liquors, in drainage, and in aqueducts.

SIREN (sī'rĕn), an instrument used to produce musical sounds and to aid in ascertaining the number of sound waves or vibrations per second which produce a note of a given pitch. The simple siren is a revolving disk with a series of holes pierced through the upper plate, to which is closely fitted a revolving disk with openings in an opposite direction. When air is forced by means of a bellows or some apparatus that furnishes pressure, the successive puffs of air produce tones. It is possible for the ear to distinguish the successive puffs when the disk revolves slowly, but a uniform note of a high pitch is obtained when the revolutions exceed ten per second. Large instruments of this kind are used as fog signals, but these are operated by steam.

SIRENIA (sī-rĕ'nĭ-à), an order of aquatic mammals, including the dugongs and the manatees. The body is formed somewhat fishlike and they live habitually in the water. These animals have no hind limbs and the fore limbs are present as flippers. They live on plants found in the sea and are most numerous in the deltas and mouths of rivers. Fossils occur in

large numbers in the Eocene Age. See **Dugong**; **Manatee**.

SIRENS (sī'rĕnz), in Greek legends, the sea nymphs that were seated on the island of the Sirens, off the southwest coast of Italy. Homer relates in his *Odyssey* that Circe warned Odysseus not to listen to the song of the Sirens, for all who gave ear to their enticing strains felt an unconquerable desire to leap overboard and join them, when they either perished in the hands of the nymphs or



A SIREN.

were engulfed by the waves. Odysseus had his crew fill their ears with melted wax, but he so fondly loved adventure that he had his comrades lash him to the mast under promise that they were not to release him until they were out of sight of the island, no matter how much he might implore them to set him free. As the alluring strains fell upon his ears, he forgot all danger and entreated his companions to release him, which they refused to do until the enchanted island had been lost to view. When the danger was past, he gratefully acknowledged the firmness of his followers, which had been the means of saving his life. The Sirens are represented in art as having the form and wings of birds and the faces of youthful maidens. In some sculptures they have the form of maidens with claws instead of feet.

SIRIUS (sī'rĭ-ŭs), or **Dog Star**, the principal star in the constellation Canis Major, or the Greater Dog, and the brightest star in the sky. It is situated a little below Orion and, according to mythology, is one of the hounds following that heavenly constellation. In the 2d century Ptolemy classed Sirius among the red stars, but it is now a brilliant white, its light being 325 times as great as that of a star of the sixth magnitude. The mass is about twenty times as large as the sun. Astronomers estimate that Sirius is about a million times farther from us than the sun and express the view that it is constantly receding from the earth.

SIROCCO (sī-rōk'kō), or **Scirocco**, the name given in Italy to the hot, oppressive wind blowing across the Mediterranean from the desert of North Africa. It usually continues to blow from three to six days and, like the

simoom, is inclined to bring on a feeling of exhaustion and suffocation. The greatest effect is felt in Malta and Sicily, but it also reaches the Ionian Islands and southern Greece.

SISAL (sī'säl), or **Grass Hemp**. See **Hemp**.

SITKA (sit'ká), a city of Alaska, on the west coast of Baranof Island, 1,135 miles northwest of Seattle and 160 miles southwest of Juneau. The harbor is deep and commodious and near it are a number of islands. Toward the inland rise snow-clad mountains, which have clusters of shrubs and trees on the lower slopes. The climate is cold, having an average temperature of 42° Fahr., while the rainfall is about ninety inches. Vegetables of various kinds are produced, but oats does not ripen in the short summer season. Among the principal buildings is a Greek church, an industrial school, a museum, a hospital, and a number of business storehouses. Salmon canning, mining, lumbering, and gardening are the chief industries of the surrounding country. A company of Russians established a trading post at Sitka in 1799, when it was called New Archangel, and after the purchase of Alaska, in 1867, it became the capital. In 1906 the seat of government was transferred to Juneau. Population, 1900, 1,396.

SIUT (sê-ōōt'), or **Assiut**, a city of Upper Egypt, capital of a province of the same name, 250 miles south of Cairo. It is situated on the west bank of the Nile, on the Cape-to-Cairo Railway, and is surrounded by a fertile section. A large dam is maintained across the Nile as a means of utilizing the water for irrigation. In the vicinity are ruins of extensive buildings erected at an early date in the history of Egypt, including tombs adorned with paintings and sculptures of historical value. The city has electric lights, public baths, and several fine mosques and bazaars. Pottery, pipebowls, clothing, and utensils are manufactured. Population, 1906, 46,106.

SIVA (sē'vā), the third person of the divine trinity of the Hindus, representing the principal of destruction. He is not mentioned in the Vedic hymns, but is referred to in many writings of the later Brahmanic literature. The linga is his symbol, which represents the creation that is to follow destruction. In statuary he is represented with five heads and three eyes, signifying the five-faced and the three-eyed. The representation of the Ganges, the sacred stream of the Hindus, is upon his head, and he holds a trident in one hand. As a destroyer of the world he is represented as of black color and he carries as his weapons an ax, a bow, and a thunderbolt. See **Vishnu**.

SIX NATIONS. See **Iroquois**.

SKAGER RACK (skäg'ēr rāk), or **Skager-rak**, a channel extending from the North Sea between Norway and Denmark, communicating with the Cattegat. The length is 140 miles; width, 75 miles; and the depth is sufficient for the largest vessels. Several good harbors are located on the coast of Norway and Sweden. The Skager Rack, the Cattegat and the Sound form an important connection between the Atlantic and the Baltic Sea.

SKAGWAY (skäg'wā), a port of entry in Alaska, at the mouth of the Skagway River, 202 miles north of Sitka. It is situated on the Lynn Canal and the White Pass and Yukon Railway, and has steamboat connections with Seattle and other cities on the Pacific. The chief buildings include those of the government, the public library, and several hospitals and public schools. Breweries, lumber mills, bottling works, and trading are the principal industries. It has a large trade in merchandise and supplies with points inland, especially the Yukon mining district. The first settlement in its vicinity was established in 1897 and it was incorporated in 1900. Population, 1900, 3,117.

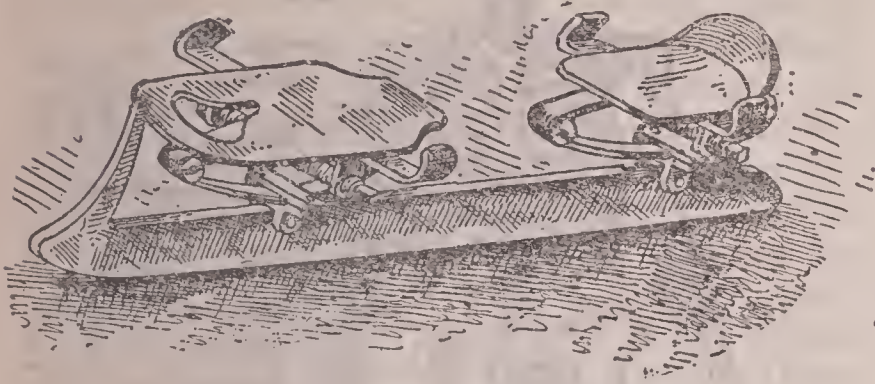
SKALD (skäld), or **Scald**, the name of a class of Norse poets, especially applied to those who were advanced in educational training. They wrote a class of literature in which the deeds and exploits of their warriors and ancestors received prominent mention. In later times the courts employed skalds to prepare writings of a dramatic character. Several hundred of these writers are mentioned in the Icelandic literature and by historians.

SKAT, the name of a game played with cards, considered the most intricate of the games in which cards are used. The 32 cards that enter into a game of euchre are used, but the picture cards are not double-ended. Only three active players take part, but one or two associates may join. This game was originated in Altenburg, Germany. It requires a manual or guide to aid the beginner.

SKATE (skāt), the name of several species of fishes of the ray family, having a peculiarly flat body. The snout of most species is pointed, the tail is long and slender, and the upper part of the body is of a grayish or a mottled color. Among the American species are the *barndoor* and the *tobacco-box* skates. Those of Europe include the *common* and *long-nosed* skates. The long-nosed skate has a remarkably long and sharp snout and its body is between four and five feet in length. The common skate is very abundant in European waters and attains a large size. It usually weighs about 100 pounds, but sometimes specimens are obtained that weigh

as much as 200 pounds or more. This species has a body whose breadth is greater than its length, the proportion being about four to three. This phenomenon, which is common to several species, is due to the expanding pectoral fins being concealed in a peculiar manner under the skin. See Ray.

SKATES, a class of devices that have a frame formed to fit the sole of a shoe, with a keellike runner of steel attached beneath. They are designed to move or glide over the ice. The



METALLIC SPRING SKATE.

earliest skates were made of the shinbones of animals, which were fastened to the feet by means of strings. It is thought that the first iron or steel skates were used in Holland, where they served to traverse the numerous canals, and in that country they are still worn by men and women when going to the city to engage in business for the day or to do shopping. Skates are employed extensively for a like purpose in Denmark, Sweden, and Norway, and in the two countries last mentioned the *skee*, or *ski*, is very common. The *skee* is a kind of toboggan for the foot, consisting of a long and narrow wooden runner, to which the shoe is attached, and is used for sliding over snow or ice. A skillful traveler is able to slide from ten to fifteen miles per hour on a *skee*, this depending somewhat on the character of the snow or ice, while the skate enables moving with rapidity only when the surface is quite smooth.

Many varieties of skates have been contrived, the construction differing somewhat with the purpose they are to serve. Formerly the frame designed to fit the sole of the shoe was made of wood and it was fastened by a heel screw and straps. At present metal is employed instead of wood, and greater security in fastening to the shoe is obtained by springs instead of straps. Skates for speed have a thin runner somewhat longer than the shoe, while the blade of those intended for figure skating is broader and rounded at the toe and heel.

Skating is an important branch of athletics, both in America and Europe. Many skating societies are maintained in the United States

and Canada, the most important being the National Skating Association, which holds races annually. The best time made in America is one-half mile in 1.21 minutes, one mile in 2.50, three miles in 9.18, and five miles in 15.93. James L. Plimpton of New York invented the *roller skates* in 1869, which are the only substitutes for ice skates that have ever proved successful. These consist of a frame to fit the sole of the shoe. They have two sets of parallel wheels, one each at the toe and heel, which set squarely on the surface whether the body of the skater is canted or upright. Roller skating is usually conducted on wooden or asphalt floors in rinks constructed for that purpose, but the fatigue is much greater than that accompanying skating on ice.

SKELETON (skĕl'ĕ-tŭn), the framework of animals, which in vertebrates is composed of bone and cartilage. It serves to support the fleshy parts and the nervous system, and forms levers for the muscles. In lower animals various structures take the place of the skeleton, as the shell of the clam, oyster, crawfish, and lobster. These formations are called *exoskeletons*, or *dermoskeletons*. The skeleton of vertebrates consists of the skull, the trunk, and the limbs, the whole constituting the *interior skeleton*, or *endoskeleton*. In man the skeleton is constructed after the same type as that found in some of the higher animal forms, but it is of an immeasurably higher development. The human skeleton is characterized by a relatively larger capacity in the skull for the brain development, longer arms, more convenience in the position of the foot, and more freedom of the lower limbs. These superior conditions give to man the ability to move with greater facility and aptness than any other living being.

The skeleton consists of about 200 bones, the number varying somewhat according to age. In the head are 22 bones, which are classed as eight skull bones and fourteen face bones. There are eight bones in the cervical region, 37 in the thorax, 64 in the upper limbs, five in the lumbar region, four in the pelvis, and 60 in the lower limbs. Several bones that are separated in youth become united later in life. Thus five of the false vertebrae at the base of the spine early join into the *sacrum*, while four tiny ones below it often grow into a bony mass called the *coccyx*. The sternum, composed of five pieces in childhood, consists of only three in the adult. While there is a change in the number of bones, their relative dimensions are adjusted with such exactness that the length of the entire skeleton can be obtained by measuring a single one of the principal bones. All the bones, removed

from the body for the purpose of examination and study, form a *natural skeleton*, if connected by dried ligaments. An *artificial skeleton* is made by the bones being joined together by wire.

The names of the bones in the human skeleton are shown in the accompanying table:

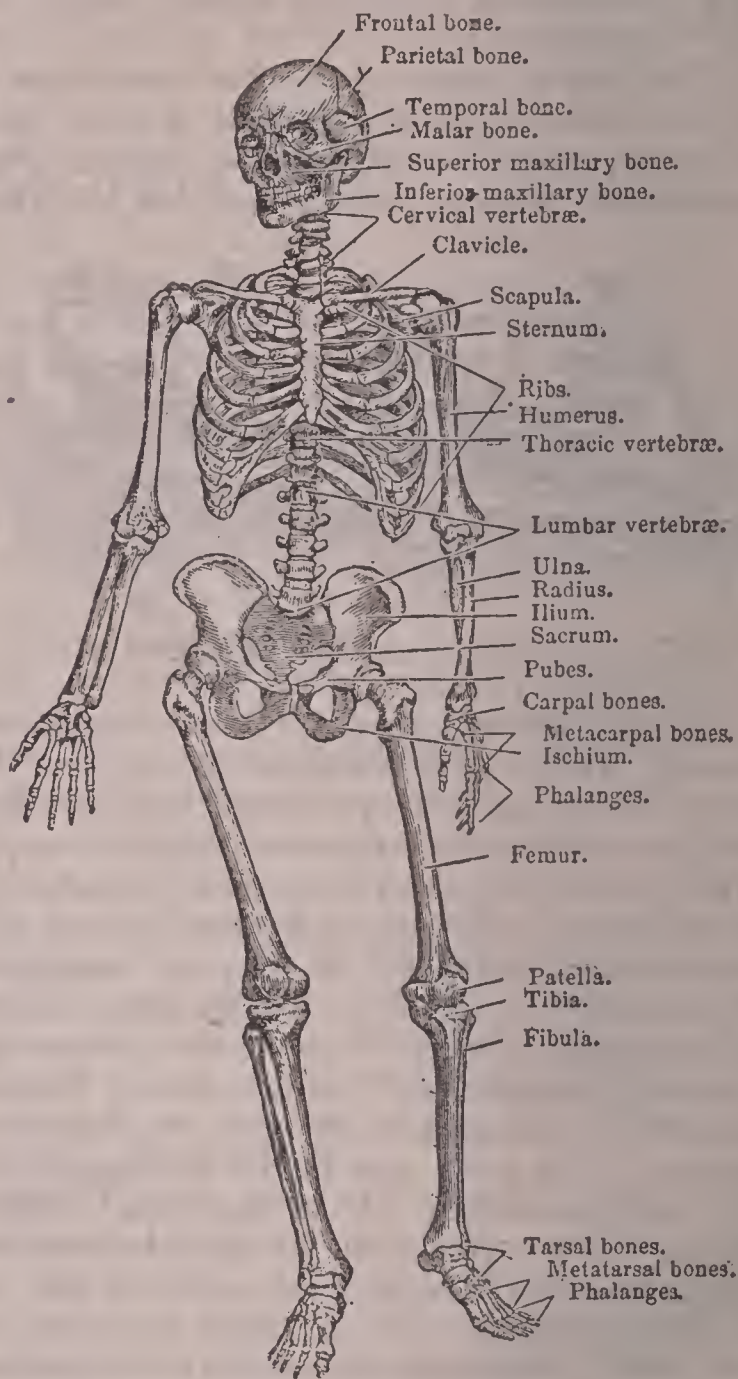
NAMES OF THE BONES OF MAN.

HEAD.....	Skull	Frontal (forehead).
		2 Temporal (temples).
		2 Parietal (side).
		Occipital (posterior base).
		Sphenoid (base).
	Face	Ethmoid (base of nose).
		2 Superior Maxillæ (upper jaw).
		2 Nasal (bridge of nose).
		2 Malar (cheek).
		2 Lachrymal (corner of orbit).
CERVICAL REGION.....	2 Turbinated (within nostrils).	
	2 Palate (posterior hard palate).	
	Vomer (nasal partition).	
THORAX	Inferior Maxilla (lower jaw).	
	7 Cervical Vertebræ (neck).	
	Hyoid Bone (base of tongue).	
UPPER EXTREMITIES..	14 True, 6 False, 4 Floating Ribs.	
	12 Dorsal Vertebræ (back).	
LUMBAR REGION.....	Shoulder	Clavicle (collar).
		Scapula (shoulder blade).
	Arm.....	Humerus (arm).
		Radius, Ulna (fore-arm).
	LOWER EXTREMITIES..	Hand.....	8 Carpal (wrist).
5 Metacarpal (hand).		
PELVIS.....	14 Phalanges (fingers).	
	5 Lumbar Vertebræ (loins).	
LOWER EXTREMITIES..	2 Innominata.	
	Sacrum.	
LOWER EXTREMITIES..	Coccyx.	
	Thigh.....	Femur.
LOWER EXTREMITIES..	Leg.....	Patella (knee pan).
		Tibia (large bone).
LOWER EXTREMITIES..	Foot.....	Fibula (outer bone).
		7 Tarsal (instep, heel).
		5 Metatarsal (arch).
		14 Phalanges (toes).

See **Bones; Foot; Hand; Head**, etc.

SKEPTICISM (skĕp'ti-siz'm), the system of philosophy which denies or doubts the existence of knowable truths or realities. As a doctrine it teaches that no fact or principle can be known definitely, that all knowledge is uncertain. It embraces *Pyrrhonism* in that it assumes the position that no fact or truth, no matter how worthy of confidence, can be established on philosophical grounds. In this sense it is opposed to the positive assumption, or assertion, of definite principles. The term skepticism is applied in theology to a doubt of the truth of revelation, the denial of the being or existence of God, and the doubt or denial of the divine origin of the Christian religion. Those who embrace the tenets of skepticism are known as *skeptics*. Pyrrho, one of the early skeptics, advised his students to suspend judgment in view of the contradictory nature of phenomena, and held to the theory that absolute knowledge is impossible. His pupil, Timon, elaborated upon the elements of doubt by proceeding upon the

premise that any proposition may be proven or contradicted by equally good reasons. David Hume's "Treatise of Human Nature" is a modern work on the subject of skepticism. This writer went so far as to question the validity of every act of conscience and is a representa-



HUMAN SKELETON.

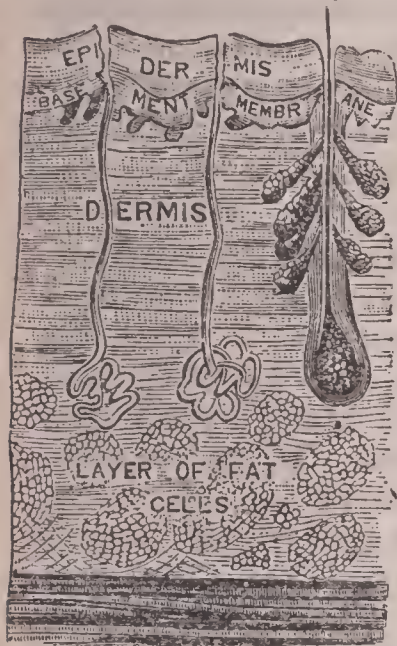
tive of the modern school of skepticism. Kant, Spencer, and other writers, although sometimes classed as skeptics, more properly are agnostics.

SKI (skĕ). See **Skates**.

SKIMMER, the common name of a genus of web-footed birds of the gull family. The lower mandible is compressed like the blade of a knife and is somewhat longer than the upper. These birds are sometimes called *scissorbills*, for the reason that their bills are well adapted for cutting or scooping. The *black skimmer* is a common bird of the Atlantic coast of North America. It is about 20 inches long and the alar extent is 45 inches. The color is dark brown on the top of the head and upper surface, with markings of white underneath. It

breeds on marshes and sandy islands, laying large, white eggs with ash-colored spots. Several other species, native to Europe and Africa, are known as *cutwater*, *shearbill*, or *razorbill*. These birds glide over the surface of the water and plow up small fishes with the immersed lower mandible. They are nocturnal in their habits, resting by day on the sandbars near the water. The female lays three or four eggs, which are hunted for food.

SKIN, the integument or outer covering of an animal, serving to protect the flesh and to fill important functions as an active organ. In vertebrates the skin consists of two layers, the external one called the *epidermis*, *cuticle*, or *scarfskin*, and the inner one called the *corium*, *cutis*, or *derma*. These two layers are separated by a basement membrane, as shown in the illustration. The epidermis has no blood vessels and is not sensitive, while the derma, or true skin, is permeated with nerves and veins, and is highly sensitive. All the external parts of the body are covered by the skin.



SECTION OF THE SKIN.

The true skin is always protected by the epidermis, but is the thickest on the back, in the palm of the hand, and at the sole of the foot. Flat cells or scales compose the cuticle and these are shed constantly from the surface in the form of dandruff, or scurf, but they are renewed regularly from the cutis below. The cuticle thickens and becomes horny by constant use, thus supplying special protection to the parts serving important purposes, as the hand of the blacksmith or mason in handling tools. The outer surface appears smooth to the naked eye, but when examined through a microscope the little scales may be seen plainly. Besides these, the skin has small elevations, called *papillae*, that serve important functions, some as organs concerned in the sense of touch and others as a basis for the growth of hair. Hair and nails are modified forms of the cuticle and have equally important functions. When the cuticle is not restored, a scar results.

The cutis contains the *sebaceous*, *fat*, or *oil glands*, with ducts that pour their secretions into the hair follicle, a minute depression of the epidermis and cutis. Each hair of the scalp is generally provided with two glands, situated

above the hair follicle, and their function is to oil the hairs and keep the skin supple. People dwelling in hot countries are supplied with a greater abundance of oil glands to prevent the skin from drying. Besides, the skin has sweat glands, made up of tubes twisted in the form of a knot, leading to the surface by a long, sometimes spiral, duct. These ducts terminate in openings in the surface of the skin, called *pores*. Their function is to eliminate water from the system, to cool the body, and to expel certain waste materials that collect in the blood. It is estimated that there are about 2,225,000 pores in the human skin, and that generally about two and a half pounds of watery vapor are eliminated per day. However, this is greatly influenced by the clothing worn, the temperature of the air, the amount and kind of food taken, and the exercise indulged in.

The skin serves as a respiratory organ, in that there is a small interchange of oxygen and carbonic acid gas. As an absorbing surface, it can take in water to a very limited extent. It has been found that death results when the pores of the skin are covered with varnish, and that it is highly essential to health for the skin to be kept clean by often washing it with soap and water. Baths not only remove accumulations of sensible perspiration on the skin, but tend to keep open the pores and facilitate the removal of dry scales as soon as they become loosened.

SKINK, a species of small lizards. The body is six to eight inches long and is covered with fishlike scales. It has a reddish-yellow color, but is marked by darker transverse bands. These animals have four strong limbs, but move somewhat like a serpent, and are able to enter small openings. They are quite numerous in the deserts of Africa and Asia, especially in the region of the Mediterranean. Several species are found in North America, ranging from Mexico to Alberta, but they are small, swift lizards and not true skinks.

SKIRRET (*skir'rēt*), a perennial plant of China and Japan. It is cultivated for its edible root, which resembles that of a parsnip, but is clustered and somewhat aromatic. The plant grows to a height of six inches. Spirituous liquor is made from the root in some countries, owing to its having a large amount of sugar. Though cultivated in Europe, the plant is not grown extensively in America.

SKUA (*skū'ā*), or **Jaeger Gull**, a web-footed bird of the Gull family, widely distributed along the coasts of the northern seas. It is distinguished by having a strong bill, long wings, a wedge-shaped tail, and a full and stout body.

In disposition these birds are quarrelsome. They frequently pursue terns and gulls to compel them to drop fish and other articles of food. All the species pursue and feed upon living birds in the habit of the hawk. The *Arctic skua* is about twenty inches long and has a wing expanse of four feet. It is frequently seen in winter as far south as the Gulf of Mexico.

SKULL, the framework of the head of a vertebrate animal. It consists of the cranium and face. The human skull has 22 bones, of

and the forehead recedes. See **Face**; **Head**; **Facial Angle**, etc.

SKUNK, a genus of quadrupeds of the weasel family, which are native to North America. They are about the size of a large cat. The common skunk has a long tail and very short legs. The general color is black, with white patches on the head and body. It is about twenty inches long and its tail is thirteen inches. The skunk resembles the polecat in having a potent and disagreeable odor that can be per-

ceived at a long distance, which it emits from anal glands. These glands secrete a fluid that is thrown with considerable force when the animal is acting in self-defense or is scared, and its disagreeable scent can be removed only with much perseverance. Several species have been enumerated. They differ somewhat in size, but their habits are quite similar. They feed on eggs, birds, insects, reptiles, fruits, and small animals, which they hunt at night. The winter is passed largely in a dormant state. The flesh of the skunk

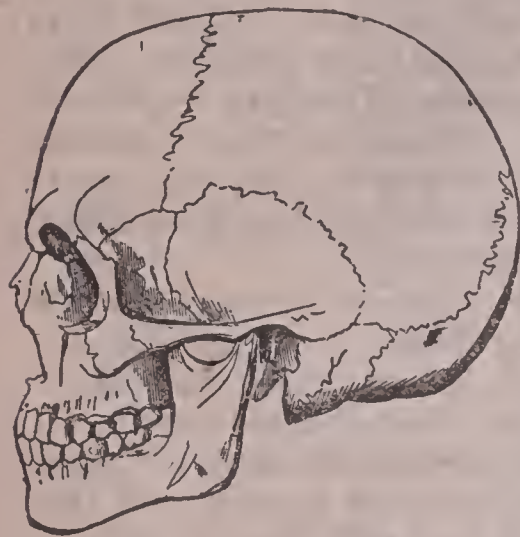
is considered a wholesome food by the Indians and others, being tender and nutritious. Skunk grease is of value in dressing leather and the skins are important for their fur.

SKYE (skī), an island of the Hebrides, lying off the western coast of Scotland, next to Lewis the largest of the group. It has an area of 535 square miles. The shores are indented

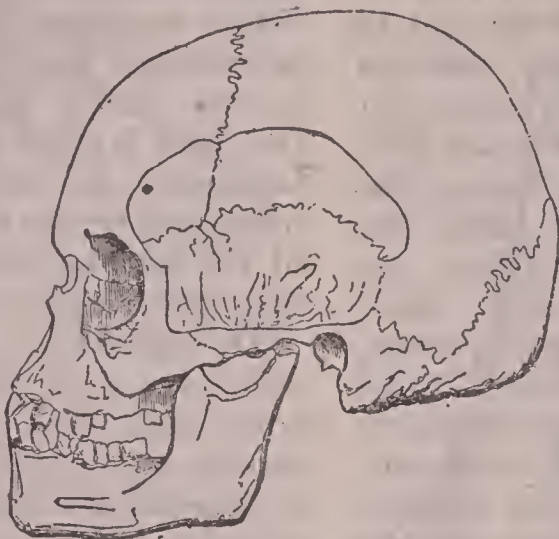


SKUNK.

by numerous gulfs and bays, most of them having precipitous shores. A large part of the surface is mountainous. The Cuchullin, or Coolin, Hills are the highest elevations, their culminating peaks rising about 3,200 feet above sea level. It has valuable fisheries and pro-



SKULL OF EUROPEAN.



SKULL OF NEGRO.

which eight are in the cranium and fourteen are in the face, but besides these are the bones of the ear and the teeth. A marked difference is noticeable between the skull of man and that of lower animals, in that the human skull has larger brain capacity and relatively a smaller face and jaws. The oval form is the best to resist pressure equally applied on all sides, and ample protection to the delicate brain is provided by the bones being composed, in general, of two compact plates, with a spongy layer between them. The *frontal*, *occipital*, and two *parietal* bones form the vault of the skull and are united by notched edges called *sutures*. These joints are not entirely closed in infants, but on the top is an opening termed the *anterior fontanelle*, so named from the perceptible pulsations of the brain, and it does not disappear entirely until the second year after birth, though sometimes the opening remains still longer. The skull grows rapidly during the first seven years of life and upon attaining full development the interior capacity is about 85 cubic inches, though often 92 cubic inches. Intelligence is estimated largely from the structure of the skull, the highest development being found in the Caucasian and the lowest in the mongrel races of Malaysia. In some races there is an approach to the lower animals, since the jaw projects forward to a remarkable degree

ductive crystalline limestone quarries. The chief soil products include oats, potatoes, and vegetables. Cattle and sheep rearing is the most important industry of the interior highlands, where pasturage of considerable value abounds, but the soil is not of material value for the production of cereals. Most of the land is owned by proprietors and attended by tenants, who use quite primitive methods in farming. The inhabitants are chiefly Celtic and speak the Gaelic language. Many Danish antiquities abound on the island. Portree, the principal seaport, has an excellent harbor and a considerable trade in merchandise. Population, 1906, 16,045.

SKYE TERRIER. See **Terrier**.

SLAG, a fused compound obtained in the reduction of metallic ores, consisting of silica in combination with bases, such as lime or alumina. All classes of slags contain some metallic ores, owing to the fact that conditions necessary to extract all the metal cannot be obtained. Anciently the proportion of metal wasted was quite large, and in recent times many of the old slags have been smelted profitably. Ideal conditions require that the fluidity be such that the metal may sink steadily through the slags, that undesirable bodies be not separated from themselves, and that they fuse at the right temperature. Slags are various in color, owing to the presence of different metallic oxides. Copper gives them a red or reddish brown, manganese a dark brown, and iron oxides a dark green or black color. In many of the older countries, slag is used for road building and other purposes.

SLANDER. See **Libel**.

SLATE, a kind of rock resembling shale, but differing from it in splitting readily into thin plates or sheets. It includes species having a variety of colors, among them bluish or grayish black, reddish brown, and greenish blue. Most species may be cut or scratched with a knife. Slate occurs in all countries having metamorphic rocks, and the quarried products are used for many purposes in manufacture and construction. The deposits differ in thickness and sometimes several grades of slate are found in different parts of the same quarries. Their uses depend upon the particular composition and the size of the sheets that may be obtained. Fine-grained species, yielding large, thick slabs, are used to make billiard tables, burial vaults, electrical switchboards, and sinks. The more fissile grades, which split into thin slabs, are employed for roofing and school blackboards. Slate is utilized in making whetstones and polishing and a soft variety is used for slate pencils. The most extensive deposits

occur in Pennsylvania, Vermont, New York, and Quebec, where slate quarrying is an important and growing industry. Products from these quarries are transported to South America, Australia, China, and many countries of Europe, the principal exports being for roofing and interior decorative use. Extensive deposits of slate occur also in other sections of North America, and in Wales, France, and Scotland.

SLAUGHTERHOUSE CASES, a number of notable causes at law decided by the Supreme Court of the United States. These cases grew out of an attempt made by the Legislature of Louisiana to restrict the slaughtering of animals in New Orleans, as a means to protect the public health of the city. This legislation in Louisiana restricted the butchering business to such an extent that it was practically prohibited by the general public, hence the cases were carried to the Federal courts and a final decision was reached in 1872. The decision is to the effect that the Fourteenth Amendment to the Constitution of the United States does not deprive the states of their right to establish police regulation, that this remains unimpaired with the states, and that it belongs to the states to provide security and protection for their citizens. The decision is looked upon as recognizing the greater rights of states and as a reactionary movement in the tendency of the Federal government to usurp the powers belonging to the states.

SLAVERY (slāv'ēr-y'), the institution under which human beings are held as the property or chattels of others. It implies the complete subjection of a person to the will and command of a master. The institution is as old as human history and still exists in some countries under modified forms. In the barbarity of remote antiquity victory in war was not complete until the adversary was put to death, but later the death penalty was inflicted only upon prominent leaders, while the rank and file were carried as captives of war into foreign lands and subjected to servile slavery. All the nations of antiquity practiced slavery in some form and utilized slave labor in the construction of highways, canals, aqueducts, pyramids, harbors, and military walls. They employed slaves in the productive arts, such as agriculture, commerce, and architecture. The Jews treated their slaves with considerable kindness and those of native blood were released after seven years of servile service.

GREECE AND ROME. Slavery was a vast institution among the Greeks, who employed slaves in domestic service and in the industries. They used them in the police and military serv-

ices. For centuries the Greeks made the distinction of excluding the slaves from attending the gymnasia and public assemblies, but permitted their entrance into the temples and as spectators at festivals. Several writers have collected evidences to the effect that slaves were treated with harshness at Sparta, but they were protected at Athens from cruelty and severe abuse. Slavery among the Romans was an extensive and systematized institution, consisting of two classes of slaves, the captives of war and the debtors who were unable to meet their obligations. At first the Roman slaves had few rights to be respected, being entirely subject to their master, who was permitted on slight misconduct to take their lives without process of law. Later the institution so affected the industries that all the handicrafts, professions, and even literature were more largely under the direction of slaves than freemen. The rise of the empire witnessed a marked improvement in the condition of the slaves, who received legal standing in the time of Augustus, and their lives were placed under the protection of the state by Antoninus.

WESTERN EUROPE. While the New Testament does not directly attack slavery, its teachings are quite inconsistent with the maintenance of such an institution. As Christianity spread over Europe, the harsher system of slavery was transformed into the milder serfage of the Middle Ages. The Koran, on the other hand, permits the acquisition of slaves by conquest, and this method was resorted to quite extensively in the time of the Crusades, but there were also importations of Negro slaves to Western Asia from the region south of the Mediterranean. Afterward Rome became a market for white slaves, who were sold into Mohammedan captivity, and subsequently a white slave piracy rose in the Barbary States, which attained a widespread influence in the 17th century. The Celts and other natives of Britain were enslaved by the Anglo-Saxon invaders, who carried on a considerable trade in Irish slaves with continental Europe. The system was discontinued with the Norman conquest in the 11th century, only to give place to serfdom under the feudal lords. Traces of serfs and serf labor remained in Scotland to the close of the 18th century and in other countries still later. See **Serf**.

SLAVE TRADE. The discovery of America gave a new and enlarged impetus to the slave trade. It was first sought to impress the Indian into service and make his race subject to the European conquerors of the new world, but it soon became apparent that the native American could not be successfully utilized in that way. As a

result, Negroes were hunted in the interior of Africa and brought to the colonies. The first slaves brought from Africa were landed at Santo Domingo by the Portuguese in 1503, and shortly after all the Christian colonial powers entered with more or less vigor in support of the slave trade. A Dutch ship landed the first cargo of slaves on the coast of Virginia in 1619, and the British government favored such importations into all of its American colonies. The traffic was very inhuman in many respects, the unfortunate Negroes in Africa being hunted with bloodhounds, crowded into unsuitable transports, and often treated with great cruelty upon reaching the American colonies. Sir John Hawkins was one of the most noted and persistent of the early British slave traders. It is estimated that about 925,000 slaves were brought to Jamaica alone prior to 1786.

William Penn and the Quakers have the credit of being the first Americans to strongly denounce the slave trade, but later societies sprang up in America and many European countries which advocated the suppression of the traffic and the gradual liberation of those in slavery. Though the Stuart kings of England and Queen Anne fostered the slave trade, sentiment became so pronounced against it that by the close of the 18th century its abolition became apparent. The French national convention paved the way in 1794 by declaring the freedom of the slaves in the French colonies. The British Parliament passed the famous Abolition Act in 1807, which made the slave trade by British subjects illegal after Jan. 1, 1808, and in the same year the slave trade was prohibited by law in the United States. Soon after the traffic was abolished by all the civilized countries. This important movement was now followed by the proposition to liberate the slaves who were already under bondage.

ABOLITION OF SLAVERY. Abolition societies were founded as early as 1780 in many Northern States of the United States, where the institution of slavery was never considered profitable, but the Southern States clung to their slaves with a growing interest. Washington and Jefferson were opponents of slavery until the invention of the cotton gin made it profitable in the Southern States, when they supported the institution, but Benjamin Franklin, John Jay, Alexander Hamilton, William Lloyd Garrison, and other eminent leaders were rapidly forming public sentiment in the North in favor of its abolition. Many of the abolitionists dreamed of a free northern republic, while the proslavery party of the South maintained views favorable to the organization of a southern republic in

which slavery was to be legally recognized. Treaties between the radical elements resulted in the Missouri Compromise of 1820 and the Compromise of 1850, but the growth of new territory continually unsettled and changed conditions.

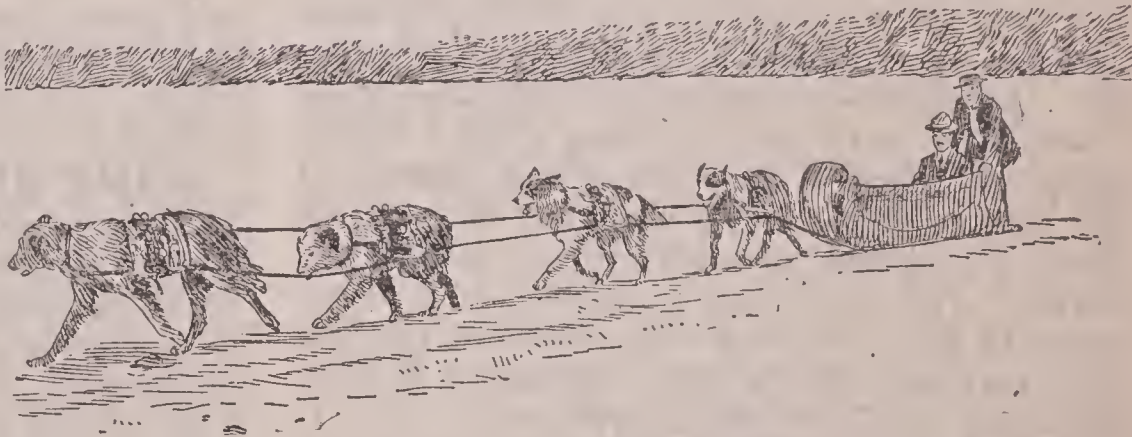
The election of Lincoln, in 1860, precipitated the secession of a number of Southern States, thus hastening the Civil War, which extended from 1861 to 1865, and the Emancipation Proclamation issued on Jan. 1, 1863, liberated about 4,000,000 slaves. This was followed, in 1865, by the adoption of the Thirteenth Amendment to the Constitution, which received the approval of 27 of the 36 states, and thus slavery became prohibited in all territory belonging to the United States. Slavery was abolished by England in 1831, by Holland in 1863, by the Spanish in Cuba in 1886, and by Brazil in 1888. The number of slaves in America varied greatly. The slaves in the colonies were computed at 300,000 in 1776. In 1790 there were 697,897 in the United States; in 1850, 3,204,313; and in 1860, 3,953,760.

PRESENT ASPECT. A limited slave trade is still maintained on the eastern coast of Africa, mostly by Arabs, and the institution of slavery is recognized by law in some parts of Asia and interior Africa. The governments of Great Britain and Germany have been foremost in suppressing the slave traffic of Africa. These governments have promoted several treaties as a means to discontinue the system as an institution. With the extension of European authority in various parts of Africa, the development of the Congo Free State, and the application of modern industrial methods, the slave system is destined to ultimately become entirely superseded by free and competitive labor. It undoubtedly will be more difficult to overcome the practice in Western Asia than in Africa, since the Mohammedan faith is friendly to the use of slaves and the Moslem countries are practically impregnable to other religions and Western industrial systems.

SLAVS (slävz), **Slaves**, or **Slavonians**, a branch of the Aryan family, which at present occupies large sections of Europe and the western part of Asia. The Slavs show a closer alliance to the Lithuanian than to the Germanic branch of the Aryan nations. In the early history of Europe they occupied the country tributary to the Carpathian Mountains. Subsequently they spread southward to the Adriatic and

northward to the Baltic and overran large parts of Northern Asia. Their settlements on the Lower Danube date from the 6th century, when they passed into Thrace, Bohemia, Hungary, Styria, and other parts of Austria. In the 7th century they formed settlements in Bosnia and Servia, and ultimately spread northward over the region of modern Russia. A portion of their settlements in the south subsequently became a part of Greece and Turkey, while Hungary and parts of Transylvania were occupied by the Magyars and Rumanians, and large parts of Austria were taken by peoples of Germanic origin.

The two groups of Slavs include the western and the southeastern. The Poles, Czechs, and the Slovaks are comprised in the western group, and the Russians, Bulgarians, Slavonians, Servians, and Croats, in the southeastern. Ancient writers generally agree in representing the Slavs as an industrious and brave people. They are credited with engaging largely in agricultural pursuits and supporting military movements rather for defensive than aggressive purposes. Their language shows a close alliance to the Sanskrit, but it is mixed considerably with the spoken tongues of other European peoples. Eight distinct dialects are recognized. They embrace the Russian, Bulgarian, Servian, Bohemian, Polish, Slovak, Polabic, and Wendic. The total Slav population of Europe is estimated at 120,000,000, but there are considerable numbers in other lands. The Greek Orthodox faith is supported generally by the Slavs, but many Poles, Slovaks, and Czechs are Roman Catholics.



SLED DRAWN BY DOGS IN THE ARCTIC REGIONS.

SLED, or **Sledge**, a vehicle for conveying loads over ice or snow. It has runners constructed of cast iron, or of wood with a steel sole, and both runners are slightly turned up at one end. Primitive sleds are made wholly of wood and have two long runners, but those of modern manufacture employ iron or steel largely, and usually consist of two sets of runners, popularly called *bobsleds*. A *sleigh* is a carriage on runners, usually two, and is used for conveying passengers. These vehicles are finely construct-

ed with one or two upholstered seats and are drawn by one or more horses. Sleighing is a favorite pastime in countries where the climate is sufficiently cold to prevent the snow from melting for several months in winter.

SLEEP, a state of repose in which the activity of the senses and brain appears to be temporarily suspended. This state occurs periodically in man and animals and is characterized by partial or complete unconsciousness, relaxed condition of the body, and general diminution of vital functions. It is necessary that all parts of the body actively engaged in the discharge of important functions have a period of cessation from toil, and during the period of sleep the work of building up goes on to repair the loss occasioned by activity during the time of wakefulness. More sleep is needed in youth than in old age, when nature makes few permanent repairs and is content with temporary expedients. The number of hours required for sleep depends upon the character of employment and must be decided by each person according to apparent needs. From six to eight hours each day is the general average, but persons exercising their brain consecutively need more. It is of much importance that those who are tired should be allowed to sleep until awakened naturally, else the system does not obtain proper rest.

As compared to the state of being awake, the pulse and breathing are slower while sleeping, the secreting organs of the body are less active, and the pupil of the eye is contracted considerably. Another peculiarity is a lower temperature, especially from two to five o'clock in the morning, when the vitality is at the lowest point and mortality among the old and weak is greatest. It is generally assumed that dreamless sleep is the most restful and vitalizing, while a morbid tendency to sleep is the result of a degeneracy of the nervous tissue and a symptom of apoplexy. Sleep is prolonged in some animals, as in hibernation. The term *sleep* is applied in a varied sense to plant life, since the presence of light has a very marked effect upon the leaves, flowers, and other parts of vegetable growth.

SLEEPING SICKNESS, a disease which is peculiar to a region of Central Africa, extending from German East Africa to the Congo Free State. This disease has devastated many sections in the interior of the country. It spreads rapidly in the warm season, somewhat in the manner of yellow fever, and for a long time baffled the missionaries and physicians. It proved fatal along the lower Congo, on the Gold Coast, and even as far north as the Senegal. Dr. Robert Koch (q. v.) in 1907 discovered that it is due to the tsetse fly, which carries the infection

in the same manner as malaria and yellow fever are spread by the mosquito.

The disease first manifests itself by a mild remitting fever, accompanied by swollen lymphatic glands and an accelerated pulse, being due to the presence of a small number of parasites which infest the blood. In the second stage the fever becomes higher, the patient suffers with intense headache and apathy, and finally passes into a comatose condition. Dr. Koch discovered atoxyl, a derivative from arsenic, to be a true specific in causing the parasites to disappear from the blood. It was shown in 1907 that the fatality from the sleeping sickness is very extensive, several villages having been reduced in three years from 30,000 to 12,000 inhabitants. However, active operations to counteract the disease were instituted in 1908, when the English, German, and French governments formed a mutual working agreement. The plan is to segregate the infected in lazarets, remove villages from low and marshy places to higher lands, and establish extensive systems for drainage. These and other means are operating to limit the scope of the disease in the sections where permanent settlements have been established by the European.

SLEIGH. See **Sled**.

SLIDE RULE, an instrument used to solve arithmetical problems. It consists of two parts, one of which slides upon the other, and on the surface of the parts are arithmetical linear scales. These are so related that it is possible to add and subtract by referring to the points as they coincide as the slide is moved. Multiplication and subtraction may be performed by means of logarithms, and natural sines, tangents, and the square or cube root of a number may thus be indicated.

SLIME MOLD, an organism usually classed as being of doubtful affinity, since it is difficult to determine whether it belongs to the animal or vegetable kingdom. Formerly the slime molds were classed as plants, but they show a close relationship to rhizopods, a class of protozoa. They consist of a mass of protoplasm during the growing stage, but are not definite in size and shape, and multiply by the development of spores. The spores burst and the protoplasm escapes in forms resembling those of an amoeba, each particle developing a delicate hair, or cilium. In this form the young life floats freely in the water, but later unites with other plants, sometimes a large number coalescing. Botanists recognize about 400 species, ranging from minute forms to some that are several inches in height.

SLING, a contrivance to throw missiles, such as stones or bullets. It consists of a small disk

of leather pierced by a hole at each end for the attachment of strings about three feet long, and in the center is a small circular opening so as to permit the missile to lie quite firmly. When the stone or other object to be thrown is placed in the sling, it is held in one hand by the strings, and after whirling it in a circle one string is freed to permit the missile to fly out in the direction aimed. This simple contrivance was important as a weapon among the ancients, both in hunting and for military purposes. It is recounted that the Achaeans and Persians were skillful slingers. Goliath, the celebrated giant of Gath, was felled by David by means of a sling.

SLOE (slō), or **Blackthorn**, a shrub of the plum family, usually growing to a height of from six to twelve feet. The wood is hard and



SLOE.

Flower and Fruit.

tough and the young growth is used for walking sticks. The flowers are white, preceding the leaves in the spring, and it is regarded by many as the original of the common garden plum. A species known as the *common sloe* is abundant in Europe, whence it has been brought to the New England states. The fruit is about the size of a large pea. It has a bitter taste and is sometimes used in making a wine and for preserves. The leaves have a greenish appearance, resembling tea, and are used to some extent in adulterating that commodity. The wood is hard and dark colored, takes a fine polish, and is used in making flails, handles to tools, and teeth to rakes.

SLOTH (slōth), a genus of mammals which belong to the bear family. They are native to Central and South America. These animals are peculiar for their long claws, which turn toward the body, thus making it difficult to move on the ground, but they pass to and fro with remarkable facility on the limbs of trees. They live almost entirely among the upper limbs of the larger trees in the tropical regions, where they are en-

abled to pass quite easily from one tree to another, which they do by clinging to the branches with their claws while the body is suspended beneath. The lips are long and extensile, thus enabling them to secure the insects, honey, fruits, and tender shoots of trees on which they feed. They are covered with coarse, shaggy hair, quite like withered grass, which protects them from insects and shields them from observation when at rest in the daytime. The tail is very short. The female produces one young at a birth, which clings to its mother until it is able to provide for itself. Flesh-eating animals and snakes are its enemies, but it protects itself against the former by climbing on the branches of trees and against the latter by using its powerful claws. Several species have been described by naturalists, the best known being the *ai*, or *three-toed sloth*, and the *unau*, or *two-toed sloth*. Both these species have a plaintive cry.

SLOT MACHINE, a mechanical device designed to facilitate the sale of some commodities, usually small articles of confection. Machines of this kind are not of modern origin, but their use prior to 1880 was quite limited. At present many kinds of slot machines are in use, including those designed to facilitate the sale of chewing gum, cigars, and perfume. Some are designed to provide entertainment, such as phonographic machines and weighing machines. The last named have thus far proven most profitable, the reason being that there is no outlay for wares sold and the machine is a durable structure. Next to them in the way of profit are the gum-selling machines, the outlay in these being small and the profit comparatively large.

These machines are so called from a slot into which a penny, nickel, or some other small coin is dropped by the patron, without which the machine cannot be operated. Most of the slot machines are stationed in hotels, railroad stations, and other public places, where they are patronized by the public, all the accounts being kept by an automatic mechanism in the machines. In some cases the slot machine has given rise to a form of gambling, in which kind the patron deposits a small coin, as a five or ten cent piece, expecting to receive in return a larger amount of money. The use of these machines is forbidden in some cities by ordinance.

SLOVAKS (slō-vāks'), the name of a Slavic people of Europe, occupying a part of Moravia and Hungary. In language and traditions they are closely related to the Czechs, but a large number of them use the German language. In the 9th century they were a powerful part of the empire of Moravia, but later were subjugated by the Magyars. Many dialects are

spoken by these people, but the writers, such as Holly and Kollar, preferred to use the German or the Bohemian tongues. In religion they are largely Roman Catholic. The number of Slovaks is estimated at about 2,000,000.

SLOVENIANS (slō-vē'nī-anz), a branch of the Slavic people in the southern part of Austria-Hungary. They reside chiefly in Carniola, Styria, and Carinthia. In habits and manners they are closely allied to the Servians. They number about 1,500,000.

SLOYD, the name of a system of manual training, called *slojd* by the Swedes, meaning skill or dexterity. It was originated in the past century, but its popularity dates from 1876, when Otto Solomon, president of the normal school at Naas, induced a greater interest in its higher and general development. Originally it trained in the manufacture of wooden household utensils, but now includes mechanical drawing and the use of complicated tools. The aim is to fit the student for practical lines in the industries, and especially to train for the employment of knowledge gained in school as a means of aiding in the work to be done. The Sloyd system has been adopted in a more or less modified form in many countries of Europe and America.

SLUG, the common name of a genus of mollusks, differing from the snail in having only a rudimentary cell. The form is elongated and more or less concealed by a mantle. On the head are four tentacles or feelers that can be drawn back. These tentacles consist of two pairs, a short and a long, and on the tips of the longer pair are the eyes. The slugs become dormant in frosts, taking shelter under clods and vegetable forms. Slugs often frequent trees in search of decaying vegetable matter, on which they feed, and in some places they ravage the fields of growing crops during moist weather. A large number of species have been studied, the best known being the gray, great gray, red, and black slugs. They are distributed in many lands and most species are preyed on by mammals and birds.

SMALL ARMS. See **Arms.**

SMALLPOX, or **Variola**, a contagious disease, resulting from a specific morbid poison and passing through several stages. Contagion is the only known origin of smallpox. It is thought to be the most contagious of diseases. The period of incubation after exposure is believed to be from ten to fourteen days, but in cases of direct inoculation of the virus the time is much shorter. A high, inflammatory fever is the first manifestation of the disease. It is followed after three to five days by eruptions, which at first feel like small shot under the skin, but finally develop into serous infiltrations, called *vesicles*. The

vesicles gradually increase in breadth, forming pustules, and by about the eighth day they break open. Shortly after they become covered by scabs. The number of pustules depends largely on the severity of the disease, ranging from only a few to many thousands. About the twenty-first day the scabs are completely gone, leaving blotches of a reddish-brown color for several months, and in many cases they become permanent pits in consequence of ulceration of the true skin. Vaccination is ordinarily a preventive, though not absolutely proof against it, but it has been found that persons vaccinated rarely have an aggravated form of the disease. About 50 per cent. of the persons afflicted with smallpox in former times died of the disease, but vaccination and enlarged skill in medical practice have lessened mortality to a remarkable extent.

• **SMELL.** See **Nose.**

SMELT, a genus of fish of the salmon family, but differing from the salmon in having conical teeth on the jaws and tongue and on the tips of the vomer. Several species have been enumerated by writers. They are widely distributed, the American smelt being a common fish from New York to the northern coast of America. It has a greenish back and small scales and is about eight inches long. It is valued highly as a food fish. The smelt ascends the rivers in the spring to spawn and in the summer returns to the ocean, but in some cases becomes land-locked in the lakes. The smelts of Western Europe are somewhat smaller than the American species, but they are equally favored as food fishes. They abound in the North Sea and the Atlantic as far north as Norway. The flavor is best in the species frequenting the ocean at least part of each year.

SMILAX (smī'lāks), a genus of plants belonging to the lily family. It includes about 200 species, of which the greater number are climbing and trailing plants. They are widely distributed in the temperate and tropical part of both hemispheres and include species that are useful in medicine and as food. About a dozen species are native to North America, including the greenbrier and carrion flower. Sarsaparilla (q.v.) is obtained from the rootstock of the smilax. A plant cultivated and known as smilax is a species of asparagus.

SMITH COLLEGE, an educational institution at Northampton, Mass., founded in 1871 to promote the higher education of women. It is so named from Sophia Smith, who founded the institution and made a bequest to it of \$365,000. Students who complete the undergraduate courses receive the degree of bachelor of arts, and more advanced study entitles them to the degree of master of arts. Among the chief build-

ings are the College Hall, the Lilly Hall of Science, the Music Hall, the Chemistry Hall, and the Hillyer Art Gallery. The grounds and buildings are valued at \$1,250,000. About 100 professors and instructors are employed and the institution is attended by 1,250 students.

SMITH'S FALLS, a city of Ontario, in the counties of Greenville, Lanark, and Leeds, 40 miles southwest of Ottawa. It is on the Rideau Canal and the Canadian Pacific Railway and is surrounded by a fertile farming country. Among the principal buildings are the high school, the Rideau Hotel, and several fine churches. The manufactures include brick, clothing, stoves, flour, woolen goods, and machinery. Power is obtained from the Rideau River. It has electric lighting and municipal waterworks. Population, 1901, 5,155.

SMITHFIELD, a six-acre tract of land in London, England, lying north of Newgate and west of Aldersgate. It was an open spot and was used for strolling in the early part of the 12th century, but in 1150 was converted into a stock and hay market, for which it was used until 1855. Smithfield served as the seat of the Bartholomew Fair and as the place of execution of English martyrs between the years 1401 and 1612. Charles Dickens mentions it in his "Oliver Twist." The greater part of it is occupied at present by gardens, seats, paths, and drinking fountains, but a small portion of it is still used as a hay market. Several railways cross it.

SMITHSONIAN INSTITUTION (smith-sō'nī-ən), a scientific institution in Washington, D. C., established by act of Congress in 1846. This institution owes its origin to James Smithson, son of the third Duke of Northumberland, who, by the terms of his will, gave an estate worth \$515,169 to the United States government "to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men."

Congress accepted the bequest in 1836 and it has been enlarged by subsequent additions to about \$950,000, which amount is held as a deposit in the United States treasury. This fund yields an income of about 6 per cent. The institution is governed by a board of regents composed of the Chief Justice of the United States, three representatives appointed by the speaker of the House, three senators appointed by the Vice President of the United States, and six citizens chosen by Congress. The general management is largely under the direction of the secretary. It has splendid buildings of Seneca brownstone, which are located in the south part of the Mall, a short distance east of Washington's monument.

The institution has the Bureau of Ethnology, the Bureau of Publications, the Astrophysical Observatory, the Bureau of Research, the National Museum, and the National Zoölogical Park. The last two mentioned are supported entirely by congressional appropriations. The National Zoölogical Park occupies a tract of 170 acres in Rock Creek Valley, near Washington. Three series of publications are issued under the direction of the secretary, known as the *Smithsonian Annual Reports*, *Smithsonian Contributions to Knowledge*, and *Smithsonian Miscellaneous Collections*. The Smithsonian Library has 115,000 volumes, but pamphlets, periodicals, and maps bring the aggregate up to about 160,000 pieces. Most of this collection is at present accommodated in the congressional library building. The secretaries of this institution include Joseph Henry, S. F. Baird, S. P. Langley, and Charles D. Walcott.

SMOKE, the volatile vapor arising from the combustion of any organic matter, as wood or coal. The term is applied in a more limited sense to the visible vapor arising from a burning substance, but, besides this, invisible gaseous matter escapes. Burning wood gives off an almost invisible smoke, consisting of water and carbonic acid, but the smoke arising from burning coal is darkened by the presence of soot, oily vapor, and fine particles of carbon. It has long been a problem how to overcome the evils of dense smoke in large manufacturing centers, especially where great quantities of bituminous coal and crude oil are consumed. Experience has shown that if the black smoke, which escapes from a furnace when a quantity of cold coal is thrown in upon an incandescent mass, can be made to pass over another portion of coal in active combustion, this carbon is consumed; that is, it is combined with atmospheric oxygen and converted into carbonic oxide, which burns, producing carbonic acid, and therefore eventually escapes as colorless vapor.

Any process that tends to increase the flame of burning material diminishes the volume of visible smoke. This is due to the fact that combustion becomes more perfect by providing a larger amount of oxygen, which can be done only by inducing an adequate draught of atmospheric air. A high degree of efficiency is secured in many American manufacturing centers using natural petroleum, where a jet of heated steam is blown into the hot combustion chamber and the oil and air enter and mix with it. Many experts argue in favor of first converting the coal into gas, as we secure a smokeless fuel in the gas, while the coke produced during the preparation of the gas has many uses, especially as a solid

fuel. Pittsburg has made remarkable progress in overcoming the evils of smoke from factories by using large quantities of natural gas, which produces no visible smoke and leaves no cinders. While that city was formerly quite dirty, it is now one of the cleanest manufacturing centers in the world.

SMOKELESS POWDER, an explosive that acts without the production of much smoke, used chiefly for military purposes. About 50 per cent. of ordinary gunpowder is made up of finely divided solids, but smokeless powders develop wholly gaseous products in the course of combustion. Besides being partly or entirely smokeless, these powders are more valuable than black gunpowder because they impart to projectiles higher velocities. They are prepared by the dissolution of gun cotton and nitrocellulose in ether, after which the compound is dried into a hornlike substance. The nitrocellulose used in this process of manufacture is prepared by soaking wood pulp or sawdust in a solution of nitric acid, or nitric and sulphuric acids. When fully hardened by drying, the product is prepared for use by separating into flakes or grains by machines. In some varieties cellulose nitrate is mixed with nitroglycerin, or with nitro derivatives of hydrocarbons, such as picric acid. The ingredients depend upon the maximum initial velocity desired. See **Gunpowder**.

SMOLENSK (små-lyěnsk'), a city of Russia, capital of the government of Smolensk, on the Dnieper, 260 miles southwest of Moscow. It is surrounded by massive walls, but they are not maintained in a good condition for defense. The principal buildings include the Cathedral of Uspenski, the museum, the public library, the episcopal palace, and a number of educational and industrial institutions. It has railroad facilities and a large trade. The manufactures include soap, leather, linen textiles, carpets, and machinery. The place was a part of Poland until 1654, when it was annexed to Russia. It was the scene of a battle between the French and Russians in 1812. Population, 1908, 51,982.

SMUGGLING (smüg'gling), the offense of importing or exporting merchandise in violation of statutory law, especially without payment of duties required by the government. The practice obtained a wide foothold after the enactment of tariff duties by European countries, both on the continent and in Britain. Scott's "Red Gauntlet" and "Guy Mannering" are titles suggested by the peculiar arts practiced in bringing smuggled goods of various kinds into British possessions, the practice being quite extensive both in England and Ireland in the time of that author. In some countries smugglers were re-

garded as heroes, as was the case with the contrabandita of modern Spain. The British navigation laws and those intended to protect manufactures caused bold and extensive smuggling in the colonies, and many respectable business men of America regarded illicit trade with pirates and West India merchants justifiable. New York was the principal port for smugglers. That city and Philadelphia and Boston were enriched by the higher profits of illicit trading. It is estimated that goods to the value of \$4,000,000 were smuggled into France under a high protective law in 1831.

The smuggling carried on at present in America is largely in articles of luxury, which are in many cases ingeniously concealed from the view of customhouse inspectors. It is not infrequent for persons landing on our shores to conceal articles of this kind in their hair, or by having them sewed in their clothes. In some regions there has been a considerable disposition to evade the payment of excise on spirits, which is quite common among the so-called *moonshiners* of the mountain regions in several southern states. The penalties for this class of smuggling are very severe. Some writers have suggested that free trade, or a very liberal tariff without any prohibitive rates, is the only remedy to entirely overcome the practice.

SMUT, or **Dustbrand**, the disease induced in higher plants by parasitic fungi. It is found frequently in the ears of corn, barley, oats, and rye, and sometimes in wheat.

Smut usually appears as a black, sootlike powder, into which the grain and its integuments are converted. In some instances it affects various parts of the plant, especially in corn. When examined by a microscope, the black powder is found to consist of round spores, but these are so minute that many thousands of them can be placed on

a square inch of surface. The smell is not disagreeable, as in some of the allied fungi. No remedy or preventive is known. Corn is in-



HEADS OF WHEAT,

Showing Healthy Head and Effects of Smut in Two Others.

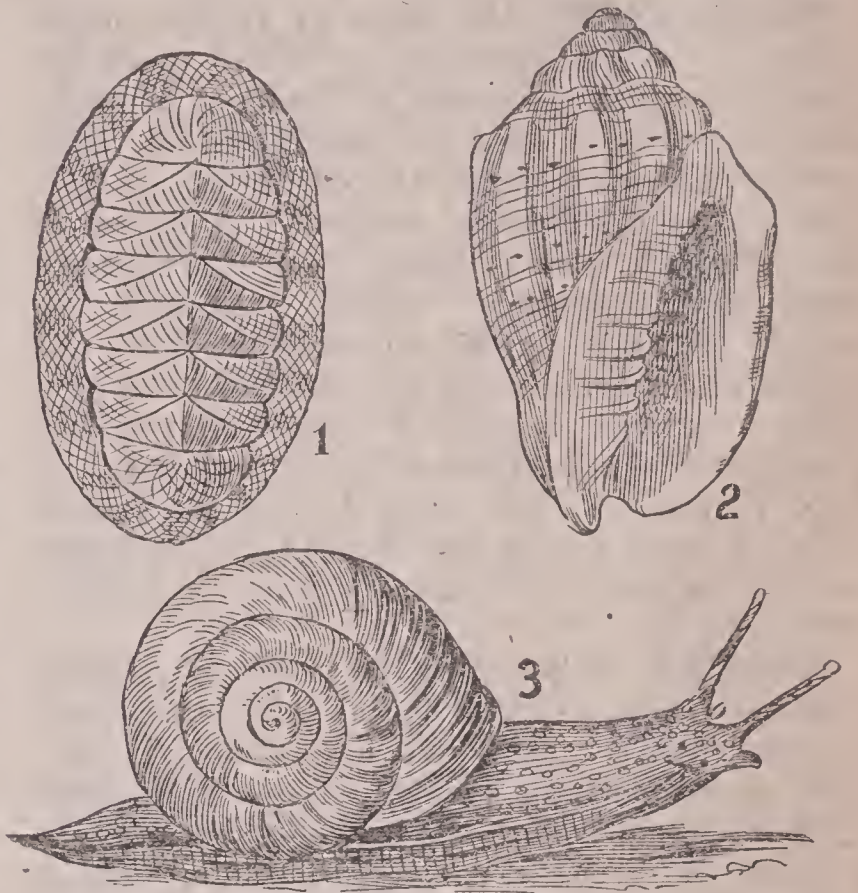
festated by a remarkable kind, the ears and tassels sometimes assuming a very large size. It is thought advisable not to select seed corn from plants growing in the vicinity of infected stalks.

SMYRNA (smēr'nà), a seaport city in Asia Minor, on a gulf of the same name, now one of the largest cities in Asiatic Turkey. The Gulf of Smyrna, formerly the Hermaean Gulf, is an inlet of the Aegean Sea, on which the city has a secure harbor. Several productive islands are at its entrance and it extends inland about forty miles. The city is built partly on the plain at the shore of the gulf and partly on the gently sloping hills. The view of the city from the sea is remarkably attractive, but the visitor is disappointed in finding many illy constructed wooden buildings, filthy streets, and defective surface and sewer drainage. Railroad connection with the interior has tended to enlarge its export and import trade, though this has been of more or less importance from remote antiquity. The exports consist principally of opium, licorice, carpets, raisins, sponges, timber, tobacco, emery, olive oil, wool, cotton, silk, and live stock. Among the leading imports are glass, petroleum, paper, clothing, chemicals, and foodstuffs. It has manufactures of cotton and woolen goods, carpets, machinery, ironware, pottery, opium, and tobacco products.

Smyrna has many mosques, bazaars, churches, synagogues, hospitals, and government institutions, but none of them is of remarkable size or architecture. The city has separate quarters for the Turks, Armenians, and Jews, and the general population is very largely diversified, many nationalities being represented. It has several notable ruins of ancient temples, theaters, and walls. Smyrna is a very ancient city, its origin being lost in the traditions of antiquity. It claims the honor of being the birthplace of Homer and other great Grecians, but nothing definite is known beyond the 7th century, when it was occupied by Ionian exiles, who later joined it to the Ionian League. The Lydians destroyed it in 630 B. C., but it regained its importance under the Romans and for many years rivaled Byzantium. It was destroyed by an earthquake in 178 A. D., but Marcus Aurelius rebuilt it soon after. Tamerlane massacred its people, in 1402, and in 1424 it became a Turkish possession. At present the inhabitants include about 85,000 Turks, 42,000 Greeks, and 16,000 Jews. Population, 1908, 220,540.

SNAIL, a gasteropodous mollusk, differing from the slug in having a large, spiral shell. The species are very numerous, varying somewhat in habits and size, inhabiting practically all

regions where fresh water is obtainable. They have four tentacles or feelers on the head, the two longer being provided with eyes, and all of them may be extended at will. The mouth has numerous rows of small teeth and is provided with a strong, horny upper mandible, while the tongue is broad and oblong. The body is soft and underneath is a foot or sole, the latter serving to facilitate its movement as it creeps along carrying the shell on its back. Snails are most



MOLLUSKS.

1, Chiton; 2, Univalve; 3, Snail.

active in warm, moist weather. They close their shell with a hardened mucus at the approach of winter, or in seasons of drought, and become inactive and torpid. When the shell and the soft parts are slightly injured, nature repairs them with remarkable completeness. In some places they effect considerable damage to garden vegetables and tender plants, on which they feed. The edible snail was a favorite article of food among the ancient Romans and is still eaten in France and other countries of Europe, where it is cultivated as a food commodity for the market. The largest snail native to America has a yellowish-white color and the shell has from four to six whorls. It is found commonly under logs or rocks, where it fixes itself to pass the winter.

SNAKE RIVER, the largest tributary of the Columbia. It rises among the Rocky Mountains of western Wyoming and, after a general course toward the northwest, joins the Columbia a short distance north of Wallula, Wash. The Snake River forms a semicircle in flowing

through southern Idaho and comprises part of the boundary line between Oregon and Idaho and between Washington and Idaho. Among the principal tributaries are the Salmon, Payette, Clearwater, Boise, and Owyhee rivers. The celebrated Shoshone Falls are on its course in southern Idaho and, after receiving the Salmon River, it forms the Salmon Falls. The entire length is about 900 miles, but only 160 miles are navigable.

SNAKEROOT, the name of several plants native to North America, so called from the belief that they are useful as remedies in treating snake bites. They are distributed in many parts of Canada and the United States. A species known as *Canada snakeroot* is found in New England and is known for its fragrance and tonic properties. *Black snakeroot*, or *sanicle*, has a root with an aromatic taste and properties of some value for antispasmodic purposes. *Seneca snakeroot* grows throughout most parts of the United States and from its root is prepared the drug known as *seneca*. It is an acrid irritant and is used by physicians in making cough mixtures in treating respiratory catarrhs.

SNAKES, or **Serpents**, an order of reptiles. They are characterized by an elongated body without limbs, terminating in a tapering tail. Writers estimate the number of species at from 1,500 to 1,800. The largest types and greatest number of species are common to the tropics, whence they gradually decrease until they entirely disappear in latitudes ranging from 40° to 55° south and north. They are especially abundant in the well-watered soil of the tropics, where the glades are open to the sun, and in these haunts may be found the largest species, such as the boas, pythons, and other types capable of devouring different forms of animals that frequent such regions. Arid districts are usually infested with vipers, rattlesnakes, and other poisonous serpents, but these types are also widely distributed in sections having a moist soil and large vegetable forms.

Writers have enumerated five general classes of snakes. These include the burrowing, tree, ground, fresh-water, and sea snakes. The *burrowing snakes* live almost entirely under the surface. They feed chiefly on invertebrate animals and do not include poisonous types. *Tree snakes* pass most of their time on trees and embrace many poisonous species. Their bodies are usually green and slender, in some cases they are colored quite like the trees they inhabit, and their food is mostly insects and animals. *Ground snakes* rarely enter water or ascend trees, but they are seen quite often in burrows

made by other animals. Most of them are not poisonous. *Fresh-water snakes* swim with great ease, are not poisonous, and feed on frogs, fish, and other forms of aquatic life. *Sea snakes* are generally poisonous, have a rudder-shaped tail, and are unable to move on land. Snakes of all kinds rarely proceed far from the place of their nativity, unless they are deprived of food and places to retreat for safety.

The body of snakes is covered with horny scales. Over the outside is a thin skin that is shed once each year and in some species even oftener. It first loosens at the head, and gradually peels off toward the tail, the skin being usually whole when cast off. The number of ribs varies greatly, some having as many as 300 pairs. These serve to give form to the body, aid in respiration, and are the organs of locomotion. When moving forward, the animal assumes a winding shape and gains advantage by the lower ends of the ribs acting as feet, while the scales serve to hold to the surface and aid in drawing the different parts of the body. The eyes are small and unprotected by eyelids. Although they have no external ear, they hear well and are affected by musical sounds. In all species the sense of sight is comparatively feeble. On the snout are two nostrils that indicate a high development of the sense of smell, upon which sense the animal relies quite largely in the pursuit of its prey. The forked tongue can be protruded with much facility, and is thought to serve as an organ of touch as well as taste.

Poisonous serpents have two fangs in the upper jaw and above them is a gland that elaborates the poison. Through the center of each fang is a small tube that serves for the passage of the venom, which is conducted from the glands by a duct or tube and forced into the object bitten. The poison fangs are set in a movable plate and turned back when not in use, but assume an erect position when the mouth is open. Snakes are oviparous, usually depositing from ten to seventy eggs. These are covered with a soft shell and are exposed to and hatched by moist heat. The pythons are the only snakes that defend their eggs and incubate them by the warmth of the body. Many of the fresh-water and sea snakes retain the eggs in the body until the embryo is fully developed, hence these species bring forth living young. Snakes are largely flesh-eating animals and feed on insects, birds, reptiles, and small quadrupeds. They are able to swallow food thicker than themselves, a curious fact that may be observed in a small ground snake swallowing a frog, and in the boa crushing its prey

by constriction through the powerful muscles of the mouth.

SNAPPING TURTLE, the name of a tortoise found in the fresh waters of North America, so called from its fierceness in defending itself against its enemies. The body is about twenty inches in length, though it sometimes exceeds three feet. The tail is long and the head is snakelike, but the shell is too small to permit either to be entirely covered. It has jaws of great strength and is capable of holding itself so firmly to the object it bites that it is pulled or lifted from the ground. A species known as *alligator snapper* is found in the lower basin of the Mississippi. The female deposits about thirty eggs in June, digging for that purpose holes in a sand bank with its hind feet. The eggs are about an inch in diameter, white in color, and nearly globular.

SNIPE, a genus of wading birds. They are common to America and Europe, frequenting the regions along the shores of rivers and lakes and the marshy places. The *American*, or



GRAY SNIPE.

Wilson's, snipe is found in large flocks, especially in marshes, and is a favorite for the fine flavor and nutritious quality of its flesh. It is about ten inches long, has strong legs, and the long, slender bill is well adapted to search for insects and mollusks under the water. The color is brownish-black above and whitish below and the voice is a peculiar bleating cry. The *great gray snipe* is common to the western regions of Europe. It is somewhat larger than the common snipe of America, while the *red-breasted snipe* frequents the shores both of America and Europe. The latter is about ten inches long with an alar extent of eighteen inches. The *jacksnipe* is somewhat smaller and is indigenous to Europe and Asia. Snipes common to America move far into Canada in the spring, where they breed, and migrate southward in the fall, usually to the gulf region.

SNOHOMISH (snō-hō'mish), a city of Washington, in Snohomish County, 38 miles east of north of Seattle, on the Snohomish River. It is on the Great Northern and the Northern Pacific railroads and is surrounded by a fertile farming and mining region. The chief buildings include the high school, the Masonic and Odd Fellows' halls, and several fine churches. It has extensive lumber mills, waterworks, electric lighting, and sanitary sewerage. Formerly it was the county seat, but that is now at Everett. Population, 1900, 2,101.

SNOW, the particles of frozen moisture which result when the air is condensed to a temperature below 32° Fahr. An assemblage of such crystals is called a *snowflake*. *Hail* and *sleet* are caused by raindrops that freeze in their passage through the air, but snowflakes are formed when the vapor crystallizes, and they are enlarged in size in falling by condensing additional moisture from the air. In mild weather they are larger than when it is extremely cold. They assume a large variety of beautiful forms; fully a thousand have been classified by observers. Snow crystals are viewed to the best advantage under the microscope when they are allowed to fall on a black surface, but the finest forms occur only in the polar regions. The star shape is the most common form. Some appear as hexagonal plates and others as hexagonal prisms, and they are often terminated by plates or a group of needles. A number of the forms of snowflakes seen after a light fall of snow are shown in the accompanying illustration.

The incident rays of light are refracted and reflected by the irregular crystal clusters and operate to give to the eye the colorless sensation of white, but when pressure is applied to



FORMS OF SNOW.

bring the crystals into close contact, snow assumes the form and appearance of ice. If the temperature of the air near the surface is warmer than 32° Fahr., any snow that is formed

in the upper regions melts before reaching the ground. It is in this way that the absence of snow in the tropics is accounted for, where it falls only near the summits of lofty mountains. Snow melts slowly in the polar zones, thus accounting for the large accumulations in the high latitudes, but the fall is heaviest in the cool temperate regions. Snow seldom occurs south of 36° north latitude, except in regions modified by high altitudes.

The *snow line* is the lower limit of the region of perpetual snow, above which the ground is covered with snow throughout the year, while below the line it melts in the warm season. The altitude of the snow line depends upon latitude. In the Himalayas, Lat. 31° N., it is 17,000 feet; in the Rocky Mountains, Lat. 43° N., 12,465 feet; in the Andes of Ecuador, Lat. 1° S., 15,800 feet; in Norway, Lat. 70° N., 3,400 feet; and in the Andes of South America, Lat. 54° S., 3,700. As a rule, that slope of a range which is exposed to the prevalent wind has a lower snow line than the opposite side. In the polar regions the snow line gradually nears the level of the sea.

Snow is an important factor in the economy of nature. It is a nonconductor of heat. Where it falls in abundance it forms a protection to the ground and thereby prevents the temperature from lowering to an extent that would injure seeds and plants. The winds are generally modified by coming in contact with regions covered with snow, while the snow melting on mountains supplies an abundance of water for irrigating arid lands and serves to replenish the rivers by its gradual conversion into water in the warm season. Glaciers are immense masses of ice and snow. They are formed by large accumulations in the snow fields situated above the snow line. *Red snow* was first mentioned by Aristotle, who found deposits of it on elevated mountain summits. It is most abundant in the Arctic regions and is due to the prevalence of minute organisms of vegetable growth.

SNOWBERRY, the common name of a bushy shrub of the honeysuckle family. It is cultivated extensively in America as an ornamental plant. The leaves are simple and the flowers are small. It bears a leafy cluster of snow-white berries at the ends of the branches. The *West Indian snowberry* is a plant of the madder family and is cultivated in greenhouses for its white berries.

SNOWBIRD, a genus of birds of the finch family, native to North America, and commonly seen in flocks during the winter. It ranges from Mexico to the northern regions of Canada, is about six inches long, and has a

slaty-gray color above with white beneath. The snowbird is often seen near houses and barns in the winter time, and in cold weather seeks shelter in haystacks and corn shocks. Snowbirds usually congregate in small flocks, and visit the barnyards in search of food. They subsist on seeds and berries. Their flesh is eaten.

SNOW BUNTING, a bird of the bunting family, widely distributed in America and Europe. It differs from the true buntings in having a long and nearly straight claw on the hind toe, and it is similar to the lark in its habits of running along the ground. In the summer time large numbers are seen far north in the Arctic region, but it moves to temperate climates in autumn. The color is a rusty-brown in winter and tawny in the breeding season, but there is less change in the female than in the male. The body is about seven inches in length and, while on the wing, it utters a pleasant song. It feeds mostly on seeds and insects. Soon after arriving in temperate regions, it becomes very fat and is then esteemed delicate food. Great numbers are killed in Greenland and dried to be eaten in winter.

SNOWDROP, a genus of early blooming bulbous plants of the *amaryllis* family. Several species are cultivated for ornament. The bulbous root produces only a few leaves and a single-flowered, leafless stem. They are native to Europe, but have been widely naturalized and greatly improved and are now grown extensively in gardens. The flower is a single white, drooping growth and issues from a scape on the flower stem. The *four-winged snowdrop* is a tree that ranges southward from Virginia. It reaches a height of fifty feet, has four-winged seeds, and bears ovate-oblong leaves.

SNOW LINE. See **Snow**.

SNOWPLOW, a mechanical device for removing snowdrifts from railroads and street car lines. Machines of this class are used extensively on railroads in the northern section of North America and other cold regions. Small snowplows are frequently attached to the engine pulling the ordinary passenger or freight trains, but larger machines are mounted on an eight-wheeled car and pushed forward by an engine attached to the rear end. In cases where great drifts have accumulated two engines are frequently attached, thus giving an immense propulsive power. The snowplow is so constructed that its cutting blades throw the snow toward both sides from the track, but in some the drift is only in one direction. Another class, the *rotary plow*, has buckets which scoop the snow and convey it to a hopper, whence it is blown by a fan. The rotary plow is pushed

along the track by the locomotive, but the working part is operated by a special engine. With devices of this kind it is possible to remove a drift of snow ten feet deep and a half mile long in a few minutes. A smaller implement is manufactured to be drawn over the common highways by horses and over car lines by electric power. Snowplows of American manufacture have been exported to Russia and other countries of Europe.

SNOWSHOE, a device made of sinew, rawhide, wood, or some other light material, and fastened to the bottom of the foot to support the wearer in walking over snow. Those made of sinew or rawhide have a light wooden frame, over which the material is stretched, and there is a device in the center for attaching it securely to the shoe. The length varies from two to five feet and the width from one to two feet, it being necessary to have a large surface to prevent sinking into loose snow. Shoes of this kind are worn extensively by the Eskimos, Sioux Indians, and Caucasians in regions far north. The *skee* is a snowshoe, or skate, which is used extensively in Scandinavian countries. See **Skate**.

SNUFF. See **Tobacco**.

SOAP, a substance made by uniting oils and fats with alkalies. It is used for washing and cleansing and in medicine. Soap is a chemical compound that has served valuable domestic purposes from the early historical period of Europe. It is singular that the art of manufacturing it was first learned by the Romans after their conquest of Gaul. At present there are manufactures of soap in all countries, it being a staple article of the world's commerce, and its use is firmly established among all peoples having any semblance of civilization.

The common soap of household use consists of a combination of potash and soda with certain constituents derived from oils, grease, and fats. Among the principal fats and oils employed are lard, tallow, and fish oils. In certain grades, especially in the finer soaps, it is common to use linseed, castor, palm, hempseed, olive, cocoanut, and other vegetable oils. The particular ingredients vary according to the kind of soap wanted, depending upon the different purposes for which it is intended. The three classes of soap may be grouped as soft soaps, coarse household soaps, and fine soaps.

Soft soap is a compound of potash, or soda and potash, with the fatty acids derived from the dry oils, such as linseed oil, whale oil, and fish oil. It is soft and pasty to the touch and dissolves more readily in water than hard soap. Soda and tallow are the chief ingredients in

manufacturing coarse *household soaps*. Resin is added in making yellow soap. Mineral and other colors added in the process of manufacture produce the mottled soap, while the *fine soaps* generally contain carbonate of soda and olive oil. The toilet soaps are usually highly perfumed and nicely colored. The grades intended for medical use are prepared of olive or almond oil and caustic soda. Soap intended for general household use is made by boiling the potash and soda with the fats and, after the soap rises to the top, it is run off into frames to be cooled and solidified into cakes. The cakes are usually wrapped in paper and boxed ready for shipment.

SOAPSTONE, or **Steatite**, a compact variety of talc, composed chiefly of impure hydrated silicates of magnesia. It is durable and takes a high polish, and is so named from its soapy feeling when touched by the hands in a moist condition. A variety known as *freestone* is cut into small blocks and heated to keep the feet warm while driving during cold weather. Some species of soapstone are ground for use in making toilet powder and others are employed in making sinks, stoves, and building stone. Extensive deposits are found in New England and in the Lake Superior region.

SOCIAL DEMOCRATS, the name applied to a body of socialists, whose aim is to carry on industry for the benefit of society as a whole, instead of recognizing the competitive methods existing at present. There is a noticeable growth of sentiment in favor of forming a socialist party, both in America and Europe, though the advocates differ widely in different countries as to the principles declared essential to reorganize society, or to bring about improvement in economic conditions. As a general rule economists do not favor socialism and, instead, reject it on the ground that science does not support it. As a whole it may be said that the great majority who favor a political socialist party are rather social reformers than socialists in a direct sense. The first attempt to embark in the political campaign in the United States took place in 1900, when Eugene Debs received 94,552 of the popular votes for President. In the campaign of 1904 there was a division and two parties resulted, Debs being the candidate for President of the Social Democrats and Corregan of the Social Labor party. The former received 397,208 votes and the latter, 32,516 votes. In Illinois Debs received 69,225 votes, the largest in any one State, and more than 25,000 votes were polled for him in each California, New York, Ohio, and Wisconsin. The heaviest vote polled for Corregan was in New York, 9,127

votes. In the election of 1908 the party polled 426,337 votes in the country.

Much attention was attracted to the heavy vote polled in Germany in the election of 1903. In that year the party polled 32 per cent. of the total number of votes cast and elected 81 members to the *Reichstag* out of a total membership of 397. However, the membership declined somewhat in 1907. The vote of the social democrat party in that country is shown in the following table:

YEAR.	SOCIALIST VOTE.	MEMBERSHIP.
1871.....	124,655	2
1874.....	351,952	9
1877.....	493,288	12
1878.....	437,158	9
1881.....	311,961	12
1884.....	549,990	24
1887.....	763,128	11
1890.....	1,427,298	36
1893.....	1,876,298	44
1898.....	2,107,076	58
1903.....	3,011,114	81
1907.....	3,259,020	43

In the United States socialism is supported by 150 periodicals. The leading publications include the *Social Standard*, Pittsburg; *Cleveland Citizen*, Cleveland; *Social Democratic Herald*, Milwaukee; *People*, New York City; *Appeal to Reason*, Girard; *Volkzeitung*, New York; and *Chicago Socialist*, Chicago. Belgium, Italy, Austria, Denmark, France, Russia, England, and Japan each have socialist parties or associations of more or less strength and the movement is supported by a number of periodicals in each of these countries. The socialist vote polled since 1906 in the countries of the world where the party has been organized is reported as follows:

Netherlands..... 65,743	United States..... 426,337
Denmark..... 76,612	Australia..... 441,270
Finland..... 268,186	Belgium..... 501,346
Italy..... 301,525	France..... 1,120,406
Great Britain..... 342,196	Germany..... 3,259,020

SOCIALISM (sō'shāl-iz'm), the term variously applied to theories of social organization, which aim to reorganize society on the basis of coöperation rather than competition. It is applied in a loose sense to all schemes for abolishing social inequality. When employed in this aspect it is generally designated as Utopian socialism, which strives to build up an ideal state of society founded on principles of justice. *Scientific socialism* is a term applied to an economic theory. It affirms that the material from which labor produces wealth, that is, land, should be the property of the community instead of individuals. Socialism is older than political economy, but in the last century it took on many new phases and won a much larger following than was previously attracted

to it. The growth of socialism has been so rapid within the last fifty years that many writers speak of it as a new theory of government, which is a correct view only when applied to its influence upon the present aspect of political parties in constitutional governments, in which socialism under various names has entered into the public policy and institutions through the development and growth of organized parties.

While an ideal socialistic state of society aims to vest in the government functions to control the organization of all the industries of the country, socialism as a political force is seeking to stimulate the gradual adoption of certain reforms, such as government control of telephones, telegraphs, railroads, mines, and other industries, aiming of course to extend this control as the conditions of society warrant. Its advocates argue that socialism is but the highest state of evolution in society, and that by a process of natural development it will ultimately secure recognition as a fundamental principle in government. They cite the fact that *slavery* was once an extensive institution, but gave way to feudalism, while *feudalism* was succeeded by capitalism, and *capitalism* will necessarily be replaced by socialism.

Modern writers have produced an extensive literature on the subject, which is constantly influencing thought among the laboring and industrial classes, both in America and Europe. The earliest influential socialist of England is Robert Owen (1771-1858), and F. M. C. Fourier is a noted advocate of that theory in France. However, the most eminent writers and advocates of this school of economy are German and Russian. Socialism in Germany had its rise preceding the Revolution of 1848 under the leadership of Karl Marx and Friedrich Engels, and as early as 1890 the socialist party had a powerful political organization, sufficient to elect about one-half of the representatives in the legislative bodies. However, the tendency among the socialists of Germany and other European countries is to modify their theories by assuming a more compromising attitude toward other political parties, and in this way to secure a gradual introduction of their theories. The Social Democratic party of America was formed in Chicago, in 1897, as an organization succeeding the American Railway Union, which was dissolved at that time. Eugene V. Debs became the leader of the new party, which declared its purpose to be the uniting of all persons who are in favor of the *coöperative commonwealth* as a substitute for the present *competitive system*.

Christian socialism claims to be the result of

applying the teaching of Christ to national, social, and commercial life, and not merely to personal conduct. It partakes rather of the aspect of a religious organization than a political influence. The advocates of this theory of government urge the view that Christ dealt more largely with the principles looking to the betterment of the conditions of life in this world than with organizing a future state. They maintain that He placed the community before the individual and taught that the foundation of society is brotherhood, not competition for profit. They hold the view that a really Christian society is socialistic, hence they adopted the name of Christian Socialists. See **Feudal System; Labor; Political Economy; Serf; Slavery**, etc.

SOCIAL SETTLEMENT, an association of individuals for the purpose of improving the educational and industrial conditions of the poorer classes. Settlements of this kind are maintained in the poorer districts of certain cities and are promoted by men and women of culture. Toynbee Hall, named after Arnold Toynbee, was established in the White Chapel district of London in 1884 and is one of the earliest social houses or settlements to be founded. The College Settlement, in New York City, and the Hull House, in Chicago, were opened in 1889 and are among the earliest of the settlements in America. They were soon followed by the Chicago Commons, Chicago, and the University Settlement, New York City, and many others. Institutions of this kind are now maintained in the leading cities of the world, including Berlin, Chicago, London, Paris, New York, and many others. The courses include physical, educational, esthetical, and industrial training. Religious instruction is nonsectarian and is confined largely to Sunday talks. All branches of economic art receive attention, especially spinning, weaving, gardening, dressmaking, fruit growing, and domestic economy.

SOCIETY ISLANDS (sō-sī'ĕ-tĭ), an island group in the South Pacific, lying directly east of Australia and south of the Hawaiian Islands. It consists of thirteen main islands and a large number of smaller ones. The group has an area of 650 square miles. Tahiti is the principal island. The surface is generally elevated, with mountains of considerable height. A ridge of highlands extends across Tahiti, which terminates in Mount Orohena, height 8,500 feet. Other summits reach elevations ranging from 3,500 to 6,980 feet. The climate is mild and healthful and the soil is generally fertile. Among the chief productions are cotton, coffee, sugar, guava, lemons, oranges, and other tropical prod-

ucts. The shell fisheries possess considerable value and it has deposits of minerals, such as clay, iron, and granite. Horses, swine, cattle, sheep, and poultry are grown in abundance.

The Society Islands were discovered by the Portuguese in 1606, and were first visited by the English in the time of George III., in 1767. Captain Cook explored the islands in 1769, naming them in honor of the Royal Society of London. France established a protectorate over them in 1844 and the entire group is now a French colony. The government is administered by a resident governor, who is assisted by a council. A general council elected by popular vote has more or less legislative power. Steamboat lines are maintained between Tahiti and San Francisco and the Hawaiian Islands. The colony has considerable export and import trade. About 50 per cent. of the commerce is with the United States. Papeete, on Tahiti, is the principal town and seaport. Most of the inhabitants are Malays. Population, 1906, 18,685.

SOCIOLOGY (sō-shī-ōl'ō-jĭ), the science which treats of the constitution and development of human society. It analyzes and classifies social facts and embraces an explanation of the history and first principles of social phenomena. As a branch of natural philosophy it is closely associated with ethnology, political economy, comparative jurisprudence, social and political history, and the comparative study of religions. Plato made a careful study of society in ancient times, as is set forth in his "Laws" and "Republic," and Aristotle made a scientific classification of social facts in his "Politics."

The word *sociology* was coined by Auguste Comte, who is the earliest of the modern writers on this subject to give it a place of more than ordinary prominence. He spent twelve years in preparing his course of "Positive Philosophy," which embraces the social doctrine known as *Positivism* and treats of the entire wants of man as an intellectual being. Another epoch-making work is Herbert Spencer's "The Study of Sociology," in which he treats society from the standpoint of evolution. He advances the view that societies are initiated by military and industrial influences, but overlooks the important feature of critical and legal reconstruction through the enlargement of intelligence. As man becomes conscious of the benefit of society, he naturally attempts to defend and improve it. In the evolution of laws and institutions, natural selection works quite as prominently as in the case of individuals. Those that do not benefit society usually disappear, though frequently only after long periods of time, and the survival of the fittest, even if realized, is

not apparent or understood at its inception. Some writers describe society as an organism, itself made up of a multitude of conscious organisms.

SODA, chemically, an oxide of sodium, but the term is applied in ordinary language to an impure carbonate of soda, which is used for glass making, washing, and hard soap. Carbonate of soda is usually manufactured from common salt and from the mineral cryolite, a double fluoride of sodium and aluminum, of which large quantities are found in Greenland. It is a white powder, is soluble in water, and attracts water and carbonic acid from the air. Large quantities are manufactured for the trade. It is sold extensively in small boxes and cans.

SODA WATER, an effervescent drink, consisting of water strongly charged under pressure with purified carbon dioxide gas, usually entirely free from soda. It is so called because the gas with which it is charged was formerly generated from sodium bicarbonate with an acid. Large quantities are sold annually, mostly in the warmer season as a refreshing drink, and it is taken principally in cases of debility of the stomach. To flavor it a fruit syrup is added, such as the syrup of lemon or strawberry, and it is sometimes enriched with cream. Soda water is prepared by the vender by means of a fountain. A form of soda water called *pop* is flavored and put into bottles, in which form it is sold in the market.

SODIUM (sō'dī-ŭm), a metallic element of the alkalis, of which soda is the oxide. It is closely allied to potassium and has a bluish-white color and a high luster. The specific gravity is .972. It melts at 204° Fahr., readily oxidizes in the air, and decomposes when dropped upon water. Sir Humphry Davy obtained the metal of sodium in 1807 soon after he had discovered potassium. Nearly 40 per cent. of the immense quantities of common salt that exist in the ocean, in the deposits of rock salt, and in the brine springs may be classed as sodium. Many compounds of sodium have been studied, the uses of which are very numerous in the manufactures. Soda is obtained from sodium. It yields protoxide of sodium, carbonate of sodium, and hydroxide of sodium, the last mentioned being frequently called *caustic soda*. To obtain protoxide of sodium, the sodium is burned in oxygen or dry air, while hydroxide is the product of the reaction of sodium with water. Common salt is a compound of chlorine with sodium. Plants growing near or in the sea contain more or less sodium and it also occurs in many animal fluids. Many uses are

made of sodium and its compounds in the medical practice.

SODOM (sōd'ŭm), an ancient city of Syria, which is mentioned frequently in the Bible in connection with Gomorrah. These two cities were situated near the southern shore of the Dead Sea, though this is disputed by some writers, and it is accounted that they were destroyed for their wickedness by a shower of fire descending from the heavens, which has led to the view that their sites are covered with the waters of the Dead Sea. Other cities mentioned in connection with their history are Zeboim, Admah, and Zoar, but it is specially cited that the last mentioned was not destroyed because of Lot's supplication.

SODOM, Apple of, the name given by ancient writers to a fruit found in Palestine, especially in the vicinity of the Dead Sea. It is described by Josephus and Strabo as beautiful to the eye, but galling and bitter to the taste, and was said to fill the mouth with ashes. These writers probably have reference to a large gall caused by an insect on dwarf oaks, since they are bitter and are filled with a porous substance.

SOERABAYA. See Surabaya.

SOFIA (sō'fē-yà), or **Sophia**, the capital of Bulgaria, on the Bogana River, 175 miles southeast of Belgrade. It occupies a fine site on a plain between ranges of the Balkan Mountains and is surrounded by a productive region. Sofia has railroad connections with Constantinople, Budapest, and other trade emporiums and is the center of a large trade. It has a number of narrow and tortuous streets, but many modern improvements have been effected since Bulgaria obtained its independence in 1878. It has a number of fine public buildings, several churches and schools of higher learning, a modern cathedral, and many mosques. The streets are lighted with electric lights. They are provided with rapid transit, telephones, waterworks, and sewerage, and several of the principal thoroughfares are substantially paved. It is the seat of the national university and of an archbishop's palace. The Romans knew it by the name of Sardica. It passed successively through attacks waged by various peoples, until it became a Turkish possession in 1382. The Russians occupied it in 1878. With the independence of Bulgaria it was made the capital. Population, 1908, 82,621.

SOIL, that part of the upper stratum of the earth's crust which furnishes nutriment to plants. It is formed partly from particles resulting from the wearing of rocks and the decomposition of vegetable and animal matters. Soil exists wher-

ever the surface is not composed of rocks or covered with water, though the term is sometimes applied in a wider sense to the areas below water that yield vegetable forms. Drift soils are the product of glacier action, while alluvial soils are those resulting from floods and water in motion. The term *subsoil* is applied to the mass of earth or rock lying beneath the soil proper, and this is usually quite free from a mixture of decayed vegetable matter. The term *transported soil* is applied to that formed from particles of rock carried to lower regions, while *sedimentary soil* results from the disintegration of rocks whose particles are not transported. Soil varies in appearance, composition, and fertility according to the particles forming it, and the particular class of crops that may be profitably cultivated is largely dependent upon its constituents. Among the different substances forming soil are lime, silica, alumina, soda, magnesia, ammonia, and alkalies.

All soils contain a considerable quantity of moisture. They hold intact various metallic oxides as well as hydrogen, oxygen, carbonic acid, and other gases. The fertility of the soil on hillsides gradually decreases by the water resulting from rains, which washes the more productive parts into the valleys. For this reason it needs to be replenished with manures more frequently than the soils of the more level lands. This circumstance accounts for the fact that the best lands for cultivation and pasturage are found in the valleys along rivers and among hills. Soil loses productiveness by continuous cropping, especially if the crops are not alternated. In arid regions the subsoil is of great importance in retaining moisture, especially if constituted of such strata as serve to prevent the rapid passage of moisture through it. This is especially true if the subsoil is not located more than two to five feet below the surface soil.

SOKOTO (sō'kō-tō), a town of Africa, situated in the Niger Territories, on the Sokoto River, a tributary of the Niger. It has a number of mosques and several government buildings constructed by the British. The manufactures include cotton goods, utensils, jewelry, and earthenware. The streets are regularly platted, but they have been illy improved, and the city is surrounded by a wall. Sokoto was formerly the capital of the Fulah kingdom, an extensive region now included in the Niger Territories. It is a British protectorate. The city has a population of about 75,000.

SOLAR ENGINE (sō'lēr), an apparatus in which the energy of solar heat is utilized as a motive power. The problem of originating a

system which will successfully employ the heat of the sun as a propelling force, next to perpetual motion, has engaged the attention of many who have sought for a convenient and inexpensive power to drive machinery. Small air engines have been operated with considerable success through the agency of expanding air, which has been made possible by the use of large mirrors. In 1901 a solar engine was constructed on this principle. It has a large mirror of a circular form and the rays of the sun are reflected upon a small boiler set in the direction of the sun, the position within the circular mirror being such that the rays are reflected upon it from all sides. The water within the boiler is thus converted into steam and conducted to an engine, by which a pump or other machinery may be put in motion. It is necessary to properly adjust the mirror in the morning so as to catch the rays of the sun, and by means of a system of clockwork it is turned so as to keep in proper position as the sun passes through its course during the day. Solar engines develop several horse power, depending upon the condition of the atmosphere, but are not serviceable during the time of a cloudy sky.

SOLAR MICROSCOPE (mī'krō-skōp), an instrument which throws the magnified image of the object illuminated by the sun's rays upon a wall or screen. It is used to facilitate the study of minute objects. The common solar microscope consists of a mirror for reflecting a beam of sunlight through a tube, which sometimes is fixed in a window shutter; of a condenser or large lens for converging the beam upon the object; and of a small lens or magnifier for throwing an enlarged image of the object at its focus upon the screen or wall in a darkened room or box. The lime light can be employed successfully in this instrument, instead of the sun's rays. One that uses such a light is called an *oxyhydrogen microscope*.

SOLAR SYSTEM, the sun and the group of celestial bodies which, held by its attraction, revolve around it. It has the sun as its center. Besides the sun, it includes the major planets, with their satellites; the minor planets, or asteroids; and the comets. In it are comprised the meteoroids, the matter that furnishes the zodiacal light, and the rings of Saturn. The fixed stars are not included in our solar system, but are supposed to be the centers of other solar systems quite similar to our own. The nebular hypothesis (q. v.) accounts for the development of heavenly bodies. According to it all the matter composing the bodies of the solar systems was scattered very thinly through the

untold vastness of the celestial space, but gradually centers of attraction formed, and these centers pulled in toward themselves other particles. This process went on for countless ages, swifter in some regions of space than in others. The sun was undoubtedly the first of these centers to assume shape and large form, and afterward other centers formed and gathered particles with more or less rapidity, thus constituting the planets and other heavenly bodies. See **Planets**.

SOLDER (söd'ēr), a fusible alloy used for joining metallic surfaces or margins. It must be more highly fusible than the metal or metals to be united, and with this object the components and their relative amounts are varied to suit the character of the work. In the ordinary process of soldering small particles, two metallic surfaces are placed together, and a small quantity of solder is melted from the stick or cake by a soldering iron, which has been previously heated in a furnace. The hot iron is applied to the joint for the purpose of forming the solder into a uniform fluid and, after equalizing its distribution, the exposed surface is carefully smoothed. It is necessary to have the surfaces cleaned perfectly by scraping before joining them, and generally muriatic acid or sal ammoniac is used to remove all particles of foreign matter, else the solder will not become firmly fixed. A hard solder made of gold and copper, or gold, copper, and silver, is employed for soldering gold; while a solder of silver and brass is used in soldering silver. The soft solders used in ordinary work are formed of equal parts of lead, tin, and bismuth, or equal parts of lead and tin.

SOLDIERS' HOMES, the institutions built and supported by the government for the care and maintenance of soldiers honorably discharged from service, whose disability prevents them from earning their living. The first to be constructed were under the national government, but later many states founded and now maintain extensive institutions of this kind. At present about 25,000 soldiers are provided for in the soldiers' homes maintained by the national or state governments. The largest under national control is the Central Soldiers' Home at Dayton, Ohio, having 4,750 members, and the largest under state control is the institution at Quincy, Ill., where 1,050 are maintained.

SOLFERINO (söl-fě-rē'nō), a town in northern Italy, twenty miles northwest of Mantua, in the province of Brescia. It is celebrated as the site of a famous battle between the Austrians under Emperor Francis Joseph and the French and Sardinians under Napoleon

III. and Victor Emmanuel, which occurred on June 24, 1859. It terminated in the overwhelming defeat of the Austrians, who lost 20,000 men in the battle that continued for sixteen hours, while the allied army lost 18,000. The whitened bones of the slain soldiers lay on the battlefield until 1870, when they were gathered and deposited in three great sepulchers by representatives of Austria, France, and Italy. The town has a tower known as the Spy, from which the plains of Lombardy may be viewed to an advantage.

SOLID (söl'id), in physics, a substance that is held in a fixed form by cohesion among its particles, hence excludes any other material particle or atom from occupying the same space. In a solid the molecular attraction is stronger than molecular repulsion, but it varies greatly in different solids. This property distinguishes a solid from a liquid or a gas, which offers little resistance to influences that tend to change their shape. The term solid is applied in geometry to any magnitude that has length, breadth, and thickness. In this sense it is a part of space bounded on all sides, but the term volume is sometimes substituted for solid. See **Matter**.

SOLITAIRE (söl-ī-târ'), the name of a game of cards played by one person, supposed to have been invented by a prisoner confined in the Bastille of France. Originally the game was played with glass balls, but now it is usually with an entire pack of cards. The purpose is to play until, after consecutive manipulation, the entire number of cards is placed in consecutive order in four piles, according to the suits. The game is played variously, hence requires the use of a manual for definite information.

SOLOMON, Song of, or Canticle, a book of the Old Testament, constituting a lyric poem in the form of a dialogue. The principal subject treated of is chaste love, which, in its purity and faithfulness, is canonized in this book. It was interpreted allegorically of God and his people by the rabbis. The Christian church followed this method of interpretation, but referred the allegory to Christ and the church. Love is here described as the strongest and holiest of human passions, as the strongest sentiment of mankind, being a flame of Jehovah which cannot be extinguished. Although no satisfactory date of the time and authorship are known, it is probable that the book belongs to the time of Solomon.

SOLOMON, Wisdom of, a book of the Apocrypha, sometimes called the *Book of Wisdom*. It consists of three parts. In the first it attacks the philosophy of Greece, especially

that of the Epicureans, and it is shown that spiritual ruin comes to those who are absorbed in worldly affairs. The second part eulogizes wisdom and relates how Solomon came to choose it for his companion. In the third part the influence of wisdom upon the history of Israel is illustrated, and the evils of folly practiced by the heathen nations is put to scorn. See *Bible*.

SOLOMON ISLANDS; an island group in the Pacific Ocean, lying east of New Guinea and north of the New Hebrides. It is one of the most extensive groups in the Malay Archipelago, containing a large number of more or less important islands. The total area is about 16,000 square miles. The group is well watered. It has a damp climate and several chains of lofty mountains, some of which attain heights of 8,000 feet above the sea. The highlands have a climate favorable to Europeans. Among the principal products are yams, coconuts, rice, cotton, fish, poultry, swine, sugar, and many species of tropical fruits. These islands were first discovered by the Spanish in 1567, but were rarely visited until in the last century. By a treaty between Germany and Great Britain, in 1885, the islands became possessions of these two nations, the northern part being subject to Germany and the southern part to Great Britain. A considerable trade is carried on by both countries, but the interior of the islands and the inhabitants have not become well known to Europeans. They are Polynesians of small stature and speak a language of the Malay type. Population, 1906, 182,500.

SOLOMON'S SEAL, a class of perennial herbs of the lily family, allied to the asparagus. The leaves are sometimes eaten as greens. The stem attains a height of from six inches to four feet, bearing sessile leaves and nodding, greenish flowers. A number of the species are native to North America, especially the *great Solomon's seal*. Several species are common to Europe. These plants bear a bluish-black berry, which is purgative. In most species the rootstalks are thick and knotted, with scars on their upper surface, due to the falling away of old stems growing vertically.

SOLSTICE (söl'stīs), the period in the annual revolution of the earth around the sun at which it reaches its greatest northern or southern declination. This gives rise to two solstices in the year. The *summer solstice* occurs on June 22, when the sun shines directly upon the Tropic of Cancer, while the *winter solstice* takes place on Dec. 22, at which time the sun appears to traverse the Tropic of Capricorn. The sun is said to stand still for several days

before and after the solstice, owing to the apparent declination of its rays being very slight.

SOLUTION (sō-lū'shŭn), the process by which a body is absorbed into a liquid, by means of a fluid termed the *solvent*, or *menstruum*. The product is also called a solution, and may be formed of a solid, a liquid, or a gas. Thus, if water is poured upon a quantity of sugar, the solid sugar will take on the liquid form, the water serving as the solvent. Water dissolves many solids and is used extensively as a solvent, but some solids require alcohol, ether, and other liquids to become dissolved. Only a given quantity of a solid can be dissolved in a liquid, since adhesion and cohesion balance each other at a given point, when the liquid is said to be *saturated*. Some solids are partly dissolved by heat, as gum camphor, but there are notable exceptions, as in the case of water immediately above the freezing point, at which temperature it will dissolve a larger quantity of lime than when at the point of boiling. Many liquids dissolve other liquids and gases, as in the solution of alcohol in water, but the latter will not dissolve oily liquids. Oils, on the other hand, may be dissolved by ether and benzene. However, water is a solvent of ordinary air and carbonic acid gas.

SOLWAY FIRTH (söl'wā), an inlet from the Irish Sea, forming a part of the boundary between Scotland and England. It extends inland toward the northeast a distance of 38 miles, receives the water from the Eden and Nith rivers, and has valuable salmon and other fisheries. The tides ebb and flow with great rapidity, usually from eight to ten miles an hour, and the inflowing waves attain a height of from three to six feet. At ebb tide large sandy tracts of the firth are left dry.

SOMALI (sō-mā'lê), **British**, a British protectorate in East Africa, lying south of the Gulf of Aden and east of Abyssinia. It has an area of 59,900 square miles. The inhabitants are largely nomadic Mohammedans, who engage extensively in stock raising, chiefly that of cattle, sheep, and horses. It produces ostrich feathers, cocoa, indigo, coffee, gum arabic, hides, and fruits. The chief imports are cotton and cotton goods. Berbera is the principal city and seaport. Other cities are Bulhar, Karam, and Zeila. The government is administered under a consul-general, who is resident at Berbera. Population, 1908, 156,500.

SOMALILAND (sō-mā'lî-länd), **Italian**, an extensive region of East Africa, belonging to Italy. It extends from the Gulf of Aden to British East Africa and from the Indian Ocean

to Abyssinia. It and British Somali include all of the Somali peninsula. The area is estimated at 115,000 square miles. Horses, cattle, and sheep are grown in abundance. Ostrich feathers, gum, wool, live stock, coffee, indigo, and fruits are the chief exports. The native inhabitants are largely nomadic Mohammedans, who are a finely formed race, but they are still in a semibarbaric state. The language is a mixture of Galla and Arabic words. Italia is the principal seaport and the capital. Bardera, near the Juba River, has a large trade. The Webi and Juba are the most important rivers. The region is quite fertile, but has an extremely hot climate and considerable desert land. Population, 416,500.

SOMERSWORTH (sūm'ērz-wūrth), a city of New Hampshire, in Strafford County, on Lake Sunapee, forty miles northeast of Concord. It is on the Boston and Maine Railroad. The surrounding country is fertile, producing grasses and cereals. Among the noteworthy buildings are the public library, the high school, the hospital, and several fine churches. It has manufactures of cotton and woolen goods, boots and shoes, machinery, farming implements, and vehicles. The vicinity was settled in 1729. It was chartered as a town in 1754 and became a city in 1893. Population, 1910, 6,704.

SOMERVILLE, a city of Massachusetts, in Middlesex County, on the Mystic River and on the Boston and Maine Railroad. It is a suburb of Boston, with which it has both steam and electric railway connections, and is a favorite residence center for many Boston business men. Among its principal buildings are the public library, the State armory, the Somerville Hospital, the home for the aged, the city hall, and many schools and churches. The leading industries are tanneries, meat-packing establishments, foundries, flour mills, brick works, and machine shops. The city occupies a fine site upon seven hills. On Prospect Hill Washington raised the first colonial flag, in 1776. Other features are Central Hill, the old Powder House, and Broadway, over which Paul Revere passed in his famous ride. The place was settled about 1631. For many years it was a part of Charlestown, but was set off as a separate town in 1842. It was incorporated as a city in 1872. Population, 1905, 69,188; in 1910, 77,236.

SOMME (sōm), a river in the northern part of France, which rises in the department of Aisne and flows into the English Channel after a course of 152 miles. Canals connect it with the Seine, the Oise, and the Scheldt. It is navigable to Amiens.

SOMNAMBULISM (sōm-nām'bū-līz'm), a

disorder that affects some persons during a condition of sleep. It is due to more or less activity in some of the psychical and motor areas of the brain, while the centers that preside over consciousness are slumbering soundly. While in this condition different kinds of impulses may take place, such as sleep-talking, sleep-crying, and sleep-walking. The last mentioned phenomenon is more remarkable and less frequent than sleep-talking, which is of common occurrence among the young, but there are others quite as marvelous. Numerous instances may be cited in which somnambulists dressed themselves and walked in dangerous localities with perfect safety, even over places they would fear to tread during a state of wakefulness. Other instances include riding on horseback, conversing systematically, and frequenting the places at which they were occupied during the day. These phenomena occur in almost equal proportions among males and females, but are most frequent in youth, while they usually disappear when adult age is attained. They are more common to persons of nervous temperament, but may be artificially produced by hypnotism. Sleep-walking is closely allied to hysteria and epilepsy, and not infrequently alternates with these and allied diseases.

SONNET (sōn'nēt), a poetic composition which consists of fourteen rhymed verses, written according to a clearly defined plan. In the sonnet as perfected by the Italian humanists of the 14th century there are two parts, the first of eight verses and the second of six, known respectively as the *octave* and the *sestet*. The first eight lines or verses make two quatrains and the remaining six form two tercets. In the quatrains there are two rhymes, the first, fourth, fifth, and eighth lines rhyming together, which is true likewise of the second, third, sixth, and seventh. While this is considered the best arrangement, other plans are often used, even in the works of Petrarch, in which the rhymes are alternate. Greater liberty is allowed in the tercets, in which the rhymes may be either two or three, but they must not occur in couplets.

The writers of sonnets are numerous, but few Americans have ever written in this style. The Romance languages, especially the Italian and Spanish, are well fitted to express fanciful feeling in the sonnet, but in English it is preferred to treat only the grave and contemplative in this style. Goethe, Uhland, Schlegel, and Tieck are the leading writers of sonnets in German; and Shakespeare, Drummond, Spenser, Milton, Mrs. Browning, Spencer, and Wordsworth, in the English. Good examples of sonnets are Mrs.

Browning's "Sonnets from the Portuguese" and Milton's "On His Own Blindness."

SONS OF LIBERTY, the name assumed by a society organized in Connecticut in 1755, the object being to promote religious liberty. Colonel Isaac Barré, in a speech in Parliament on Feb. 6, 1765, applied the phrase to the party in America who opposed the enactment of the Stamp Act. The name was afterward adopted by a number of societies who favored the separation of the colonies from Great Britain, many of which were secret organizations.

SONS OF VETERANS, a society organized at Philadelphia, Pa., in 1879, to which all lineal male descendants from honorably discharged soldiers and sailors of the Civil War are eligible. This patriotic society is a companion organization of the Grand Army of the Republic, the chief society of Federal veterans. About 100,000 members belong to the society, which includes 2,000 local camps and 29 state divisions. The Daughters of Veterans is a similar organization, to which daughters of honorably discharged soldiers and sailors, as well as daughters of Sons of Veterans, may be admitted when attaining the age of fifteen years.

SONSONATE (sōn-sō-nä'tā), a town of Salvador, in Central America, 40 miles west of San Salvador. It is situated on a plain and has railway facilities by the line passing from Santa Ana to the port of Acajutla. The surrounding country is fertile, producing large quantities of sugar cane, tobacco, and fruits. Population, 1909, 18,150.

SOOCHOW (sōō'-chou), or **Suchau**, a city in China, on the Imperial Canal, 54 miles northwest of Shanghai. It has water communication with Shanghai, which is its port, and its trade is of material importance. The city is inclosed by a wall ten miles long and is divided into several parts by canals. It has extensive manufactures of silk and cotton goods, clothing, porcelain, books, and utensils. The surrounding country possesses much fertility, and the city is adorned with many beautiful gardens and parks. The inhabitants are generally cultured and refined and have good educational conveniences. Soochow has a large number of fine temples, hospitals, colleges, and government buildings. Population, 500,150.

SOOT. See **Lampblack**.

SOPHIA (sō-fī'ā). See **Sofia**.

SOPHIA, Church of Saint, the most celebrated and valuable edifice of the Mohammedans, located in Constantinople. It was erected by Emperor Justinian, who dedicated it in 558 as a place of worship for the Eastern Church. This noble structure remained in the hands of

the Christians until 453, when Constantinople was captured under Sultan Mohammed, who replaced the cross by the crescent of Islam. The interior is richly decorated with paintings and mosaics and a fine dome surmounts the edifice. This dome has a diameter of 105 feet and a height of 184 feet.

SOPHIST (sōf'ist), meaning a man of wisdom, the name given to a school of teachers in Greece, who flourished in the time of Socrates and for several decades immediately preceding, about the middle of the 5th century B. C. The period at the time of their origin was one of social and political decline and it was the main intent of the school to establish a liberal education to supplement the customary instruction in gymnastics, reading, writing, and music. It is noteworthy that the sophists held almost a monopoly of general education for nearly a hundred years, but they were considerably divided among themselves, both in their theory and practice, and many of them were mere critics of the philosophers who had lived before. The superior grade of these teachers included Protagoras of Abdera and his disciples, Gorgias and Hippias of Elia.

The sophists taught many branches of higher learning. They consisted of the four classes known as teachers of disputation, politics, culture, and rhetoric. With the establishment of the noted philosophic schools known as the Academy and Lyceum, the philosophers took the place of the sophists as the educators of Greece. Both Socrates and Plato accused them of teaching unsocial doctrines, and alleged that they endeavored to make the worse appear the better cause of action. The later sophists were generally accused of being self-seeking and mercenary, though this view was undoubtedly overdrawn, since the sophists are known only by the writings of their antagonists.

SORATA (sō-rä'tā), or **Illampu**, the highest mountain in Bolivia, situated about 16 miles east of Lake Titicaca. It is an extinct volcano. The highest point is 21,495 feet above sea level. Sir William M. Conway ascended it in 1897.

SORBONNE (sôr-bôn'), a famous college of the University of Paris, so named from its founder, Robert of Sorbon, who established it in 1252 with the sanction of Louis IX. He had been selected as the chaplain and confessor of the sovereign at a time when the University of Paris held a place of great eminence, and decided to open an institution in which priests could teach theology gratuitously, but regulations were made to obtain the necessaries for their maintenance. The founder provided for sixteen professors, four each in the Norman, French,

Picard, and English, and shortly after faculties in German and Flemish were added. Robert drew up the constitution and became the first head, and no substantial changes were made until the French Revolution. Originally destined for poor students, the Sorbonne soon became a meeting place of large numbers from all walks of life, and received many students from the University of Paris.

Theology was the only branch of study pursued. Those attending were provided with a place to live at the institution, instead of finding lodging elsewhere, as had been the early custom in France. The institution rapidly attained to a high position and became the leading theological school in Europe, attracting students from countries far remote. In it, were trained the greater number of the Paris doctors. Cardinal Richelieu, in 1629, opened the present buildings in the Quartier Latin. The old university was destroyed by the Revolution in 1792, and when it was reorganized by Napoleon, in 1808, a faculty of theology was established at the Sorbonne. At present there are seven chairs in theology and, in addition, lectures are given and degrees are conferred in the branches of science and literature. Napoleon III. projected a reconstruction of the buildings. He formulated plans under which work was begun in 1884 and completed in 1889. The old church was retained on account of its artistic merit. It contained the tomb of Richelieu.

SOREL (sō-rĕl'), a city of Quebec, capital of Richelieu County, 45 miles northeast of Montreal, at the confluence of the Richelieu and Saint Lawrence rivers. It is on the Quebec Southern and the Canadian Pacific railways. The manufactures include clothing, ships, earthenware, and machinery. Among the chief buildings are the county courthouse, the high school, the Carlton and Brunswick hotels, and many schools and churches. It has a large trade in grain and produce, much of which is shipped by steamboats on the Saint Lawrence. A majority of the people are French. The place was settled in 1665, when a fort was built here. Population, 1908, 8,758.

SORGHUM (sôr'gŭm), a plant which resembles broom corn and sugar cane. Several species are cultivated for the manufacture of a nutritious molasses, but in dry regions it is grown quite extensively for fodder. The sorghum plant is native to China, whence it was introduced into France, and in 1856 it was brought to America. The seed resembles that of broom corn. It is usually drilled in rows at the same time of the season that corn is planted. The growth is slow for several weeks after

coming out of the ground, but later it grows rapidly and usually attains a height of eight to sixteen feet. It is stripped of its leaves and cut before frost, usually in September or October. The stalks are pressed in a cane mill for the juice, which is reduced by boiling to molasses or sugar. An acre yields from 75 to 150 gallons of molasses or sorghum. The seed is highly valuable for its nutritive quality, but is not used extensively as a food. Sorghum can be cultivated wherever corn grows, but also in more arid regions, where it is cut several times in the season as



SORGHUM PLANTS.

fodder for stock. The Kaffir corn of South Africa is a kind of sorghum. It is grown successfully for its seed and fodder in the region from Saskatchewan to Texas.

SORREL (sôr'rĕl), a genus of perennial herbs of the buckwheat family. They are allied to the docks, from which they differ in their leaves and acid. The species common to America is the sheep sorrel, which is found in pastures and poor soil. The common sorrel of Europe has narrow leaves and grows to a height of from one to two feet. It is used in making soups, sauces, and salads. The *sorrel tree* of America belongs to the heath family and is native to the Allegheny Mountains of the South. It has white flowers and leaves about five inches long, which become crimson in early fall.

SOUL, the part of man that renders him a rational and spiritual being; the spirit that distinguishes him from the lower animals. The word is sometimes used as a synonym of mind and of spirit, but each has an application not suitable to the others. Mind includes reason, conscience, and a free will, while soul in its limited use does not. The spirit differs from the soul in that the latter is always associated with a being that lives or has lived, while spirit may be applied to a being that may not have or have had such a connection. Aristotle and the Scholastics assumed that soul means the primary principle of life. They held that plants have a vegetable soul, that all animals are endowed with

a sensitive soul, and that man alone has a rational and immortal soul. Their view of the superiority of the human soul was based on the fact that man has the power of mind to form abstract ideas.

All Christians hold that the soul is responsible for the deeds done in the body, but differ in view regarding the future state. Some believe that in the final judgment each soul will have its lot irrevocably fixed for eternal existence, others hold that those first punished may pass through a transitory state into bliss, while still others believe in total annihilation of the unjust. Many eminent philosophers held the doctrine of the preëxistence and transmigration of the soul, a view still commonly supported by many people. Christians are generally divided into two classes, one holding that each soul is produced by natural generation, and the other that each is separately created by God. Modern materialists regard soul a result of organism and a function of the body.

SOUND, a term admitting of two definitions: the sensation produced upon the organ of hearing by vibrations in matter, and the vibrations of matter capable of producing a sensation upon the organ of hearing. In the first use of the word there can be no sound where there is no ear to catch the vibrations, but in the latter use there can be a sound in the absence of the ear. Sound waves result when a sonorous body is struck or a person speaks, and these are propelled by molecular motion until those which fill the cavity of the ear are pressed against the tympanic membrane, when the vibration is transmitted to the auditory nerve and by it to the brain, which takes cognizance of the sensation. The air is alternately condensed and rarefied as the sound wave advances, and the motion of the air particles is alternately backward and forward in the same direction in which the wave is advancing. This motion, as in water waves, is a movement of the form only, while the particles vibrate but a short distance to and fro. Just as the length of a water wave is measured from crest to crest, so a sound wave is measured from condensation to condensation.

An elastic medium is necessary to convey sound waves from the sounding body to the ear. No sound is heard from a bell struck in a vacuum, since there is no medium in which waves may be produced to carry the sound. Air being an elastic body, it transmits sound waves readily, but they are carried also by liquids and solid substances. Solids possessing elasticity are better conductors of sounds than either liquids or gases, which may be verified by putting the ear to the ground on the approach of a horseman, or

to the rail on the approach of a train. Sound travels through air at 32° Fahr. 1,090 feet per second. The velocity increases with the temperature, this being due to the fact that an increase of temperature both decreases the density and increases the elasticity. In water at ordinary temperature sound travels about 4,700 feet per second, and its velocity varies greatly with the nature of solids used as a conductor. In the metals it is from four to sixteen times that in air. The velocity of all ordinary sounds is the same, this being observable in the harmony maintained by a band playing at a distance, in which the soft, loud, high, and low notes all reach the ear at the same time.

Sound waves diminish in intensity in an inverse proportion to the square of the distance, and travel faster with the wind than against it. They may be reflected, refracted, and inflected. When reflected they produce echoes; by refraction they may be converged on any spot, and by inflection they may be bent around solid obstacles. Musical sounds depend upon a succession of impulses at a regular rate, the pitch of the note rising with the rapidity of the impulses. Noise is produced when smoothness and regularity are absent, as in striking several keys on a piano, or firing a gun. The capacity to perceive sound waves varies in different persons, the highest being roughly estimated at 48,000 vibrations per second and the lowest at 16 per second. When the number of impressions on the ear in each second is less than 16, the hearer perceives them separately, and when they exceed 48,000 the sound becomes too shrill to be audible. A *speaking trumpet* is a conical instrument held to the mouth of the person talking, and is used to cause the voice to be heard at great distances. The *ear trumpet* is employed to aid persons partially deaf in hearing, and acts to concentrate the sound of the voice.

SOUND, The, a strait of Europe, which is situated north of Germany. It connects the Cattegat with the Baltic Sea and separates Sweden from Denmark. The Sound is about fifty miles long. It is an important waterway between the North and the Baltic seas. Denmark collected toll from all merchant vessels passing The Sound from the 15th century until 1857, when the duties were abolished by an indemnity to Denmark amounting to \$16,000,000, and it was stipulated at the same time that the treaty nations must maintain lighthouses on its coasts. Strong fortifications are maintained at its entrance, the most prominent being the fortress of Kronberg.

SOUNDING, the process of measuring the depth of water and the quality of the bottom of

the sea, usually by a plummet lowered from a ship. Formerly the plummet consisted of a rope on which the number of fathoms were marked and at its end was a piece of lead, but in deep water it was quite difficult to determine whether the weight had reached the bottom. Plummetts are made at present by attaching an elongated lead weight, supplied at one end with an opening to receive the connection, at which a wire rope is fastened. Usually two plummetts are carried by vessels, one weighing eight or ten pounds, called the *hand lead*, and one weighing 20 to 65 pounds, called the *deep-sea lead*. Plummetts intended to ascertain the character of the bottom are usually provided with a tallow-covered device at the lower side, to which gravel, shells, sand, and other particles adhere when the lead strikes the ground. Other sounding apparatus has been devised to facilitate scientific investigation of the depth and character of the bottom, and many records are extant as a result of extensive soundings.

The Tanner sounding machine is used in depths which do not exceed 500 fathoms (3,000 feet). For greater depths the Sigsbee machine, which reels in sounding wire by steam power, is used. On both machines steel piano wire is used in place of the hemp sounding lines formerly employed, its advantages being strength, lightness, and small bulk. With it, heavier sinkers can be employed to give an up-and-down trend, and its smaller surface per lineal foot renders it less liable than the hemp lines to be diverted from the vertical by currents.

A shot weighing about 65 pounds is attached to the sounding cylinder and is automatically detached when the bottom is reached, in order to lessen the tension when reeling in. The sounding cylinder used at present brings up a specimen from the bottom, while a water cup takes a sample of water within a few feet of the bottom, and a deep-sea thermometer automatically registers the bottom temperature.

The United States government recently employed the Sigsbee machine on the *Albatross* in taking soundings in the Pacific Ocean and found a depth of 4,813 fathoms (about five and a half miles), one of the deepest oceanic depressions in the world, about 100 miles southeast of Guam. The highest mountain in North America would be covered by nearly two miles of water if placed in this depression.

SOUTH AFRICAN WAR, the conflict for supremacy in South Africa, in the years 1899-1902, between Great Britain and the republics of the Orange Free State and the Transvaal. A large immigration had been attracted by the discovery of gold in the Witwatersrand, and this

influx of foreigners into the republic organized by the Boers caused them to place greater restrictions upon the rights of citizenship. These immigrants were called *Uitlanders* and they were more or less opposed to the dominion of the Boers, since they were largely British subjects and had ties in language and citizenship with the predominating influences of Cape Colony and Great Britain. In order to forestall the development of a citizenship with a majority of British sympathizers, the Boers under the leadership of Paul Kruger, the president of the Transvaal Republic, in 1887, fixed the period of residence necessary before naturalization at fifteen years. This action caused much dissatisfaction, since many foreigners were not permitted to have a voice in the government.

In 1896 the affairs were brought to a crisis by the Jameson Raid, under the leadership of Leander Starr Jameson, but this movement was discredited by the British government. This incident was in effect a victory for the Boers, who greatly strengthened their position by placing legal restrictions upon the *Uitlanders* and utilizing their resources so as to be prepared for an armed conflict. Negotiations were conducted with the British government, which had been petitioned by the foreign inhabitants to intercede in their behalf in a friendly way, but the diplomatic negotiations proved futile. War was declared by the Transvaal Republic in October, 1899, and the Orange Free State immediately cast its fortune with the belligerent.

At the beginning of the conflict Great Britain had about 21,500 men in South Africa. These included a force of 12,000 in Natal, 1,000 in Rhodesia, 1,000 in Mafeking, 2,500 at Kimberley, and 5,000 in Cape Colony. This was a larger force than was mobilized by the Boers, who had about 20,000 men. The forces of the Transvaal and the Orange Free State immediately invaded Natal, routed the British at Nicholson's Nek, and marched upon Ladysmith, which was held by 10,000 troops under Sir George White, and under Petrus Joubert invested that place. Another force of Boers under Cronje besieged Mafeking, which was held by Colonel Baden-Powell with 6,000 men. Large reinforcements were dispatched to South Africa and Sir Redvers Buller undertook the relief of Ladysmith. In the meantime Lord Methuen was sent to Kimberley. The British suffered a defeat on the Modder River and sustained severe losses in obstinate fighting at Colenso and Ladysmith. However, the British forces were rapidly increased to 130,000 men and by the latter part of February, 1900, both Kimberley and Ladysmith were relieved.

SOUTH AMERICA

Scale of Miles

0 100 200 400 600 800

Important towns are shown in heavy face type



GALAPAGOS IS.
TO ECUADOR
Same scale as large map

ABINGTON I.
CHATHAM I.
ALBEMARLE I.
DEFATIGABLE I.

50
SANTA INES I.
Tierra del Fuego
WOLLASTON IS.
STATEN I.
Mt. Darwin
Strait of Magellan
Port Stanley
FALKLAND IS. (Br.)
Arenas
Grande Bay
SANTA CRUZ
Rawson
MADRE DE DIOS I.
WELLINGTON I.
CAMPANA I.
CHONOS ARCH.
Gulf of Peñas
S. Matias Gulf
S. Matias I.
General Roca
General Acha
General Roca
Temuco
Concepcion
Valparaiso
Mt. Aconcagua
Ovalle
Seren
Calders
Taltal
Antofagasta
ST. FELIX I. (To Chile)
ST. AMBROSE I. (To Chile)
MAS A FUERA I. (To Chile)
MAS A TIERRA I. (To Chile)



Bloemfontein, the capital of the Orange Free State, was captured by the British in March, when Lord Roberts declared that country British territory. After remaining at Bloemfontein more than a month, Lord Roberts decided to advance on Pretoria, the capital of the Transvaal. On the Vet River he encountered a force of Boers under General Louis Botha, but succeeded in moving forward upon Johannesburg, which he entered in May. Pretoria was occupied in June, but President Kruger had removed the capital to Machadodorp, and General Botha occupied a position a short distance from Pretoria. General Buller advanced northward with a large force to cooperate with Lord Roberts, and the combined army pushed forward against General Botha, who had taken a strong position at Bergendal, where he was defeated in August. The last battle occurred in September, 1900, when the Boers were defeated at Spitzkop, after which a large number crossed the border into Portuguese territory. Lord Roberts in the same month proclaimed the Transvaal to be British territory, naming it the Transvaal Colony. President Kruger sailed on a Dutch man-of-war from Lourenço Marques for Holland in October.

The conflict now resolved itself into a struggle of small bands against superior forces. Hostilities continued until in May, 1902, when the Boers concluded to accept the terms of peace offered by the British. These included that they acknowledge themselves subject to Edward VII., that no punishment should be inflicted upon them for any acts connected with the war, that the Dutch language be taught in the public schools on request of the parents, and that a civil government be established at the earliest possible date. It was likewise provided that the government to be established should be representative and that no tax to cover the expenses of the war should be levied upon landed property. In the conduct of the war great courage was shown by the Boers, who did not exceed 75,000 men in actual service. On the other hand, the British force in South Africa during the war numbered 450,000 men and officers. Of this number 52,000 were raised in South Africa, 31,000 were sent as volunteers from British colonies, and the remainder was made up of militia and regular troops.

SOUTH AMBOY (äm'boi), a borough of New Jersey, in Middlesex County, 35 miles southwest of New York City. It is on Raritan Bay, at the mouth of the Raritan River, and on the Central of New Jersey, the Pennsylvania, and other railroads. On the opposite side of the river is Perth Amboy, with which it is connected by a bridge. The manufactures include ma-

chinery, brick, pottery, and clothing. It is a market for coal, fruits, and merchandise. Waterworks, electric lighting, and sewerage are among the public utilities. It was incorporated in 1898. Population, 1905, 6,258; in 1910, 7,007.

SOUTH AMERICA, one of the six grand divisions, the second in size of the Western Hemisphere and the fourth largest of the world, being exceeded in extent only by Asia, Africa, and North America. It is situated between 12° 45' north latitude and 55° 50' south latitude and between 35° 1' and 81° 30' west longitude. The extent from north to south, from Cape Gallinas to Cape Horn, is about 4,800 miles, the greatest breadth from east to west is 3,300 miles, and the area is 7,700,000 square miles. It is bounded on the north by the Caribbean Sea and the Atlantic Ocean, on the east by the Atlantic Ocean, and on the west by the Pacific Ocean. The Equator crosses the northern part and about one-third lies in the Temperate Zone, the remainder of the continent being in the Torrid Zone.

The coasts are more uniform than those of North America. A narrow stretch of land, the Isthmus of Panama, joins the two continents. This isthmus is indented on the south by the Gulf of Panama and on the north by the Gulf of Darien. On the northern coast of the continent is the Gulf of Venezuela, on the northeast are mouths of the Amazon, and on the southeastern shore are the estuary of La Plata, the Blanca Bay, the Gulf of Saint Matias, and the Gulf of Saint George. The western coast has the Gulf of Penas, the Gulf of Corcovado, and the Gulf of Guayaquil. However, all these indentations are comparatively small. The islands are uniformly small and lie near the mainland. They include Trinidad, off the northern shore; South Georgia and the Falkland Islands, east of the southern extremity; and the Galapagos Islands, west of Ecuador. Tierra del Fuego, in the extreme south, is separated from the mainland by the Strait of Magellan.

DESCRIPTION. The cordillera of the Andes trends along the western coast, from the Isthmus of Panama to Cape Horn, forming the loftiest ranges of the Western Hemisphere. It forms a natural continuation of the Cordilleras of North America. A narrow strip of low land, averaging less than a hundred miles, lies between these highlands and the Pacific coast. About forty active volcanoes are included with the peaks, but many others, some of which are characterized by huge volcanic holes, have long been extinct. Aconcagua, height 23,910 feet, is the highest peak of South America, but many other summits approximate it in height. The greatest altitudes are reached in the vicinity of 32° south latitude,



PHYSICAL MAP OF SOUTH AMERICA.

whence the surface slopes with more or less irregularity both toward the north and the south. Among the notable peaks are those of Cacaca, 20,250 feet; Cotopaxi, 19,613 feet; Antisana, 19,335 feet; and Chimborazo, 20,498 feet.

The secondary system of highlands is located in the northern part of the continent, mainly in Venezuela and the Guianas, forming a watershed between the Amazon and the Orinoco. This group of irregular mountains has a general altitude of 2,000 feet, but the highest peaks approximate 10,250 feet. A third system of highlands is situated in the eastern part of the continent, known as the Brazilian Highlands, which form an extensive plateau whose surface is much lower than the average altitude of the Andean system. The average height approximates 2,500 feet, although some of the many ranges are much higher. A large portion of the surface of the Brazilian Highlands is level, but in some sections they are cut by great cañons, and the rivers flow with considerable velocity or have extensive rapids and falls. In the eastern part it slopes quite abruptly toward the Atlantic, but in the interior it merges into a great central plain. Between the highland regions, extending from north to south, is the great plain which includes the selvas, the llanos, and the pampas.

The drainage of South America is chiefly into the Atlantic, owing to the fact that the Andes form a great and continuous watershed. Three vast river systems, those of the Amazon, the Orinoco, and the La Plata, discharge the larger part of the drainage. The Amazon, while not the longest river, discharges more water than the Mississippi and the Missouri rivers combined, hence takes rank as the largest water course of the globe. In the northern part is the Orinoco, which discharges almost as much water as the Mississippi, although it is smaller than the Saint Lawrence system. The central lowlands lying toward the south are drained by the estuary of the Rio de la Plata, which receives the Paraná, the Uruguay, and other tributaries. The estuary of this river is a lakelike expanse and the overflowed territory in the rainy season resembles a shallow inland sea. In the northwestern part of the continent is the Magdalena, which drains the highlands of Colombia and flows into the Caribbean Sea. Another large stream, the São Francisco, drains a large part of the Brazilian Highlands and discharges into the Atlantic near 10° south latitude. Other streams which discharge directly into the sea or into some of the larger rivers include the Colorado, the Negro, the Chubut, the Salado, the Pilcomayo, the Tocantins, the Xingu, the Tapajos,

the Madeira, the Ucayali, the Rio Negro, and the Cauca. The continent has no great lakes or inland seas, the only large body of water being Lake Titicaca, located on the border between Peru and Bolivia, at an altitude of about 12,000 feet. Lake Maracaibo, in Venezuela, is an inlet from the Gulf of Venezuela.

CLIMATE. South America has a more equable climate than North America, owing to the fact that it lies on both sides of the Equator. However, it varies considerably by reason of differences in altitude and proximity to the sea, the colder sections being in the lofty highlands and in the extreme southern part of the grand division. Most of the tablelands near the Equator have a uniformly high temperature, the higher regions of the Andean plateaus are cold, and the southern part is extremely cold, variable, and disagreeable in the winter, especially in the months of June, July, and August. The seasons, instead of being designated as in North America, are known as the wet and dry seasons and are determined mainly by the occurrence of the equatorial rains. An enormous rainfall prevails on the Atlantic slope, especially in the northeastern part, where the annual precipitation ranges from 50 to 200 inches. This heavy rainfall extends throughout the valley of the Amazon, even to the eastern slopes of the Andes; hence the currents of air, being deprived of their moisture, move as dry winds down the western slope, where the rainfall is very scant. The driest belt is along the narrow coast of Peru and northern Chile, where the precipitation is only a few inches.

FLORA. The vegetable life of South America ranges from that of the temperate to that of the tropical zone, being controlled largely by latitude, rainfall, and altitude. A large part of Colombia and Venezuela, having a hot climate and excessive rainfall, is characterized by luxuriant vegetation. The forms are tropical in character, except where the altitude is considerably above the sea. The equatorial forests are the most dense as well as the most extensive in the world, being approximated only by the vast forests of equatorial Africa. They are abundant in the valleys of the Orinoco and the Amazon, where they are known as the *selvas*, but nearly all parts of the grand division have an abundance of timber along the streams and in the mountains. A portion of the valley of the Orinoco, known as the *llanos*, is almost treeless. In the rainy season this section is covered with nutritious grasses, but vegetable forms become quite parched in the dry season, when the region of these plains resembles an arid desert. The great southern plains, known as the *pampas*, extend

from the eastern summits of the Andes to the south central part of Argentina. They resemble the great plains of the south-central section of Canada and the Mississippi valley, having a gently undulating surface and being covered with valuable native grasses. Among the plants which are native to the continent are the potato, tree ferns, deciduous trees, several species of pampas grass, many palms and bamboos, and a large number of coniferae.

FAUNA. The animal life of South America may be said to include that of the West Indies and Central America. Since many forms are isolated and materially different from those of North America, it is believed that the two continents were formerly separated and that they were united at a comparatively recent date. Eight families of mammals belong exclusively to this grand division, including several species of rodents, many edentates, the blood-sucking bats, and two families of monkeys. It has no ruminants, except the llamas, few insectivora, only one kind of bear, and no animals related to the horse, except one species of tapir. The birds include 23 families and 600 genera, many of which belong exclusively to the continent. The reptiles include the boas, the scytales, and several families of lizards and frogs. The birds of song and plumage are well represented, including the humming bird, the tanager, the flamingo, the toucan, the parrot, and the araçaris. A large number of sea fowl and birds of prey belong to the continent, the latter including the condor, which is the largest bird of this class. An abundance of fish is found in the fresh waters as well as off the shores.

MINERALS. The continent is rich in many kinds of minerals, especially in gold, silver, diamonds, copper, iron, lead, borax, niter, and mercury. However, mining has been confined chiefly to the production of gold and silver. Gold occurs in the interior of Brazil, in southern Argentina, and throughout the greater part of the Andes. Silver is obtained in large quantities in Bolivia and other sections of the western highlands. Copper and mercury are mined in the Andes and on the northern coast. Iron deposits are known to exist in the three principal mountain systems, but this metal has not been produced extensively. Formerly Brazil was the principal source of diamonds, but the output is greatly surpassed by that of South Africa. Rich guano deposits are worked along the coasts of Chile and Peru, niter and borax are obtained in Chile, and coal is found in Brazil, Uruguay, Argentina, and Colombia. Venezuela is the principal source of emeralds and asphalt. As compared with Mexico, Canada, and the United

States, the mining interests are not well developed.

INDUSTRIES. Agriculture and stock raising continue to be the leading industries. Wheat is grown extensively in Argentina and Chile, these countries competing with the production of this cereal in Canada and the United States. Coffee is grown in large quantities in Brazil, which country continues to be the chief source of this product. Brazil, the Guianas, and Venezuela have a large output of sugar and tobacco. Cacao is grown in the valley of the Amazon and Orinoco, corn is cultivated more or less throughout the tropical regions, and fruits and vegetables are abundant, except in the extremely southern part. Bolivia, Peru, Colombia, and the valley of the Amazon produce large quantities of rubber and medicinal plants. Grazing is the principal industry in a large part of the valley of the Paraná, especially in southern Brazil, Uruguay, and large parts of Argentina. Cattle are bred extensively in the llanos of Colombia and Venezuela.

The manufacturing industry has not been developed as extensively as the resources would justify. Comparatively little has been done in the production of steel and iron. Although lumber is produced in large quantities, it is exported chiefly in a semimanufactured state. Argentina, Chile, Brazil, and Peru have a considerable railroad mileage in operation. Several transcontinental lines connect the Atlantic with the Pacific, but they are confined to the valley of the La Plata. A large part of the trade is carried on the rivers, many of which are navigable for long distances; but the Amazon, the La Plata, and the Orinoco are the most important in this respect. A large part of the interior trade is carried by mules and ponies. Oxen are employed extensively for farm work. The exports consist principally of coffee, cotton, silk, borax, silver, lumber, meat, hides, tobacco, and medicinal plants.

INHABITANTS. South America was peopled by many tribes of Indians before the continent was discovered and settled by Europeans. Some of these inhabitants were powerful nations, having large cities and stable forms of government, but others constituted hordes of wandering tribes. The Araucanians were among the chief aborigines. They and kindred races occupied a large part of the highlands in the northwestern part of the continent, extending southward to Patagonia. They pursued agriculture, constructed canals and aqueducts, and maintained schools and other institutions common to an intelligent people. These peoples were either enslaved or became intermixed with the Spanish and Portuguese.

At present a large element in nearly every country of South America consists of a mixture of Indian and European blood. However, many Spaniards, Italians, Portuguese, and Germans have settled in different sections. These people and their descendants comprise the leading commercial and industrial element.

POLITICAL DIVISIONS. All the political states of South America are republics except Guiana, which is divided about equally among England, France, and the Netherlands. The countries are Panama, Venezuela, Colombia, Ecuador, British Guiana, Dutch Guiana, French Guiana, Brazil, Peru, Bolivia, Chile, Paraguay, Uruguay, and Argentina. The population, as reported by the latest census returns, is 43,850,580.

HISTORY. Columbus discovered the continent of South America in 1498, when he cruised along the northern coast and explored a portion of the Orinoco. Two years later the coast of Brazil was explored by Pinzon and Diego de Lepe. Pedro Alvarez Cabral discovered the continent independently while on a voyage to India by the route around Africa, which had been opened by Vasco da Gama. He explored the vicinity of Bahia, in the eastern part of Brazil, but he supposed this region to be a part of Asia. In 1513 Balboa crossed the Isthmus of Panama and discovered the Pacific. Magellan passed the southern point of the continent in 1520, when he discovered Tierra del Fuego and probably the Falkland Islands. Explorations were soon after made of the interior by Gonzalo Pizarro and Orellana. Cabot explored the Paraná in 1528, and Irala established an overland route from the La Plata to Peru. Many Spanish explorers devoted much time in the 16th and 17th centuries in search of El Dorado, the fabled king of a fabulous city that was supposed to exist somewhere in the northern part of South America.

The Spaniards and Portuguese began to claim all of South America as early as the 16th century, when they undertook to found colonies in different parts of the continent. Brazil was claimed by the Portuguese and Spain claimed the remainder of the coast. Later the two nations established claims to whatever lands they conquered, advancing steadily inland from the coasts. Francisco Pizarro captured Cuzco, the capital of the Incas, in 1533, and converted it into a Spanish settlement. He founded Lima two years later and made it the capital of his viceroyalty, which included the northwestern portion of the continent. Lima soon developed into an important city and became the center of a large trade. In the course of time the entire grand division was claimed by the Portuguese

and the Spaniards, the former settling in the eastern part and the latter in the northern and western sections. No other European countries attempted settlements in South America, excepting only the French, Dutch, and English, who established claims to Guiana within the 17th century. These conditions remained stationary until the early part of the 19th century, when the Spanish and Portuguese colonies undertook to become freed from the dominion of the Europeans.

Simon Bolivar, taking advantage of the Napoleonic Wars in Europe and the War of 1812 in North America, developed a large following and eventually succeeded in establishing republics in Peru, Chile, Bolivia, Venezuela, and Argentina. Brazil became independent of Portugal in 1823, but retained a monarchical form of government until 1889, when the present republic was established. Negro slavery maintained a foothold until 1888, when it was finally abolished. None of the nations is as powerful as the United States or the larger countries of Europe. The people seem to lack the peculiar qualities manifested by the nations of Northern Europe, by which the latter carried civilization and industry to the different regions which they colonized in North America.

SOUTHAMPTON (sŭth-hămp'tŭn), a seaport city of England, on the Southampton Water, 70 miles southwest of London. The harbor is commodious and has ample dock accommodations. Communication is maintained by railways and electric lines with many inland towns. Among the principal buildings are the Saint Michael's Church, the Netley Hospital, the Holywood Church, the public library, the city hall, the public market, and many intermediate and secondary schools. The manufactures include sugar, hardware, spirituous liquors, vehicles, sailing vessels, steam engines, machinery, and textiles. It has a large foreign trade with the West Indies, Australia, South Africa, and the Mediterranean. The city is a fashionable resort in summer. It has fine street pavements, waterworks, street railways, and several parks. Population, 1907, 119,745.

SOUTH AUSTRALIA (as-tră'li-ă), a State of the Commonwealth of Australia, situated in the central part of the continent. It is bounded on the north by the Timor and Arafura seas, east by Queensland, New South Wales, and Victoria, south by the Indian Ocean, and west by Western Australia. Extending across the continent from north to south, it has a length of 1,850 miles. The general width is from 550 to 700 miles. South Australia proper occupies the southern part, while the northern section is

known as the Northern Territory, the latter having an area of 523,620 square miles. The total area is 903,690 square miles.

DESCRIPTION. The southern coast has more inlets of large size than any other part of the Australian shore, including Spencer Gulf, Encounter Bay, and Saint Vincent's Gulf. On the northern coast are Queen's Channel, Van Diemen Gulf, and the Gulf of Carpentaria; but the shores are more regularly formed than the southern. In the interior is an arid region with several mountain ranges and numerous lakes that have no outlet to the sea, the principal one of these being Lake Amadeus. Among the mountain chains of the north-central part are the Reynolds, the James, and the McDonnell ranges, and these have a general elevation of about 3,000 feet above sea level. In the southern part are the Stuart and other less important ranges, with peaks from 1,500 to 3,000 feet. As a whole, the State is a vast plain with an undulating surface, and much of the interior is a desert of sandy tracts and marshes.

None of the streams is important except the Murray, which enters the southeastern part and flows into Encounter Bay. The Macumba and the Cooper rivers flow into Lake Eyre, which has no outlet to the sea. Among the principal streams of the north are the Victoria, Daly, Alligator, Liverpool, and Gladstone rivers. The lake region of the south-central part, which is shut off from the sea by the Galler Range, has no visible outlet. The lakes within this region, besides Lake Eyre, include the Torrens, Gairdner, Frome, and Gregory lakes. During the dry season they are reduced to marshes with heavy salt crusts, but become quite deep during the periods of rains. In the interior the rainfall is very scant and the climate is extremely hot, but there is abundance of moisture and a corresponding fertility in the region adjacent to the southern coast. The dry season extends from December to March, when hot winds are frequent and the temperature rises to 118°. It seldom falls to 32°, but the climate is singularly healthful. At Adelaide the rainfall is 24 inches and in the northern part it is more abundant, ranging from 50 to 70 inches.

The coast regions are moderately timbered with string bark, gum, pine, eucalyptus, and other trees, but in the interior regions forests are either absent or limited. The State possesses little value for agricultural purposes aside from the southern and extreme northern regions, but it has excellent ranges for grazing. Water is not obtainable in some sections, and a supply of rain water is preserved in cisterns for use in the dry season. In some localities many artesian

wells abound and are utilized to some extent for irrigation.

INDUSTRIES. Mining is not as important as in some of the other Australian states. Very rich deposits of copper occur and the mining of this metal is more extensive than that of any other. The absence of coal has made it impossible to work the deposits of iron ore, in which the State is rich. Other minerals include gold, lead, bismuth, granite, and limestone. The fisheries on the coast are extensive, especially in Spencer Gulf and the Gulf of Saint Vincent. The manufactures are confined largely to products that are consumed locally and include flour, machinery, canned fruits, pottery, and clothing. Flour is the chief manufactured product and large quantities are exported. Other exports include wheat, wool, wine, minerals, and live stock.

Agriculture is the principal occupation. In the acreage under cultivation South Australia ranks second among the states of the Commonwealth, but the farming district is chiefly in the southern part. Tracts of considerable size are irrigated by drawing water from rivers and artesian wells. Wheat is the principal cereal and exceeds in acreage all other crops combined. The products next of importance are hay, barley, oats, potatoes, and fruits, especially grapes, oranges, and lemons. Silk culture and the mulberry tree have been introduced successfully. South Australia has large interests in raising sheep, of which there are 5,500,000 head. Other domestic animals include cattle, horses, swine, and poultry.

GOVERNMENT. The Governor is appointed by the British crown and is aided by an executive council of six members. Two chambers are included in the Legislature, consisting of the legislative council, of 18 members, and the house of assembly, of 42 members. All are elected by the people, the former for six years and the latter for three years. The right of suffrage is vested in all without regard to sex, but a small property qualification is required. A commissioner chosen by the State has administrative authority in the Northern Territory.

The State maintains a system of public schools, at which attendance is free and compulsory between the ages of seven and thirteen years. Many secondary schools are well established, but these are either private or denominational. The schools culminate in the University of Adelaide, which has extensive courses and adequate facilities. Technical and industrial schools receive aid from the State.

The public utilities are largely owned and controlled by the State or by municipalities. Telegraph and telephone lines, including a telegraph

system between Adelaide and Fort Darwin, as well as the postal system, are owned by the government. Farmers are aided by loans on easy terms, and industrial disputes are settled largely by arbitration. Railroad building has been encouraged, but the lines are confined to the southern part. The principal railway extends from Adelaide north to a point on the Macuba River, passing in its course the southern shore of Lake Eyre. At present 2,500 miles are in operation.

INHABITANTS. The settlements are confined almost entirely in the southeastern part of the State. At the last census only 4,096 persons resided in the Northern Territory, exclusive of 20,000 aborigines. Nearly all the people are of British origin, chiefly English and Scotch, and those of foreign birth are largely Germans. In religious affiliation the people are Anglican, Methodist, Roman Catholic, Lutheran, Baptist, and Presbyterian, in the order named. Adelaide, on the Gulf of Saint Vincent, is the capital and largest city. Port Darwin is the capital of the Northern Territory. Other cities include Mount Gambier, Port Adelaide, Port Pirie, and Palmerston, the last mentioned being a port city on the northern coast. Population, 1906, 383,829.

HISTORY. Navigators from Holland, Spain, and Portugal visited different sections of the coast at various times in the 16th and 17th centuries. The first English settlement was made in the vicinity of Port Adelaide, a short distance northwest of Adelaide, in 1836. Adelaide, on the Torrens River, soon after became the capital of a prosperous colony, which attracted many emigrants by the discovery of copper in 1843. With the discovery of gold in Victoria, in 1851, a large number of colonists left the settlement, but the development of pastoral and agricultural interests rapidly increased the population. South Australia became a constitutional colony in 1856, after which the interior was explored. The Northern Territory was annexed in 1863. In 1900 it joined the federation of the Commonwealth of Australia.

SOUTH BEND, a city in Indiana, county seat of Saint Joseph County, on the Saint Joseph River, 85 miles southeast of Chicago, Ill. It is on the Grand Trunk, the Indiana, Illinois and Iowa, the Lake Shore and Michigan Southern, and other railroads. The surrounding country is fertile, producing fruits and cereals. Among the noteworthy buildings are the county courthouse, the city hall, the high school, the Y. M. C. A. building, the Federal building, the Oliver Hotel, the Saint Joseph's Academy, the University of Notre Dame, and the Northern Indiana Medical and Surgical Institute. The works of

the Oliver Plow Company and of the Studebaker Carriage and Wagon Company are in South Bend. Among the manufactures are vehicles, farming machinery, woolen goods, sewing machines, furniture, flour, paper, machinery, hardware, tobacco products, and brick. It has a large wholesale jobbing trade. The Saint Joseph River furnishes an abundance of water power and is navigable for small craft to South Bend. The place was platted in 1831 and became a city in 1865. Population, 1900, 35,999; in 1910, 53,684.

SOUTH BETHLEHEM (bĕth'lĕ-hĕm), a borough of Pennsylvania, in Northampton County, on the Lehigh River, opposite Bethlehem. It is on the Lehigh Valley and the Philadelphia and Reading railroads. Among the noteworthy buildings are the Lehigh University, founded by Asa Packer in 1865. Other features include the high school, the public library, the Saint Luke's Hospital, the Bishop Throp Seminary for girls, and many churches. It has manufactures of silk, textiles, armor plate, engines and boilers, hosiery, flour, hardware, Bessemer steel products, ordnance, and machinery. South Bethlehem was founded by the Moravians in 1745. Population, 1900, 13,424; in 1910, 19,973.

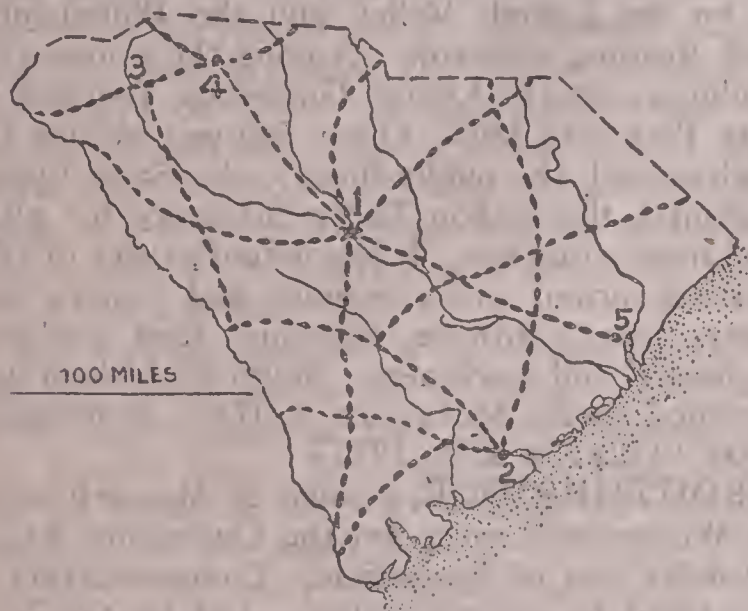
SOUTHBRIDGE, a town of Massachusetts, in Worcester County, on the Quinebaug River, 30 miles east of Springfield. Communication is furnished by electric railways and by the New York, New Haven and Hartford Railroad. The surrounding country produces fruits, cereals, and vegetables. The features include the public library and the Y. M. C. A. building. It has manufactures of carriages, cotton and woolen goods, boots and shoes, hats and caps, optical instruments, and machinery. The place was separated from Charleston in 1801 and incorporated in 1816. Population, 1910, 12,592.

SOUTH CAROLINA (kār-ō-lĭ'nā), a southern State of the United States, one of the original thirteen states, popularly called the *Palmetto State*. It is bounded on the north and northeast by North Carolina, southeast by the Atlantic, and southwest by Georgia. In shape it is triangular, with a base of 190 miles fronting the ocean and an apex extending inland 240 miles. A number of small bays indent the coast, including Bull's Bay, Saint Helena Sound, and Port Royal Sound. The area is 30,570 square miles, of which 400 square miles are water surface.

DESCRIPTION. The surface is divided about equally into the coastal plain along the ocean and the Piedmont plain lying inland. From the northern boundary to Winyah Bay the coast is rather low and sandy, but farther south it is higher and broken by inlets and estuaries. In

the northwest are ridges of the Blue Ridge Mountains, which rise to elevations ranging from 2,500 to 3,350 feet. Mount Pinnacle, the highest summit in the State, has an elevation of 3,336 feet above sea level. From the highlands the surface slopes gradually toward the southeast, forming the coastal plain with a width of 100 miles. This section is less than 500 feet above the sea and has a light sandy soil, forming low, marshy, and swampy regions along the coast, especially near the mouths of the rivers.

All of the drainage is toward the southeast into the Atlantic. The larger streams rise in the mountains of North Carolina, including the



SOUTH CAROLINA.

1, Columbia; 2, Charleston; 3, Greenville; 4, Spartanburg; 5, Georgetown. Chief railroads indicated by dotted lines.

Great Pedee, which receives the Little Pedee and flows into the Atlantic through Winyah Bay. The Santee, formed by the Wateree and the Congaree, drains the central part of the State. It is connected by the Santee Canal with the Cooper River, which flows into Charleston harbor. The southwestern boundary is formed by the Savannah, which separates the State from Georgia. Across the Piedmont plain the streams flow rapidly, from which they pass over the fall line into the coastal plain, where they are wide and sluggish. Steamers ascend the larger streams to the fall line.

The State has a mild and healthful climate. Snow rarely falls in the interior and never on the coast, but frequently in the highlands. All sections have an abundance of precipitation, ranging from 40 to 60 inches. At Charleston the temperature is 65° and the average for the State is 61°. In January the mean temperature is 44° and in July it is 79°, while the maximum ranges from 100° in the highlands to about 106° in July. Storms sometimes sweep across the coastal plain.

MINING. The State has vast deposits of granite and limestone and considerable quanti-

ties of gold, silver, lead, copper, phosphate, and iron ore. Clay products and phosphate rock rank highest in value, the latter being used extensively in the manufacture of fertilizers. The total output of the mines and quarries is \$3,125,000, of which about one-third is represented by granite. Coal is mined in the northwestern part of the State and mineral waters are obtained for commercial purposes in the highlands.

AGRICULTURE. About 75 per cent. of the land is included in farms, which average 90 acres, and more than half of the holdings are worked by Negroes. The soil is exceedingly fertile in the central section, and the coastal plain contains an extensive area of rice lands. Rice culture was introduced from Madagascar as early as 1693, and the quality grown is the finest in the market. Cotton is the chief product, the annual yield being about 1,150,000 bales. A large part of the product is sea-island cotton, which yields profitably along the coast, and the quality produced is of a high grade. Other products include corn, wheat, oats, potatoes, hay, tobacco, and many species of fruit, such as oranges, lemons, peaches, pears, apples, grapes, and pomegranates. Hops, flax, sorghum, and broom corn are grown quite extensively. Stock raising is a profitable enterprise. Cattle are raised both for meats and dairy products. Other live stock includes swine, horses, mules, sheep, and poultry.

MANUFACTURES. The State has grown rapidly in manufacturing enterprises since 1880. It has much water power and an abundance of raw materials. The forests yield large quantities of cypress, hickory, beech, sycamore, walnut, magnolia, and other species that are valuable for construction purposes. Cotton goods comprise the principal output, and in this manufacture the State holds first rank in the South and second in the Union. Fertilizers, flour, lumber and timber products, cotton-seed oil and cake, turpentine and rosin, pipe tobacco and cigars, clothing, and machinery are produced in large quantities. The fisheries yield material for curing and canning, such as the shad, bass, whiting, and oysters.

COMMERCE AND TRANSPORTATION. Charleston is the principal port and is the center of a large foreign trade. However, the larger commercial interests are coastwise and inland. All of the larger streams are navigable to the fall line, such as the Pedee, the Santee, and the Savannah, and they have been improved to a considerable extent by the removal of obstructions and the construction of canals. The Southern, the Atlantic Coast Line, and the Seaboard Air Line are the principal railroads. Charleston, Colum-

bia, Sumter, and Greenwood are the leading railroad centers. The total steam railroad lines aggregate 2,350 miles. Electric railways are operated in the cities and some of the interurban districts.

GOVERNMENT. The present constitution was adopted in 1885. It vests the chief executive authority in the governor, lieutenant governor, secretary, attorney-general, treasurer, comptroller-general, adjutant and inspector-general, and superintendent of education, all being elected by popular vote for two years. Legislative authority is vested in the Legislature, which consists of two branches, the senate and the house of representatives. Each county is represented in the upper branch by one senator. Representation in the lower house is based upon population, the present number being 24 members. Both senators and representatives are elected by the people, the former for four and the latter for two years. Four judges, one known as the chief justice and the other three as associate justices, constitute the supreme court. They are elected for terms of eight years by the General Assembly. The State is divided into judicial districts, each having a court of general session and a court of common pleas, and the judges of these are appointed for four years by the General Assembly. Local government is exercised by townships, municipalities, and counties.

EDUCATION. The State has made noticeable advancement in education the past two decades, although more than half the population consists of Negroes. In 1900 the rate of illiteracy was 35.9 per cent. based on the total population, while among whites alone it was 13.6 per cent., and among the colored population it was 52.8 per cent. The public schools are separate for whites and Negroes, both being supported in part by a State school tax and in part by local taxation. They are under the direction of a State board of education, which has the power to appoint the county boards, and the latter boards appoint the trustees in the respective districts. High schools are maintained in the towns and cities. Normal instruction is given to teachers by the State at the Winthrop Normal and Industrial College, in Rock Hill.

The University of South Carolina, which is at the head of the public school system, consists of the Winthrop Normal and Industrial College at Rock Hill, the South Carolina College at Columbia, the Clemson Agricultural College at Calhoun, a military academy at Charleston, and departments of medicine and pharmacy at Charleston. Among the leading private institutions of higher learning are the Lutheran New-

berry College, Newberry; the Allen University, Columbia; the College of South Carolina, Clinton; the Furman University, Greenville; the Claflin University, Orangeburg; the Erskine College, Due West; and the College of Charleston, Charleston. The leading State institutions are located at Columbia, including the penitentiary, the orphan asylum, the hospital for the insane, and the institution for the deaf and dumb.

INHABITANTS. The number of persons to the square mile is about 45, and the foreign-born population is very small, only 5,528. Since 1820 the colored inhabitants have outnumbered the whites. Columbia, on Broad River, is the capital. Other cities include Charleston, Greenville, Spartanburg, Camden, Sumter, and Anderson. In 1900 the State had a population of 1,340,316. Of this number 782,509 were colored, including 67 Chinese, 121 Indians, and 782,321 Negroes. Population, 1910, 1,515,400.

HISTORY. The Spaniards first explored the coast of South Carolina in 1525 and named the region Chicora. A party of French Protestants under John Ribault made the first settlement near Beaufort in 1562, naming the place Port Royal. The colonists soon abandoned their enterprise of colonization and returned to France. The next attempt at settlement was made by a party of English under William Sayle, who located at Port Royal in 1670, but ten years later removed to the present site of Charleston. Charles II. made a grant of the territory to colonists who attempted to set up the feudal system under a constitution called the Grand Model, but the region was divided by George II. into North and South Carolina in 1724, when the latter became a royal colony. The State adopted its first constitution in 1776, when it gave vigorous support to the Revolution and was the scene of numerous internal disturbances, owing to the presence of many Tory sympathizers. Sir Henry Clinton captured Charleston and battles were fought at Eutaw Springs and Camden. The State was among the first to ratify the national Constitution, which it did on May 23, 1788, by a vote of 149 to 73. The tariff laws of 1828 caused many citizens to take part in a convention at Columbia in 1832, which nullified those laws, but the nullification ordinance was repealed after Henry Clay's compromise tariff was passed in 1833.

South Carolina seceded from the Union on Dec. 20, 1860, being the first to take the step, and on April 12, 1861, the first gun was fired on Fort Sumter. It was readmitted on June 25, 1868, having previously adopted a revised Constitution. In 1886 a severe earthquake de-

stroyed much property in the vicinity of Charleston. The South Carolina and West Indian Exposition was held at Charleston in 1901 and 1902. Prohibition gained a wide foothold within the last decade, but a majority of the people appear to favor local option. The Legislature has adopted several measures to encourage immigration.

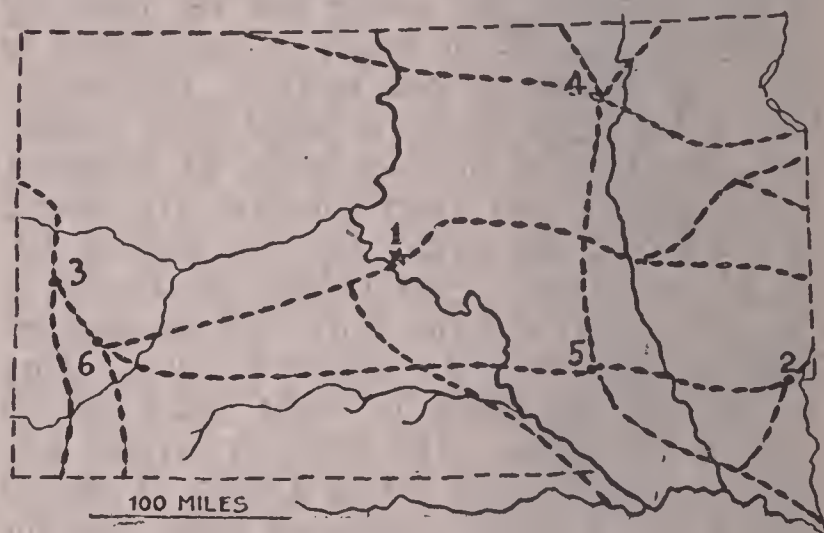
SOUTH CAROLINA COLLEGE, an educational institution of higher learning in Columbia, S. C., established in 1801. It was opened for instruction in 1805, but was closed for a brief time on account of the Civil War. In 1878 it was reorganized into two branches, the South Carolina College, for whites, at Columbia, and the Claflin College, for Negroes, at Orangeburg. It was made coeducational in 1894. The courses include law, physics, biology, chemistry, mathematics, classics, civil and mechanical engineering, and normal instruction. With it are affiliated a number of accredited schools, from which students are admitted without examination. It has a library of 35,000 volumes, a faculty of 20 instructors, and an attendance of 225 students.

SOUTH CAROLINA EXPOSITION, an exhibition held in Charleston, S. C., known officially as the South Carolina Interstate and West Indian Exposition. It was opened on Dec. 1, 1901, and closed on June 2, 1902. Many states of the Union and a number of foreign countries were represented by buildings or exhibits. The purpose was to demonstrate the industrial progress and commercial possibilities of the South and the countries of Central America, South America, and the West Indies. It was officially reported that 675,000 persons attended.

SOUTH DAKOTA (dā-kō'tā), a northwestern State of the United States, popularly called the *Coyote State*. It is bounded on the north by North Dakota, east by Minnesota and Iowa, south by Nebraska, and west by Wyoming and Montana. The length from east to west is 370 miles and the breadth is 223 miles. A part of the southern boundary is formed by the Missouri River, which separates the southeastern part from Nebraska. The Big Sioux River forms a part of the boundary between it and Iowa. It is separated from Minnesota partly by Lake Traverse, the Minnesota River, and Big Stone Lake. The area is 77,650 square miles, which includes 800 square miles of water surface.

DESCRIPTION. The general slope of the eastern part is toward the south, the western inclines toward the east, and through the central part extends the low depression of the Missouri

River, which slopes toward the south. All of the State lies within the region of the Great Plains. The elevations range from 1,350 feet in the southeast to 3,000 feet in the west. A narrow belt along the shore of Lake Traverse is less than 1,000 feet, while Harney Peak, the culminating summit of the Black Hills, has an altitude of 7,216 feet. The surface of the eastern part is a gently undulating plain, the region west of the Missouri is considerably diversified by ranges of hills, and in the western part are the Black Hills. These mountains lie on the boundary between South Dakota and Wyoming,



SOUTH DAKOTA.

1, Pierre; 2, Sioux Falls; 3, Lead; 4, Aberdeen; 5, Mitchell; 6, Rapid City. Chief railroads indicated by dotted lines.

extending into the State about 100 miles. In the southwestern part are the so-called Bad Lands, which consist of denuded bluffs and hills, through which deep ravines have been cut by the action of streams. The plateau known as the Coteau du Missouri extends into the State from North Dakota and forms an elevated region between the Missouri and the James rivers. Another plateau, known as the Coteau des Prairies, extends into the State from Minnesota and occupies the region lying in the northeastern part, between the James River and the Minnesota boundary. The eastern half of the State is generally fertile, interspersed in localities by sandy tracts, but the character of the soil west of the Missouri is greatly diversified. Here many buttes and irregular ridges characterize the surface, but large tracts and the valleys are fertile, and fine grazing lands abound even in the most arid regions.

All of the drainage belongs to the Missouri, which traverses the State from the central part of the northern boundary to the southeastern corner. It has a comparatively narrow valley, from which bluffs rise from 150 to 300 feet, merging into the level plains beyond. From the west it receives the inflow from the White, Big

Cheyenne, Moreau, and Grand rivers, but the volume carried by these streams is comparatively small in consideration of the large areas drained. The Keya Paha River crosses the boundary into Nebraska and joins the Niobrara. The eastern part is drained principally by the James River, or Dakota River, which enters the State from North Dakota and discharges into the Missouri a short distance below Yankton. East of it is the Vermilion River and on the Iowa border is the Big Sioux. Numerous small lakes of glacial origin are in the eastern part, of which Big Stone and Traverse, on the Minnesota border, are the most important. A ridge separates Lake Traverse from the Minnesota River, hence this lake and a small tract in the northeast corner are located in the valley of the Red River of the North.

South Dakota has a singularly healthful and invigorating climate and is noted for its large number of bright days. The extremes are quite marked, ranging from 40° below zero in the higher altitudes during the winter to 108° in summer. In January the mean temperature is 15° and in July it is 73°. Blizzards laden with fine floating snow blow across the State in winter, but the snowfall is not heavy. The rainfall ranges from 20 to 30 inches in the eastern part to 15 to 20 inches in the west, where irrigation is employed to some extent. The summers are pleasant, the nights are cool, and the autumns are particularly beautiful. The State is largely a treeless prairie country, but forests are found along the streams and in the Black Hills, and many tracts of timber have been planted. Among the forest trees are the elm, ash, maple, cottonwood, and box elder, in the valleys, and the Black Hills region has a good growth of pine and cedar.

MINING. The mineral wealth is confined chiefly to the Black Hills, where gold, silver, copper, nickel, manganese, and graphite are found. Gold is the principal product from the mines and represents a value of \$6,750,000 out of a total of \$8,125,000. Lignite coal occurs in veins of considerable extent in the northwestern part of the State, but the output is not sufficient to supply the demand for local consumption. Clays of commercial value are abundant, suitable for the manufacture of brick and pottery. Limestone, granite, and sandstone are quarried for building and other economical purposes. Mineral waters are found in the Black Hills, especially at Hot Springs, which is noted as a health resort, owing to its thermal and richly laden mineral waters.

AGRICULTURE. Though irrigation must be resorted to in some sections of the State, agri-

culture is the leading industry. The eastern part has ample rainfall for all classes of farming, while the irrigated region is confined to the western section, where the water is drawn from the White and the Cheyenne rivers and their tributaries. About 50 per cent. of the area is included in farms, which average 362 acres, and only 20 per cent. is rented. Wheat is grown on a larger acreage than any other cereal and a comparatively large extent is devoted to the growth of hay and forage. The cultivation of corn, though most extensive in the eastern part, has grown in favor very rapidly. Other crops grown extensively include barley, oats, rye, flaxseed, potatoes, garden vegetables, and fruits, including chiefly apples, plums, and cherries. Large areas, especially in the west, are devoted to grazing, but the larger ranches are fast giving way to mixed farming. The State has extensive interests in growing cattle, both for meat and dairying, and the breeds are generally of a high order, such as Shorthorn, Holstein, and Hereford. Large numbers of horses, swine, and sheep are exported. Large interests are vested in growing mules and poultry.

MANUFACTURES. Considerable progress has been made the past decade in the output of manufactures, which consist largely of products obtained from raw materials of the farm and mines. Flour is produced in large quantities and this is true likewise of butter, cheese, and condensed milk. Large interests are vested in printing and publishing, notably at Sioux Falls and Aberdeen. Other products include Portland cement, cured and packed meats, clothing, earthenware, brick, and farming machinery.

COMMERCE AND TRANSPORTATION. Large quantities of cereals, minerals, and live stock are exported. The tendency is to increase manufacturing within the State, with the view of employing labor and building up the wealth of local communities. Textiles and farming machinery are imported extensively. Although the Missouri is navigable in its entire course through the State, it is not used extensively for that purpose. Railroad building has received marked attention since 1880, and at present the State has 3,250 miles in operation. Two lines cross the State from east to west, those of the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul. Both these companies have lines crossing the eastern part of the State from north to south, while the transcontinental line of the latter crosses the northeastern part and enters North Dakota on the west side of the Missouri. Other lines within the State are the Great Northern, the Illinois

Central, the Chicago, Rock Island and Pacific, the Minneapolis and Saint Louis, and the Chicago, Burlington and Quincy. Many highways have been improved by grading and the building of bridges.

GOVERNMENT. The constitution was adopted when the State was admitted into the Union, in 1889. It vests the chief executive power in the governor, lieutenant governor, secretary of State, auditor, treasurer, attorney-general, commissioner of schools and public lands, and superintendent of public instruction, all elected for two years. Five judges constitute the supreme court, all elected for four years. The State is divided into judicial districts, each presided over by a judge elected for four years. For the purpose of local government the State is divided into counties, which are again divided into townships. Local government is administered through the township, municipal, and county authorities.

EDUCATION. The State takes high rank intellectually, only 5 per cent. of the people over ten years of age being illiterate. A State superintendent of public instruction, elected by the voters, has general supervision of the schools, but he is aided by city and county superintendents. The towns and cities maintain high schools by local taxation, based upon both personal and real property, and the common schools are supported by State and local aid. Normal schools are maintained at Madison, Spearfish, and Springfield. The State University, situated at Vermilion, is at the head of the system of education. Other State institutions include an agricultural college at Brookings and a school of mines at Rapid City. Among the leading denominational and private schools are the Lutheran Augustana College, Sioux Falls; the Dakota University, Mitchell; the Huron College, Huron; the Redfield College, Redfield; the Yankton College, Yankton; and the Black Hills College, Hot Springs.

Yankton is the seat of the State insane asylum, Hot Springs has a soldiers' home, and Gary contains an institution for the blind. The reform school is located at Plankinton and the State prison is at Sioux Falls. Canton has an asylum for insane Indians.

INHABITANTS. The State has grown rapidly in population, owing largely to its extensive region of fertile lands open for settlement or sale under favorable conditions. About one-fifth of the inhabitants are of foreign birth, including principally Germans, Swedes, and Russians. The Lutherans are the strongest religious denomination. Pierre, on the Missouri, is the capital. Other cities include Sioux Falls,

Lead City, Yankton, Aberdeen, Mitchell, Deadwood, and Watertown. In 1900 the population was 401,570. This number included a total colored population of 20,856, of which 465 were Negroes and 20,225 Indians. Population, 1910, 583,888.

HISTORY. South Dakota was acquired as a part of the Louisiana Purchase in 1803, but was under British rule prior to the settlement of the boundary between the United States and Canada. The Lewis and Clark expedition ascended the Missouri in 1804-06, and soon after fur trading posts were established. A treaty with the Dakota Indians opened the region to settlers in 1851. The first permanent settlement was made at Sioux Falls in 1857. In 1861 the two Dakotas were organized as the Territory of Dakota with the capital at Yankton, but the seat of government was removed to Bismarck in 1883. A division was made in 1889, when South Dakota was admitted as a State into the Union, and Pierre became the capital. The divorce laws were more liberal than in any other State from the beginning, but they were somewhat altered in 1908.

SOUTH DAKOTA, University of, an educational institution at Vermilion, S. D., organized on a coeducational basis in 1882. It was established as a territorial institution under the name of the University of Dakota, but its name was changed when the Territory was divided into North and South Dakota. As an endowment it received 86,000 acres of public land, which has been sold or leased as a means of support. Courses are maintained in law, music, commerce, collegiate branches, civil and mechanical engineering, classics, literature, military science and tactics, and geological surveying. The property of the University has a value of \$375,000. It has a library of about 15,000 volumes. The faculty includes 40 professors and instructors, and there is an average attendance of about 500 students.

SOUTHERN CROSS, an interesting group of stars in the Southern Hemisphere, including four stars of the first magnitude. Good views of it may be taken at the Tropic of Cancer, but its aspect is considerably better farther south. The four principal stars form a cross, two of them pointing directly east and west, while the upper and lower ones point to the South Pole. The Southern Cross is a less striking configuration than the Great Bear, but it is equally interesting from the circumstance that in the different seasons of the year the hour of the night is indicated by the position it assumes.

SOUTH HADLEY (hăd'li), a town of

Massachusetts, in Hampshire County, three miles northeast of Holyoke. It is on the Connecticut River, which has a fall of forty feet at this place, and is near the Boston and Maine and other railroads. Electric lighting, sewerage, and a public library are among the utilities. It is noted as the seat of Mount Holyoke College, the oldest collegiate institution for women in the United States. The manufactures include brick, fertilizers, cotton and woolen textiles, and lumber products. Population, 1910, 4,894.

SOUTH McALESTER (mäk-äl'is-tēr), a city of Oklahoma, in the Choctaw Nation, 85 miles southwest of Fort Smith, Ark. It has transportation facilities by the Missouri, Kansas and Texas and the Chicago, Rock Island and Pacific railroads. Electric railways extend to a number of points in the eastern part of the State. The surrounding country produces large quantities of cotton, fruit, and bituminous coal. Among the manufactures are coke, brick, flour, cigars, and machinery. It has a public library, a number of fine schools and churches, and many substantial business blocks. Electric lighting, sewerage, and telephones are among the utilities. Population, 1900, 3,479.

SOUTH MILWAUKEE (mīl-wā'kē), a city of Wisconsin, in Milwaukee County, ten miles south of Milwaukee, on the Chicago and Northwestern Railway. It has manufactures of steam dredges, hardware, clothing, and machinery. The chief buildings include several public schools, a number of churches, and numerous business houses. Electric lighting and waterworks are among the public utilities. Population, 1905, 5,284; in 1910, 6,092.

SOUTH MOUNTAIN, Battle of, an engagement of the Civil War in the United States, fought at South Mountain, near Sharpsburg, Md., on Sept. 14, 1862. General Lee had invaded Maryland with a large army and was stationed near Turner's Gap with 18,000 men, where he was attacked by 28,000 Federals from McClellan's Army of the Potomac. After a stubborn resistance, the Confederates were compelled to retreat, losing 2,600 men, while the Federals lost 1,800. They fell back to Antietam (q. v.), where another battle was fought two days later.

SOUTH NORWALK (nōr'wāk), a city of Connecticut, in Fairfield County, fourteen miles southwest of Bridgeport. It is located at the mouth of the Norfolk River, on Long Island Sound, and has communication by the New York, New Haven and Hartford Railway. The site is on elevated ground overlooking the sound, hence its location is both pleasant and healthful. The harbor is extensive and carries

a large coastwise trade. Clothing, boots and shoes, hardware, and machinery are among the leading manufactures. It has waterworks, electric lighting, and a public library. Oyster fishing and shipbuilding are carried on extensively. It was chartered as a city in 1870. Population, 1900, 6,591.

SOUTH OMAHA (ō'mā-hā), a city of Nebraska, in Douglas County, situated immediately south of Omaha, on the Union Pacific, the Chicago, Rock Island and Pacific, the Chicago, Burlington and Quincy, and the Missouri Pacific railroads. Communication within the city and with Omaha is maintained by electric railways. The noteworthy buildings include the high school, the public library, the city hall, and many churches. It is particularly noted on account of its extensive stock yards, meat-packing houses, rendering tanks, and trade in cured meats. The hog-slaughtering industry takes third rank in the United States. It has systems of sewerage, waterworks, and electric and gas lighting. South Omaha has had a remarkable growth the past decade. It ranks as the third city in the State, being exceeded only by Omaha and Lincoln. The place was settled in 1882 and incorporated in 1886. Population, 1900, 26,001; in 1910, 26,259.

SOUTH ORANGE, a village of New Jersey, in Essex County, fifteen miles west of New York City. It is on the Delaware, Lackawanna and Western Railroad and has connections by electric lines with other points in the State. The site is on elevated ground facing Orange Mountain, hence it is popular as a residential center for Newark and New York business men. Among the features are Seton Hall College, the public library, the townhall, and several fine schools. It has a large local trade and manufactures of clothing and machinery. The first settlement was made in 1670. Population, 1905, 4,932; in 1910, 6,014.

SOUTH POLAR EXPLORATIONS. See **Polar Expeditions.**

SOUTHPORT (south'pōrt), a borough of England, in Lancashire, eighteen miles north of Liverpool. It is situated at the mouth of the Ribble Estuary, on the Irish Sea, and is popular as a watering place. Besides many public buildings and institutions, it has an art gallery, a public library, and winter gardens. The manufactures include clothing, earthenware, and machinery. Electric street railways, gas and electric lighting, waterworks, and pavements are among the public improvements. The place was first platted in 1830. Population, 1908, 52,864.

SOUTH PORTLAND (pōrt'land), a city of Maine, in Cumberland County, on Casco

Bay, opposite Portland. It is connected with Portland by four bridges and electric railways and has communication by the Boston and Maine Railroad. The manufactures include hardware, sailing vessels, and clothing. It is the seat of a State school for boys, has a fine soldiers' monument, and is protected by government fortifications. Formerly it was a part of Cape Elizabeth, but was organized as South Portland in 1895. Population, 1910, 7,471.

SOUTH SEA SCHEME (skēm), a plan originated by Robert Harley, Earl of Oxford, in 1711, with the view of securing the payment of the debt of England, which at that time aggregated \$50,000,000. An amount equal to the debt was loaned to the government by a number of merchants, who were guaranteed an annual payment of 6 per cent. interest. They were given a monopoly of the South Sea trade and the right to collect certain customs. The popular idea that enormous riches could be obtained in South America caused the stock to rise with remarkable rapidity until it reached \$5,000, but a collapse came when certain stockholders transferred their interest to others. It was found that fictitious stock to the amount of \$6,300,000 had been authorized, of which about one-half had been sold. To reimburse the heavy losers the government confiscated the property of the directors and remitted an amount equal to \$35,000,000 due the government. Though this course provided a small measure of relief, it did not by any means repay those who had been induced by glowing promises to invest their money.

SOUTH SHIELDS. See **Shields, South.**

SOVEREIGN (sŭv'ēr-īn), a gold coin of Great Britain, the standard of value, representing the pound sterling. It is equivalent to twenty shillings, or about \$4.86, and was first coined in 1817, when it began to supersede the guinea. The sovereign weighs 123.274 grains troy. See **Pound.**

SOVEREIGNTY, in government, the state of being sovereign, that is, having independent and supreme authority. The term is used in two different senses in relation to the power of a state or nation, these implying that internal as well as external sovereignty may be exercised. By *internal sovereignty* is meant the power of the state over its citizens, which is absolute and indivisible, that is, the state cannot be limited, except by its constitutions and laws, in exercising prerogatives over its citizens; and its authority cannot be divided so as to permit one or more other sovereigns to exercise the functions of government over its members. *External sovereignty* has reference to affairs with other na-

tions, such as concluding treaties, declaring war, negotiating peace, and exercising powers relating to its internal affairs. While a sovereign state is absolutely independent in theory, it is more or less dependent in fact, since no political state can exist without taking cognizance of other nations.

SOWING MACHINE (sō'īng mā-shēn'), an implement for sowing the seed of grasses and cereals, such as are grown by agriculturists and gardeners. In the early stages of farming the seed was scattered by means of the hand, the sower carrying a supply of seed in a bag or box suspended from the shoulder. Subsequently devices were placed on the market that enabled the sower to scatter the seed by carrying a mechanical device, but this was soon superseded by machines mounted on wheels to be drawn by horses. Still later implements were manufactured that scattered the seed and at the same time cultivated the soil, small steel shovels being attached beneath the box for that purpose. They are of two kinds, known as *drill* and *broadcast* seeders. The former sow the seeds in rows, while the latter scatter them uniformly.

A machine with a funnel to hold the grain, having a disc operated by means of a chain connected with the wheel of a cart, has come into wide use. Most of the farmers who cultivate large fields attach a device of this kind to the box of a common wagon, the propelling force being supplied by a rim attached to one of the hind wheels. The seed to be sown is placed in the wagon and the operator places the grain in the funnel as required, while the driver at the front end of the wagon attends to the team so a uniform speed may be maintained in moving across the field. Machines of this kind are usually called *broadcast seeders*. By means of a single machine twenty to thirty acres may be sown in a single day, though a moderately high wind interferes with the uniformity in scattering the seeds, this depending somewhat upon the character of the grain sown.

SOW THISTLE, a genus of plants native to the Eastern Hemisphere, of which about thirty species have been described. The *common sow thistle* is two or three feet high, bears small yellow flowers, and is a branching plant. Another species is known as the *field sow thistle*, which is an obnoxious weed in richly cultivated land. Several of these plants have been brought to Canada and the United States with shipments of seeds, and have developed into injurious plants, similar to the Canada thistle.

SPAHIS (spā'hēz), the name applied in Al-

geria to a class of cavalry, consisting of natives. It was organized to supersede the regular cavalry in 1796, and has been maintained since the French conquered that country. Cavalrymen belonging to the spahis carry such weapons as the javelin, lance, and saber. The uniform is similar to that of the Arabs. In British India the name *sepoys* has reference to a similar class of native troops.

SPAIN (spān), a kingdom in the southwestern part of Europe, occupying about six-sevenths of the Iberian peninsula. It is bounded on the north by the Bay of Biscay and France, east by the Mediterranean, south by the Mediterranean, the Strait of Gibraltar, and the Atlantic, and west by Portugal and the Atlantic Ocean. From France it is separated by the Pyrenees and from Africa, by the Strait of Gibraltar. The greatest extent from east to west is in the northern part, where it is 620 miles, and its extent from north to south is 540 miles. The coast line is quite regular, having no large indentations, but it has an extent of 3,120 miles. Spain proper includes the Balearic Islands, in the Mediterranean, and a tract of land on the coast of Africa with an area of thirteen square miles. The total area is 194,783 square miles, and the portion on the continent of Europe has 192,004 square miles.

DESCRIPTION. The surface is greatly diversified by mountains, tablelands, and valleys. The interior has a general altitude of from 1,000 to 3,000 feet above the sea, much of which is a treeless plateau sloping toward the west. Among the principal mountain chains are the Cantabrian and the Pyrenees, in the north; the Sierra de Gredos, the Sierra Gaudarrama, and the Montes de Toledo, in the central part; and the Sierra Morena and the Sierra Nevada, in the southern part. The highest mountains belong to the Pyrenees, which in Spain include Pico de Aneto, 11,160 feet, but the highest peak in Spain is Mulahacen, 11,420 feet, in the Sierra Nevada. This peak is the loftiest summit of Europe outside of the Alps. Other mountain heights range from 5,275 to 8,500 feet, the latter being the elevations in the Cantabrian Mountains. Between many of the mountain ranges are deep and narrow valleys, which are drained by rapid streams, and many of the ranges are very difficult to traverse.

The drainage is chiefly toward the west, but some of the important rivers flow eastward into the Mediterranean. No streams flow directly north, owing to the fact that the Cantabrian Mountains form a watershed near the Bay of Biscay. The principal rivers flowing into the Mediterranean are the Ebro, the Júcar, and the

Segura. The Guadalquivir flows southwest and discharges into the Atlantic. The Guadiana, the Tagus, and the Douro rise in Spain and flow through Portugal into the Atlantic, while the Minho forms part of the boundary with Portugal and discharges into the Atlantic on the northern frontier of that country. About 800 miles of the waterways are navigable, but only 300 miles can be used the entire year, owing to the marked effect of the dry season. The Guadalquivir, which is navigable to Seville, is the most important navigable stream. Spain has many small lakes, including Lake Albufera, but they are not important.

The climate is greatly diversified, owing to extensive variations in the altitude, and there are marked differences in the annual rainfall of the coast and interior sections. It may be said that the southern part has a semi-tropical climate, while the interior has warm summers and cold winters. In summer the temperature rises so high in the tableland that the earth becomes parched and nearly all of the rivers dry up, and in the winter this section is marked by a low temperature. In the center of the country, at Madrid, the mean temperature is 55°, but frost and snow are rare, and the summer heat frequently rises to 107°. Rainfall in the interior ranges from eight to fifteen inches per annum, but in the coast regions there is a much larger precipitation. Dry winds frequently blow from the Sahara of Africa in the summer. In the winter a cold wind, called the *Gallego*, blows from the north.

MINING. The mineral deposits of Spain are extensive and diversified. Coal is found in nearly all sections of the country, but is produced chiefly in León, Asturias, and Lérida. Almaden has the richest quicksilver mines in the world. In the output of lead it excels any other country of Europe and it has inexhaustible deposits of copper, but the latter are worked chiefly by German and British capital. Extensive salt-evaporating works are maintained at Valencia and in the Balearic Islands, and rock salt deposits abound in Catalonia and New Castile. Other minerals include zinc, manganese, antimony, gold, iron, and silver.

AGRICULTURE. The soil is singularly fertile, even in the hilly sections, but irrigation is the basis of agriculture in most parts of the country. Farming has attained its highest development among the Basques and Catalonians. About four-fifths of the area is productive, either as grazing or farming lands, and irrigation is extending the tillable surface. About one-third of the tilled surface is under fields and gardens and the remainder is devoted to

growing grasses, orchards, and vineyards. Wheat is the leading cereal. Other important crops include rye, barley, maize, rice, oats, and potatoes. The food cereals are not grown in sufficient quantities to supply the demand, hence many of the foodstuffs are imported. Spain is celebrated for the fine-fleeced merino sheep and in proportion to population it has a greater number of this class of animals than any other country of Europe. Goats are raised extensively for their flesh, milk, and skins, and some of the larger estates have as many as 3,500 of these animals. Horses of Arab stock are reared to some extent, but the mule is a more popular and numerous animal in Spain than the horse. Cattle are grown both for meat and dairying and special breeds for bullfighting are maintained. Other domestic animals include swine and poultry.

Extensive interests are vested in the southern part in growing the cork oak. The vine industry is one of wide extent, producing large quantities of grapes that are used in the manufacture of high grades of wine. Fruits of all kinds grow in abundance, especially olives, oranges, lemons, and apples, and large quantities are dried and canned. The culture of the mulberry tree and the silkworm receives marked attention, and in the production of raw silk Spain takes a high rank. Other products include cotton, sugar cane, rice, licorice, saffron, and vegetables. Though the forests have been cleared largely to obtain agricultural land, considerable oak, chestnut, willow, beech, and poplar timber still abounds.

MANUFACTURES. At present the home demand cannot be supplied by the output of manufactures, but they are extending noticeably under encouragement by the government. Catalonia, of which Barcelona is the leading city, has greater developments in manufacturing than any other province. Here are extensive establishments for the manufacture of silk, cotton, and woolen textiles. Large interests are vested in the manufacture of leather at Cordova and the royal factories of Madrid, Seville, and Valencia have a large output of pipe tobacco and cigars. Extensive steel and iron works are maintained and efforts are being made to supply the entire home demand. The fisheries yield large quantities of cod, tunny, and sardines, much of the output being cured and canned, but the home industry does not supply the demand. Other manufactures include beet sugar, olive oil, glassware, boots and shoes, porcelain, cutlery, hardware, and machinery. Water power is utilized extensively in the manufacturing enterprises.

COMMERCE. Although Spain has a large foreign trade, it exports raw materials and imports manufactured articles. Fruits, wine, and minerals are the chief exports. The principal imports include lumber, cotton textiles, and machinery. Great Britain, France, the United States, and Germany have the largest share of trade in the order named. The imports exceed the exports.

TRANSPORTATION. Many of the highways have been improved, but they do not compare favorably with those of France and Germany. About 10,125 miles of railways are in operation, all owned by private corporations. Electric railways are operated in the cities, whence they extend to some of the interior towns. A large share of the domestic trade is carried by coasting vessels and through canals. Telephone and telegraph systems are utilized extensively, the latter including 23,500 miles.

GOVERNMENT. Spain is a constitutional monarchy, the present constitution dating from 1876. It is hereditary, giving precedence to the male line of equal right. Executive power is vested in the sovereign, who has legislative functions in connection with the Cortes, the lawmaking authority. The king is assisted by a council of nine ministers, such as the ministers of foreign affairs, interior, finance, agriculture, instruction, etc. Two houses constitute the Cortes, namely, the senate and the chamber of deputies. Members in the former hold office partly by inheritance and partly by election, and in the latter they are chosen partly by popular vote. At present there are 80 who hold office by right of birth; 100, by appointment of the crown for life; and 180, by general election for five years, making a total of 360 in the senate. On the other hand, there are 406 deputies elected for five years in the chamber of deputies. In 1890 the constitution was amended to extend the right of suffrage to all male Spaniards who are 25 years of age, but a nominal property qualification maintains.

The supreme court of cessation is the highest judicial tribunal. Subordinate to it are the district courts, from which causes may be appealed to the supreme court. Local judicial authority is vested in the municipal courts and those of justices of the peace, whose decisions are subject to review by the higher courts. Each province has its own assembly, chosen by popular vote, and is subdivided into communes for the purpose of local government. Spain has a standing army of 80,000 men, but in addition there is an active military reserve. The navy is not strong when compared to the naval equipment of other countries of Europe. At present

the fleet includes twelve armored vessels of large size, several protected cruisers, and a number of gunboats. The peseta is the common monetary unit, having a value of about twenty cents in the money of Canada and the United States.

EDUCATION. Though education was formerly neglected, a better era has set in and schools are regularly inspected. A compulsory educational law was passed in 1857, requiring attendance upon elementary schools, but it has not been enforced with any degree of strictness. The rate of illiteracy is placed at 60 per cent., but it is thought that the amended compulsory law of 1902 will tend to greatly improve conditions within the next decade. Spain was unfortunately involved in colonial and foreign wars the latter part of the last century, by which the home government was deprived of many of its young men and the finances needed to promote domestic development. However, the country has entered upon a state of industrial, educational, and governmental transition that gives evidence of greater prosperity.

The Roman Catholic is the national church, but a restricted form of liberty of worship is extended to Protestants. Spain is the most Catholic country in the world. The number of non-Catholic church members may be placed at 50,000. The Catholic Church in Spain has nine archbishoprics and is divided into fifty-four dioceses. Ten universities are maintained, including those at Saragossa, Santiago, Valencia, Seville, Valladolid, Barcelona, Granada, Oviedo, Salamanca, and Madrid. The University of Madrid was founded in 1836 and is now the best equipped and attended educational institution of Spain, while that of Salamanca, greatly renowned in the Middle Ages, is at present in least repute. The government maintains schools of agriculture, engineering, commerce, fine arts, mining, and music. Besides those supported as public institutions are many private and parochial educational enterprises.

COLONIES. The colonial possessions of Spain are at present confined to Africa. They include Rio de Oro and Adrar, Bata and Cape San Juan, and Fernando Póo. The total area of these possessions is 252,850 square miles, but all are sparsely populated, containing not more than 124,500 inhabitants. To these are added the Canary Islands, located about 70 miles from the northwestern coast of Africa. The colony of Rio de Oro and Adrar, on the western coast of Africa, is governed by the executive of the Canary Islands.

INHABITANTS. The density of population is about 97 to the square mile. Many of the in-

habitants have emigrated to Spanish-America, and there is still considerable emigration to Argentina, Brazil, and Uruguay. Madrid is the capital and largest city. Other cities of importance include Barcelona, Valencia, Seville, Málaga, Murcia, Cartagena, Saragossa, Granada, and Cadiz. Population, 1906, 19,565,903.

LANGUAGE AND LITERATURE. Spanish is a Romance language. It sprang from the Latin, introduced into Spain with Roman dominion. Spanish is spoken by the people of Mexico and parts of Central and South America. The language embraces a number of different dialects, but the Castilian branch is the classic and literary form. It may be considered one of the most beautiful of European tongues and is distinguished from the Portuguese by its deep and open tones. It has twenty-seven letters and as many distinct sounds, of which six are classed as vowels.

The first writings in Spanish literature are the "Poems of the Cid," dating from the 12th century. These include a number of songs and ballads dedicated to national heroes, principally recounting the adventures of Rodrigo Diaz de Vivar. The Benedictine monk, Gonzalo de Berceo (1198-1268), published a number of didactic verses of great beauty, and soon after appeared ballads and romances of chivalry. Alfonso X. stimulated literature by encouraging writers, and in 1265 caused the publication of a Castilian code of laws known as "Las Siete Partidas." Juan Ruiz is a famous poet of the 14th century and a contemporary of Pedro Lopez de Ayala (1332-1406), who published a number of fables, pastoral hymns, and patriotic songs and made a version of the "Dance of Death." Many of the ballads and traditions were handed from generation to generation up to the 16th century, when the second period of Spanish literature begins. This epoch marks the development of lyric poetry alongside the didactic, receiving impetus from Provençal poets who settled at the court of Barcelona. The most noted production in that century is the "Amadis de Gaula," a large work devoted to romantic chivalry.

The period from the 16th to the 18th century is the most splendid and productive in Spanish literature. Charles V. was a patron of learning. In his reign many German scholars were retained in the Spanish universities, and under him Spain became the foremost state in Europe. The conquest of Naples caused Spanish writers to study Dante, Petrarch, and other great Italian masters, thus leading to numerous translations and original works. Miguel Cervantes wrote his famous "Don Quixote" in 1605, which

was received with great favor and presented in a dramatized form throughout the 17th century. Lope de Vega (1562-1635) is one of the eminent Spanish dramatists in this golden period of literature. The historians include Juan de Mariana and Diego de Mendoza and there are equally prominent writers in theology, law, science, astronomy, and geography. Spanish literature was influenced by the French at the accession of the Bourbons, and it has been extended by writers in Mexico and South American countries. The 19th century marks a period of decline in the literature of Spain, but the enactment of laws to encourage education and industrial arts is stimulating scholarship and enterprise. As a result the 20th century promises a new epoch in its literature and the addition of many works of educational value.

HISTORY. The region occupied by Spain and Portugal was inhabited in ancient times by the Iberians, who were afterward joined by Celtic tribes. Phoenician settlements were made along the Mediterranean coast as early as 1100 B. C., when Cadiz was founded, and the Greeks soon after established several colonies. Spain was known to the ancient Greeks as *Iberia*, the name being applied in the writings of Herodotus in connection with the Phoenicians. Carthaginian invasions occurred about the middle of the 3d century. These people established a considerable commerce, but under Hamilcar Barca they subjected a large part of the peninsula to Carthage. Subsequently incursions were made under Hasdrubal and Hannibal, who greatly extended the Carthaginian influence, but soon after war began with Rome, finally resulting in the Carthaginians being expelled from Spain in 205 B. C.

The Romans generally applied the name of *Hispania* to the region, dividing the country into the northern and southern divisions, but many prolonged wars resulted before the country was finally conquered. Augustus Caesar completed the conquest in 19 B. C. Soon after the Latin language and customs were adopted and the Christian religion superseded the hero and idol worship of the Carthaginians. With the decline of Rome came successive invasions from the west and north. The Franks made a great invasion in 256 A. D., but the country continued to prosper until the early part of the 5th century, when a tide of Vandals and Alani swept over Spain, destroying many of its finest cities and carrying away its treasures.

The Visigoths established a kingdom in 418, which brought a return of general prosperity that endured until 711, when it was conquered by Arabs and Moors under Tarik, who defeated

the native army at Jerez de la Frontera in July of that year. At first the government was administered by the caliphs of Bagdad and later by the caliphs of Damascus, but dissensions ultimately caused the establishment of an independent dynasty under Abd al-Rahman in 756, known as the Ommyade dynasty, with the seat of government at Cordova. In that period the Moorish kingdom reached its greatest grandeur and Cordova became the finest city in Western Europe. Mosques and other forms of architecture were erected in the different cities. Many of the finest buildings of Moorish construction are still to be seen in different parts of Spain.

Small kingdoms began to form in various parts of Spain by the uniting of descendants from the Visigoths and early Iberians. Among the states were Aragon, León, Castile, Asturias, and Navarre, and wars for supremacy became frequent, but all united as a common enemy against the Moors. With the extinction of the Ommyade dynasty in 1131, Mohammedan power began to decline and the two Christian states of Aragon and Castile rose rapidly. A decisive battle at Las Navas de Tolosa, in the Sierra Morena, in 1212, so reduced the Moslem influence that they retained only Granada and Cordova and from that time the Moorish influence declined rapidly. With the marriage of Isabella of Castile to Ferdinand of Aragon, in 1469, the crown of the two kingdoms became united and with this union begins the history of modern Spain. Each of the two states retained its own customs and laws, but there was a gradual fusion of the two governments, and in 1476 the *Holy Brotherhood* was formed to enlarge the powers of the central government by curtailing the power of the nobles. The *Inquisition* was founded in 1481 with the view of extending religious orthodoxy and unity. The Jews were expelled soon after and in 1492 Moorish dominion ended by the conquest of Granada. In the latter year Columbus discovered America. That noted event not only aided the country commercially, but the military power of Spain received its first great impetus, both in America and Europe. On the death of Ferdinand, in 1516, his daughter Joanna ascended the throne. She had married Philip, son of Maximilian I. of Germany, but was soon succeeded by her son, Charles I.

Charles was not only King of Spain, but also of the Netherlands, which came to him as an inheritance from his father, and in 1519 he succeeded to the throne of Germany as Emperor Charles V. He was a rigid Catholic, and his religious zeal caused him to declare war against the Turks and the Protestants of Germany and

France, a course that proved a heavy tax upon the resources of his dominion. However, the addition of extensive territory to Spain enabled him to enlarge the navy and bear the burdens of long conflicts of arms. Among the most notable events of his reign are the conquest of Mexico in 1518 and of Peru in 1531, and the annexation of the Milanese and large regions in Northern Africa. He resigned all his dignities in 1556 to his son, Philip II., who gave Spain a successful internal administration, but exercised with great freeness the Inquisition and political and religious despotism. In 1580 Portugal was united to Spain, but his foreign policy was highly disastrous, losing a large part of the Netherlands and the Invincible Armada, as the Spanish fleet was called, and consequently the country declined in prestige as a great naval power. Philip III., his son, succeeded him in 1599, in whose reign the Moors were cruelly oppressed and the Moslem faith was extinguished, and in 1609 an edict was issued that all the Moriscos were required to depart from Spain under penalty of death.

The Moors had introduced the cultivation of silk, cotton, tobacco, and rice in Spain and had established systematic irrigation, founded schools, and developed agriculture to a high degree of perfection. They represented the most successful industrial class and their expulsion proved highly disastrous to Spain. From that blow the Iberian peninsula never recovered and Spanish influence suffered still further by the Thirty Years' War. Philip IV. ascended the throne in 1621 and he was succeeded by Charles II., who died without an heir in 1700. This brought on the War of the Spanish Succession, which ended in 1713 by the Treaty of Utrecht, and Philip V., the first of the Bourbon kings, was recognized as sovereign of Spain. By its terms he lost Naples, the island of Sardinia, Sicily, Milan, Gibraltar, Minorca, and the Netherlands. However, he strengthened the kingdom at home. In 1746 Ferdinand VI. ascended the throne, and he was succeeded in 1759 by Charles III. The period of these three kings was one of general prosperity, and in the reign of the last mentioned the Inquisition was broken by banishing the Jesuits in 1767. Charles IV. succeeded to the throne in 1788, but abdicated in favor of Ferdinand VII. in 1808. In the same year Joseph Napoleon was made king by his brother and governed until 1813, when Ferdinand VII. was restored by an army of the European allies under Wellington. It was in this period, in 1800, that Spain ceded Louisiana to France.

While the wars against Napoleon were in

progress the Spanish colonies of South America asserted their independence, Florida was sold to the United States in 1819, and a revolution in 1820 abolished the Inquisition and gave the country a more liberal constitution. Ferdinand, having abolished the Salic law in 1822, was succeeded by his daughter as Isabella II. in 1833, under the regency of her mother. Don Carlos, a brother of Ferdinand and a pretender to the throne, raised a revolt, which was suppressed. The queen was declared of age in 1843, but her reign was disturbed by numerous revolts and party intrigues, causing her to flee from the country several times. She was finally exiled and Amadeus, second son of Victor Emmanuel of Italy, was elected king by the Cortes in 1870, but this sovereign resigned after a disturbed reign of three years. Soon after an attempt was made to establish a republic, but this project failed, and Alfonso XII., son of the exiled Isabella, became king in 1874. After his death, in 1885, his wife, Maria Christina of Austria, became queen regent of her infant son, Alfonso XIII. An extended war in the island of Cuba, which had grown highly destructive, finally caused the United States to intervene in behalf of the revolutionists in Cuba, and war between the two nations was formally declared by the United States Congress on April 25, 1898. Every battle on land and sea resulted favorably to the United States. The treaty of peace signed at Paris on Dec. 7, 1898, gave independence to Cuba and ceded Porto Rico and the Philippines to the United States, but a payment of \$20,000,000 was made to Spain for the Philippine Islands. Alfonso XIII. (q. v.) became of age in 1902, when he assumed full charge of the government. He adopted a conciliatory policy and did much to extend trade and develop the resources of the country.

SPANDAU (spän'dou), a city of Germany, in the Prussian province of Brandenburg, about seven miles west of Berlin. It occupies a favorable site at the confluence of the Havel and Spree rivers, has railroad and electric street railway facilities, and is noted as an industrial center. The manufactures include woolen and linen goods, gunpowder, firearms, and machinery. It is strongly fortified, having a citadel well adapted to prolonged defensive operations, and is an important military depository of Germany. It has a garrison of 3,750 men and the government operates the factories which produce heavy ordnance and gunpowder. The city has long been an important strategic point. It was captured by the Swedes in 1634 and by the French in 1806. Spandau became a territory of the Prussians in 1813 and since then

has been greatly improved. Population, 1905, 70,295.

SPANIEL (spän'yěl), an extensive breed of dogs, distinguished by large, drooping ears, an affectionate disposition, and long, silky hair. The three most common species include the *lamb spaniels*, *water spaniels*, and *toy spaniels*. The color of most spaniels is a livered tint, but white with brown or black markings is not infrequent. The *Maltese*, *Blenheim*, and *King Charles* dogs are small species of spaniels. Most dogs of the spaniel breed are highly intelligent and very obedient.

SPANISH-AMERICAN WAR, an armed conflict between Spain and the United States, brought about in 1898 through the failure of Spain to provide and maintain a stable government in Cuba. Bloodshed and unrest had disturbed the public affairs of the island for nearly fifty years, and American citizens who had invested in securities and enterprises had no rights that Spain sought to protect. A condition of war existed in Cuba from 1868 until 1878, known as the *Ten Years' War*, and this was followed by a brief period of peace. The Cubans rebelled in 1895 and sought to establish an independent government, but they were repressed with unusual cruelty and severity, and the conditions of famine and devastation became very severe. Secretary of State Olney, in 1896, represented the interests of American commerce to the authorities in Spain and President Cleveland pointed out that the United States should consider the interests of the Island from the standpoint of higher obligations than those due to Spain. Congress appropriated \$50,000 for the relief of the suffering Cubans in 1897.

Early in 1898 the United States dispatched the battleship *Maine* to the harbor of Havana to protect American interests, and many contributions were sent for the Cuban reconcentrados. The battleship *Maine* was destroyed by the explosion of Feb. 15, 1898, and this greatly inflamed the Americans, though it was impossible to place the blame upon officials of Spain. However, Congress appropriated \$50,000,000 for national defense and in March an American commission reported that the *Maine* had been destroyed by a submarine mine. Congress made the declaration that "the people of Cuba are and of right ought to be free and independent," and on April 25 issued a declaration of war. While Spain was requested to relinquish Cuba, the President was authorized to accomplish that result by using the army and navy of the United States. On April 23 the President called for 125,000 volunteers and the same day the first

gun was fired, when the *Nashville* captured the Spanish merchantman *Buena Ventura*.

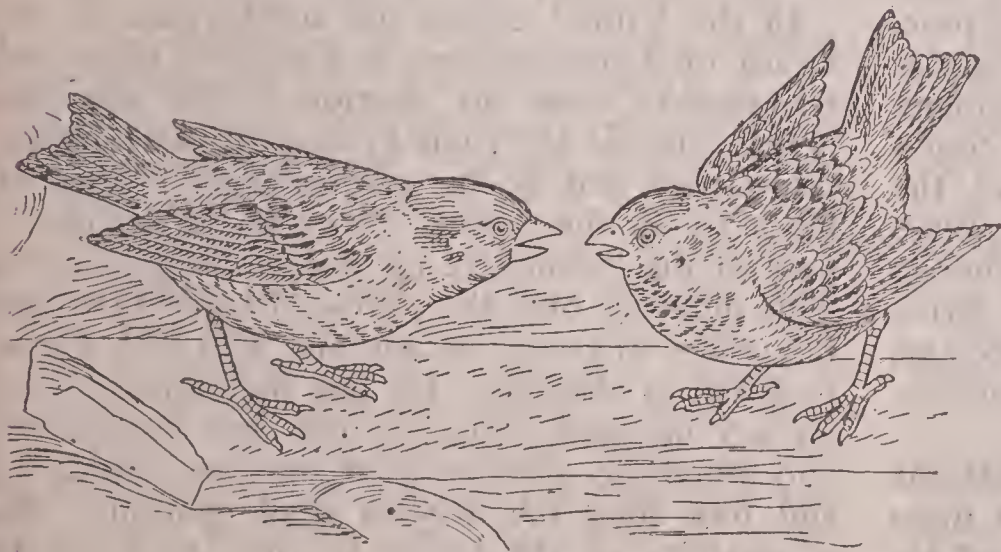
Spain had a force of 60,000 men in Cuba and its fleets were at that island and in the Philippines. The United States rapidly mobilized 200,000 volunteer troops, a second call for 75,000 men having been made in May. Camps of instruction were established near Tampa and Chickamauga, and the naval forces were utilized to blockade the ports of Cuba. Commodore George Dewey, on April 30, destroyed the Spanish fleet at Manila Bay, where the Americans lost six wounded, while the Spanish loss was 634 killed and wounded. General Merritt was dispatched to the Philippines with troops to penetrate the islands. In the meantime Admiral Cervera had taken a position in the harbor of Santiago, where his fleet was discovered by Commodore Schley. The latter was superseded by Admiral Sampson on June 1, after which Richmond Pearson Hobson made his daring exploit to sink the collier *Merrimac* with the view of locking the Spanish fleet into the harbor.

General Shafter sailed from Tampa, Fla., with transports bearing about 17,000 men and officers. With these he attempted to capture the harbor and fleet at Santiago, being aided by about 5,000 Cuban troops under General Garcia. The Spaniards offered resistance at Las Guasimas, where the Americans under General Wheeler lost 68 men. The battle of El Caney was won by the Americans on July 2, in which the Roughriders under Colonel Wood played an important part. Cervera, hoping to gain by the American movements on land, attempted to escape from the harbor of Santiago on the 3d. The Spanish fleet was immediately pursued by every ship in the American squadron, and in the course of a few hours the six Spanish vessels were destroyed or captured. About 350 Spaniards were killed in the battle, Cervera and 1,700 men and officers were captured, while the Americans lost only one man killed and ten wounded. The siege of Santiago continued until July 15, when General Toral surrendered. General Miles, on July 27, landed at Ponce, in Porto Rico, and a few days later took possession of the island in the name of the United States. General Merritt arrived at Manila on the 25th, where he assumed command of 20,000 American troops, and on Aug. 7 captured the city, taking about 11,000 prisoners.

The war was concluded by the Treaty of Paris, negotiated at Paris, France, on Dec. 10, 1898. By its terms Spain surrendered Guam, the Philippines, and Porto Rico to the United States on payment of \$20,000,000, but retained certain commercial privileges in the Philippines.

At the same time Spain relinquished all claim to Cuba. The expense of the war to the United States is placed at \$165,000,000, up to Oct. 31, 1908. Within that period 2,910 Americans lost their lives, but all except 306 died from disease. This successive loss of life caused the suspicion that the camps were mismanaged, but an investigation proved that it was due principally to the climatic conditions of the semitropical countries in which the army and navy operated, the United States' forces being largely unaccustomed to the conditions found there.

SPARROW (spär'rō), a genus of birds of the finch family, which are widely distributed in North America and Europe. The American sparrows include several species of small birds, among them the *song sparrow*, *chipping sparrow*, *field sparrow*, and *fox sparrow*. The color is mostly brown with white and black markings, and they are noted for being tame and greedy. The *house sparrow* is native to Europe, but was introduced in Canada and the United States in 1862. Since then these birds have spread over most of North America, owing to the rapidity with which they increase. In some localities a small sum is paid for their destruction, and in several instances legislatures appropriated funds for that purpose. They are noted for feeding with much greed upon caterpillars and other insects, but frequently prove a pest to the market and fruit gardener. In the winter season they congregate in cities and about buildings, both for shelter and food. They nest on the ground and in bushes, usually laying from four to six eggs with spots of dark brown.



HOUSE SPARROW.

SPARROW HAWK, the common name of several small falcons. They are about twelve inches long with an alar extent of twenty inches. The wings are short and they have a curved bill and long, slender legs. The plumage is of a brownish color, usually diversified by darker

spots, and the male has dark brown shades on the upper side of the head. Both sexes incubate. These birds are bold and skillful in attacking their prey, which consists of sparrows, pigeons, lizards, mice, young chickens, and insects. The *American sparrow hawk* is a handsome bird and is allied to the kestrel. Several species of sparrow hawks are native to Europe and Australia.

SPARTA (spär'tā), or **Lacedaemon**, a city of ancient Greece, the next in power to Athens. Anciently it was the capital of Laconia. It occupied a fine site on the Eurotas River, about twenty miles from the Mediterranean, and was the chief city in the Peloponnesus. Mount Taygetus is situated at the rear of its site, rising to a height of 7,985 feet, and other elevations make the valley and slopes occupied by the city a strategic point of easy defense. The laws of Lycurgus prescribed the architecture that should be erected, thus preventing the construction of buildings with elaborate architectural forms, and they brought about such a military spirit that the city rose to great power in the 6th century B. C. It is reputed that Lacedaemon, son of Zeus, founded the Spartan state, and Menelaus is famed as its most eminent king.

Sparta joined Athens and other cities of Greece in the war against the Persians and Leonidas, King of Sparta, commanded the Grecian forces at the celebrated pass of Thermopylae. Later a spirit of rivalry rose between the two great cities, which caused the Peloponnesian War in 431 B. C., a contest continuing 29 years. The war terminating favorably to Sparta, it became the predominating influence in Greece, and under King Agesilaus waged an extended war against Persia. During that period Athens revived in power. From 378 to 363 B. C. the celebrated Theban War took place, when the Thebans conquered Sparta, and the city never again rose to its former greatness. Cleomenes made an unsuccessful attempt to restore its former power in 235, but at that time many foreigners had settled in the city, while the small per cent. of remaining Spartans had been reduced to a state of poverty. The Romans finally conquered Sparta and other Grecian cities in 146 B. C.

The laws of Lycurgus are supposed to date from 825 B. C., and their influence upon Spartan life and industries was very marked. The development of the mind was sacrificed to that of the body. Physical strength and military skill were the qualities most desired in the citizens, the sole object being to train soldiers for the de-

fense of the state. This system gave rise to ignorance, but inculcated habits of courage and sobriety. Athens taught the arts of fine speaking, while Sparta inculcated brave acting and laid the foundation for skillful captains and wise magistrates and legislators. Three classes of society existed in most of the period that Sparta flourished. The governing class was made up of the *Spartiatæi*, the free middle class was constituted of the *Perioikoi*, and the slaves were the *Helots*. Those who were unable to pay their debts, and the captives of war, were reduced to the Helot condition, while the skillful in physical exercises and military accomplishments gained promotion to the governing class. Children of weak or defective constitution at birth were not allowed to live, while all the strong and vigorous became the charge of the state.

Sparta maintained extensive colonial, commercial, and manufacturing enterprises, and made remarkable development in the culture of cereals, fruits, and domestic animals. The Helots were bound to the soil, which they cultivated for its owners, but in cases of emergency they served in the army. Education of a high literary class was not deemed conducive to the public good as in Athens, and there was a marked difference between the instruction given males and females. The modern town of Sparta occupies the site of ancient Sparta. It was founded by the Greeks in 1836 and is the capital of the province of Laconia. Population, 4,375.

SPARTANBURG, a city in South Carolina, county seat of Spartanburg County, in the northwestern part of the State, on the Southern and the Atlantic Coast Line railroads. The surrounding country produces fruits, tobacco, and cereals and has deposits of iron, gold, and limestone. It is a cotton-manufacturing center, and produces clothing, earthenware, and machinery. Among the noteworthy buildings are the county courthouse, the Kennedy Public Library, and the State Institute for the Deaf, Dumb and Blind. It is the seat of Wofford College, a Methodist Episcopal institution founded in 1854. Brick and macadam pavements, waterworks, sewerage, and street railways are among the improvements. Population, 1900, 11,395; in 1910, 17,517.

SPAVIN (späv'in), the name of a disease of the horse, consisting of certain swellings upon the hock joint, which is situated in the hind leg between the knee and the fetlock. It may occur in two forms, known as bog spavin and bone spavin. *Bog spavin* is due to an injury of the true hock joint of the horse, accompanied by swelling and inflammation, and usually is brought on by a sprain or overwork. *Bone spavin* is caused by an injury and is accompanied

by a bony deposit about the joint, causing a local enlargement and stiffness. In bone spavin it is necessary to give the animal rest and in most cases the lameness passes away, though the joint continues to be stiff.

SPAWN (span), the eggs of mollusks, fishes, crustaceans, frogs, and other species of animals. The eggs or ova are extruded in a mass by the females and, after being fertilized by the male, give rise to new life in the same species. This applies only to some forms of oviparous animals, while in others the fertilization by the male is effected before the eggs are extruded. In ovoviviparous animals copulation takes place between the sexes and the eggs are hatched in the body, as in some reptiles and fishes. The eggs deposited in the spawn, as in the fishes, often reach several millions. Spawn is generally deposited near the shore, or an ascent is made of the streams to deposit the spawn in fresh water, as is done by the salmon.

SPEAKER (spēk'ēr), the presiding officer of a deliberative assembly, whose duty is to preserve order and see to it that the rules of debate are enforced. The presiding officer of the British House of Lords is the lord chancellor, whose appointment is derived from the sovereign, but the House of Commons elects its own speaker, subject to the approval of the crown. The latter can only speak or vote in committee, except in the case of an equality of votes, when he gives the deciding vote. He holds office until the dissolution of the Parliament of which he was elected speaker. Since the office is non-political, the speaker may hold during opposing and successive administrations, and is usually rewarded with a peerage on retiring.

In the United States the speakership of the House of Representatives is a political office and the speaker owes his election to the majority party. He has the right to appoint the standing committees and is the acknowledged leader of his party in the house. Since he is the chairman of the Committee on Rules, he exercises a wide influence over the course of legislation, and his power to recognize any one who may desire to speak is absolute. He has the right to vote on any measure, signs all bills and resolutions, and practically decides what shall be considered and how long the debates shall continue. By a majority of the house he may be removed from office.

SPEAKING TRUMPET, a metallic tube with a small end fitted to the mouth and considerably enlarged or widened at the other extremity. It is used for giving greater intensity to the voice, as the sound is forcibly projected through it. The *megaphone*, an inexpensive

kind of speaking trumpet, is used extensively at public gatherings, such as horse races. Instruments of this class were used by the ancient Greeks, and it is reported that Alexander the Great used one in giving orders. The modern speaking trumpet was invented by Sir Samuel Morland (1625-1695) and has been variously modified and improved. The larger sizes are from three to five feet in length and make it possible to understand the human voice several miles. This is due to the fact that the sound is intensified by successive reflections from the walls of the tube, and that the aërial undulations which produce it are thus carried forward in a collected body on the line of the axes of the trumpet.

SPEARMINT (spēr'mīnt). See **Mint**.

SPECIE PAYMENT (spē'shī), **Resumption** of, the term used in American history in reference to the resumption of coin payments after the Civil War. At the beginning of the conflict, in 1861, the banks of New York City were required, owing to the disturbed conditions of business, to suspend payment in coin, and in this course they were followed by most of the banks throughout the country. Congress came to the relief by authorizing the issue of large quantities of United States notes, making them a legal tender for all purposes, except payment of interest on the national debt and duties on imports. This caused the paper money, known as *greenbacks*, to depreciate in value, and had the effect of bringing about uncertainty in financial and commercial affairs. In 1866 Congress passed an act to retire the greenbacks by the payment of specie, at which time the amount in circulation was \$356,000,000, but this did not have the desired effect. The matter of resuming specie payment was taken up in earnest in 1875, when Congress ordered that government contracts, including paper currency, should be payable in specie on and after Jan. 1, 1879. Gold and silver bullion was accumulated in the treasury through the sale of bonds and the mints were run over business hours for some time. The resumption of specie payment caused an increase in the value of currency, hence prices decreased correspondingly, and those in debt suffered losses and hardships in that they were compelled to make payments in money whose value was increasing rapidly.

SPECIES (spē'shēz), the term used to denote a single group of animals or plants, which are subordinate to a genus and are capable of reproducing similar organisms by interbreeding. In the kingdom of organic nature the species are founded on identity of form and structure, both external and internal. The species have

capability of producing beings like themselves, and the offspring likewise possesses the power of reproduction. The term species is applied in mineralogy and chemistry in inorganic substances having identity of composition, physical properties, and crystallization.

SPECIFIC GRAVITY (spē-sīf'īk grāv'ī-tŷ), or **Relative Weight**, the ratio of the weight of a substance to that of the same volume of another substance taken as a standard of comparison. Since temperature and other agencies have an influence upon the weight of a given bulk of matter, it is necessary to know the temperature in all exact measurements of standards. Pure distilled water at a temperature of 62° Fahr. is taken as the standard for measuring the specific gravity of liquids and solids, which is reckoned unity, and air is the standard for designating the specific gravity of gases. A pint of mercury weighs 13.6 times as much as a pint of water; thus, if we compare the weights of equal bulks of mercury and water, we find that the mercury is 13.6 times as heavy as water. Hence, the specific gravity of mercury is 13.6.

According to Archimedes' law, a body in water is buoyed up by a force equal to the weight of the water it displaces. To obtain the specific gravity of any substance heavier than water, a given bulk is weighed in pure distilled water, then in air, and the specific gravity is found by dividing the weight in air by the loss of weight in water. The specific gravity of solids lighter than water, such as a piece of cork, is found by attaching a given bulk to a piece of metal heavy enough to sink the cork in the water. The weight of cork in air being known, it is divided by the weight it loses in water (which is found by ascertaining the loss of weight to both the copper and cork; then finding the weight lost by the copper when immersed; then the difference in this weight and the weight they both lose in water; the result is the weight that the cork loses in water), and the quotient equals the specific gravity.

Specific gravity may vary slightly in different specimens of the same substance, but in the table below is given the specific gravity usually assigned to the common substances named:

Platinum.....	21.53	Sulphur.....	2.00
Gold.....	19.30	Limestone.....	2.75
Granite.....	2.75	Milk.....	1.03
Copper.....	8.90	Ice.....	.92
Zinc.....	7.15	Potassium.....	.96
Iron.....	7.78	Quicklime.....	.80
Silver.....	10.47	Pine Wood.....	.66
Mercury.....	13.60	Cork.....	.24
Cast Iron.....	7.21	Ocean Water.....	1.03
Iridium.....	21.80	Sulphuric Acid.....	1.84
Glass.....	2.90	Alcohol.....	.79
Honey.....	1.45	Ether.....	.71
Diamond.....	3.50	Bone.....	1.75
Chalk.....	2.65	Liquefied Oxygen.....	1.12
Cobalt.....	8.95	Human Body, alive.....	.89

SPECIFIC HEAT, the amount of heat required to raise the temperature of a given quantity of that substance, one or more degrees, as compared with the amount of heat required to raise an equal quantity of some other substance through the same number of degrees. Since water possesses the highest specific heat of any common substance, it is generally taken as the standard of comparison. However, the specific heat of a substance varies with its condition. A given substance has a greater specific heat in the gaseous than in the liquid state, and its specific heat is reduced by converting it from the liquid to the solid state. As compared with water taken as a standard at 32° Fahr., if the specific heat is 1, the specific heats of an equal weight of wrought iron is 0.114; alcohol, 0.659; vinegar, 0.920; mercury, 0.033.

SPECTACLE (spĕk'tà-k'1), an instrument for aiding or shielding the eyes. It consists of a pair of lenses, which are framed, usually with metal, so as to keep them in their proper position. The lenses are made of a fine quality of glass and are ground to accommodate the need of the wearer. As eyesight becomes weakened in old age, it is frequently necessary to change the glasses, which is also the case with those wearing spectacles to shield the eyes from light too strong for them to bear. *Long sight*, or *far-sightedness*, is remedied by wearing convex glasses, which converge the rays of light on the retina of the eyes. *Short sight*, or *near-sightedness*, on the other hand, requires concave lenses, which diverge the rays of light to cause the image to be formed on the retina. *Astigmatic sight* is a defect of the eyes in which the focus of the crystalline lens varies in different azimuths, and can be remedied by spectacles in which the focus differs in different azimuths. In most cases of defective eyes it is advisable to consult an optician, that glasses may be practically adjusted. Spectacles of wire gauze are worn to exclude dust particles. That class of devices is commonly called *goggles*. Most spectacles have numbers engraved on their glasses to indicate their focal length in inches. It is best to have the spectacles close to the eye, and so adjusted that they make the distance of distinct vision about twelve inches.

SPECTROSCOPE (spĕk'trō-skōp), an optical instrument used to separate rays of light into their prismatic colors, so as to determine the substance, which may be done from the position from the spectral lines. This instrument enables us to examine the spectra of solar light, as well as those produced by flames in which different substances are volatilized. See **Spectrum**.

SPECTRUM (spĕk'trŭm), the colored image or images produced when the rays from any source of light are decomposed or dispersed by refraction through a prism. The law of refraction of light was discovered by Willebrord Snell (1591-1626), a Dutch mathematician, in 1621, and by its aid Descartes explained the rainbow. Later Newton investigated the decomposition of light, after an examination of the spectrum of sunlight, which he carried on by means of intercepting with a prism the light coming into a dark room through a hole. The most common form of spectrum used in study is produced by the light of the sun passing through a triangular glass prism and falling on a screen. Ordinarily sunlight produces the sensation of white light on the eye, but when it falls on a glass prism the component colors are unequally refracted or bent out of their course in passing through the glass, and become spread out into a band displaying the seven rainbow colors. The violet is at one end of the series and the red is at the other, the order being violet, indigo, blue, green, yellow, orange, and red. The order may be remembered by the word *vibgyor*, formed by the initial letters, though there are a large number of different shades where the component colors overlap each other. Any luminous body gives off a spectrum, which is characterized by the particular ingredients of which it is composed.

In order to determine the composition of a substance, it is necessary to reduce it to a gas or vapor and heat the gas or vapor until it emits light, when the light may be examined. The unaided eye is unable to detect all the differences in the light given off by the different gases of glowing vapors, unless the various colors of such light are separated from one another in its passage through a prism. An instrument called the *spectroscope*, or *spectrometer*, is used for that purpose. This instrument consists of four essential parts: the part designed to volatilize the substance to be examined and heat its vapor to luminosity; a tube with a plate containing a narrow slot at one end, so as to limit the amount of light thrown on a convex lens at the other; a prism, or a number of prisms, through which the light passes for the formation of the spectrum; and a microscope with which to examine the spectrum so formed. The examination of a spectrum is called *spectrum analysis*. The light of the sun and of many stars has been examined by spectrum analysis, and these heavenly bodies have been shown to contain some of the same elements as those which exist in the crust of the earth. Spectrum analysis has been employed successfully in

physiology and pathology and for the discovery of metals, such as iridium and rubidium.

SPECULUM (spĕk'ŭ-lŭm), an alloy of tin and copper, usually in the proportion of 58 parts of tin to 126 parts of copper. It is employed in preparing the reflecting surfaces in several kinds of telescopes. Glass is now frequently used for the same purpose, being prepared by spreading a covering of silver film over the side turned toward the object. In surgery, a speculum is an instrument for dilating canals and cavities in the human body, as in the ear, thus facilitating an examination of their interior. A reflecting body is an essential part of these instruments, since it serves to facilitate an examination of the parts by throwing upon them a strong light.

SPEECH, the vocal sounds uttered to communicate ideas, produced by a modification of the vibrations generated in the larynx. These modifications take place as the vibrations pass outward through the cavities of the mouth and nose. Speech appears to be controlled by the nerve centers that are seated on the left side of the brain, in the back part of the third frontal convolution. While speech is natural, its exercise depends upon careful training. Articulate speech is stopped by pressure or injury to this part of the brain, but it does not necessarily prevent vocalization, nor does it prevent the expression of thought by signs or by writing. See **Voice**.

SPEEDWELL (spĕd'wĕl), a genus of herbs and shrubs native to the temperate regions of both hemispheres. They include about 200 annual and perennial plants. Many species produce beautiful flowers, generally colored blue, pink, or white. The *common speedwell*, having bitter and astringent leaves, is used to some extent in medicine and as a substitute for tea. *Brooklime*, a common wild plant of Europe and North America, belongs to this genus. It has ovate or oblong leaves and bluish flowers.

SPELLING REFORM, the movement to simplify the spelling of certain words in the English language. A board to promote this movement was organized under the chairmanship of Brander Matthews, in New York City, in 1906, funds for the purpose having been supplied by Andrew Carnegie. The first list of 300 words to be simplified was published in March of the same year. President Roosevelt recommended that the departments of the government use this simplified spelling and later presented the matter to Congress, but that body did not adopt the proposed simplification. However, the National Educational Association approved the 300 words in a meeting held in 1907,

although the board of directors of this organization restored three words that the association had simplified ten years before.

The movement was reorganized on a very satisfactory basis in 1908. At present the Simplified Spelling Board consists of about 43 members and several representatives of English-speaking countries aside from the United States. The board is assisted by 165 scholars and educators who are engaged in university and public school work. The recommendations formulated by means of this movement were approved by 300 periodicals, 2,000 business houses, 3,000 institutions of higher learning, and 18,000 educators. Among the simplifications are to use *e* instead of *ae* in *aesthetic*, *er* instead of *re* in *meter*, and *f* instead of *ugh* in *draught*. The following are examples of words spelled according to the system recommended:

abridgment	curst	paragraf
affixt	cyclopedia	pedagog
altho	decalog	quartet
anesthetic	demagog	silvan
antitoxin	dettor	subpena
blest	ecumenical	thorofare
catalog	envelop	thruout
cifer	esophagus	winkt
claspt	favor	woful
comprest	gelatin	yoman
coquet	mama	

SPELTER. See **Zinc**.

SPENCER (spĕn'sĕr), a town in Worcester County, Massachusetts, ten miles west of Worcester, on the Boston and Maine Railroad. It has the Richard Sugden Library, several fine schools, and Spencer Public Park. The manufactures include boots and shoes, underwear, wire, woolen goods, machinery, carriages, and clothing. It has good municipal facilities, such as waterworks, electric and gas lighting, electric street railways, and pavements. Spencer was settled in 1720, was made a part of Leicester in 1744, and became incorporated in 1753. Population, 1905, 7,121; in 1910, 6,740.

SPENCER GULF, an extensive inlet on the southern shore of Australia, in the State of South Australia. It extends from the Indian Ocean toward the northeast a distance of 200 miles and is from three to 90 miles wide. Cape Spencer and the Yorke Peninsula are east of it, and Cape Catastrophe and the Eyre Peninsula lie immediately west. At its entrance are Thistle and Gambier islands. Port Augusta is at the head of the gulf.

SPERMACETI (spĕr-mă-sĕ'ti), a white fatty substance found in the sperm oil of the head of the sperm whale and several other animals. It is in the fluid state while the animal is alive,

but separates after death and forms concrete deposits differing from the sperm oil, the latter being a neutral liquid at ordinary temperatures. Spermaceti is inodorous and nearly tasteless. It has a white appearance, resembling wax, and is used largely for making candles. In pharmacy it serves as the basis of ointments and cerates. The sperm whale is a large species of the whale family native to the Pacific Ocean, often weighing 175 to 215 tons, and the male attains a length of 60 to 80 feet. A large-sized sperm whale yields 10 to 25 barrels of spermaceti and 60 to 100 barrels of oil.

SPERM WHALE. See **Whale.**

SPEY (spā), a river of Scotland, rising in Inverness-shire, and, after a course of 110 miles, discharging into Moray Firth. It has important fisheries, chiefly salmon. The Spey is the second longest river of Scotland, being exceeded in length only by the Tweed.

SPEZIA (spēt'sē-ä), a seaport city of Italy, on the Gulf of Spezia, fifty miles southeast of Genoa. It is situated on the coastal railroad, has an excellent harbor, and is noted as the most important naval station of Italy. The arsenal is the finest of the kingdom. Extensive manufactures of cannon, gunpowder, sailing vessels, and clothing for the army and navy are maintained by the government at Spezia. The city is provided with modern facilities and has a large trade in cereals, wines, olive oil, and fruits. Population, 1906, 66,482.

SPHENE (sfēn), the name of a mineral belonging to the titanite variety, so called from the wedge shape of the crystals. In color it varies greatly, but yellow, green, and dark brown predominate. It is found in a crystallized form with gneiss, granite, and mica slate.

SPHERE (sfēr), in geometry, a body bounded by a surface, every point of which is equally distant from the center. The figure may be generated by the revolution of a semicircle about its diameter, which is called the *axis of the sphere*. A line drawn from the surface to the center is called the *radius*.

The surface is equal to four times the area of a circle of the same diameter; and its solid contents is equal to that of a pyramid whose base is equal to the surface of a sphere, and whose altitude is the radius. Spheres are to one another as the cubes of their diameters. See **Globe**.

SPHEROID (sfē'roid), a body resembling a

sphere in form, but differing from it in not being perfectly spherical. It may be generated by a revolution of an ellipse about one of its axes. If this be the conjugate axis, the spheroid is termed *oblate*; if the transverse axis, it is said to be *prolate*, or *oblong*.

SPHEROIDAL STATE, the form assumed by a liquid when thrown on a surface of highly heated metal. This may be illustrated by placing a small quantity of water upon a highly heated metal surface, when it rolls about in spheroidal balls or masses. The temperature of the drops is a few degrees below the boiling point, owing to the fact that they are not in actual contact with the heated surface, but float on a cushion of nonconducting vapor. Any liquid in the spheroidal state evaporates rapidly by the heat radiated from the surface.

SPHINX (sfīnks), an ancient Egyptian divinity, who personified wisdom and the fertility of nature. This goddess was transplanted to Greece, where it became possessed with malignant power and partook of the nature of a monster. When Hera became displeased with the Thebans, she sent this monster as a punishment for their offenses. Sphinx had her seat on a rocky eminence near the city of Thebes, which commanded a pass that the Thebans were compelled to traverse in their way of business, and propounded a riddle to all comers. She tore all persons to pieces if they failed to solve it. King Creon became grieved at the number of people that fell prey to the



SPHINX AND PYRAMIDS AT GIZEH.

monster and, on consulting the oracle of Delphi, was informed that Sphinx could be destroyed by solving one of her riddles. Oedipus, being offered the crown and Jocaste in marriage by the king, proceeded to the spot where Sphinx was seated. The riddle propounded was, "What creature goes in the morning on four legs, at noon on two, and in the evening on three?"

Oedipus promptly replied, "Man: since in his infancy he creeps on all fours, in his prime walks on two legs, and when old age has enfeebled his powers, he brings a staff to his assistance, and thus has three legs." The solution being correct, Sphinx flung herself over the precipice and perished in the abyss below. Sphinx was represented in Egypt with the body of a lion and the head of a woman, but the Grecians sculptured sphinxes with the bust and head of a male.

The *Great Sphinx of Egypt* is a representation of the goddess Sphinx. It is hewn from solid rock, with feet built of masonry. The body of the sphinx is 172 feet long and rises about 66 feet above the surface. The head is 30 feet long and the legs of masonry are 50 feet, stretching forward almost parallel to its sides. This structure, being near the pyramids of Gizeh, is thought to have been built about the same time. Other sphinxes occur in different parts of Egypt, some having the heads of rams or hawks, but none approaches the Great Sphinx in size. Originally the Great Sphinx had a beard, and a cap covered its head, but now only traces of these remain, and the countenance is mutilated so that the outlines of the features can scarcely be traced. It is supposed to be the work of Chephren, a king of the fourth dynasty.

SPHYGMOGRAPH (sfig'mō-gráf), an instrument used to measure and record the flow of the blood in an artery. It is placed over the pulse, or some part of the body where the pulse beat is distinct, and by this means a series of delicate levers are set in motion, recording the results of the measurement on a moving surface of paper. This instrument not only records the frequency of the pulse beat, but gives a record of the shape and force of the blood wave. The sphygmograph, when combined with a microphone, constitutes a *sphygmophone*, an instrument for determining by the ear the rhythm of the pulse of a person at a distance.

SPICE ISLANDS. See **Moluccas**.

SPICES, a class of aromatic and pungent vegetable substances, used extensively for flavoring food and as condiments. The production of spices is an important industry in many tropical countries, especially in the warmer regions of Asia and the East Indies, but large interests are vested in the growth and preparation of these commodities in the West Indies and tropical America. Spices were brought from Arabia and other countries of the East to Europe in the Middle Ages, and Arabia is still a noted spice-producing and trading country. The aro-

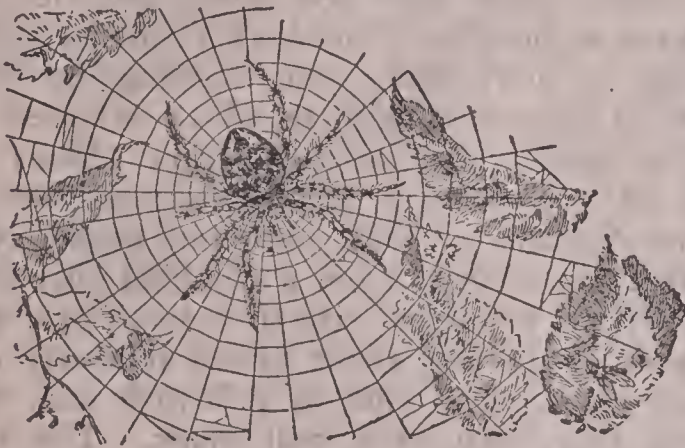
matic and pungent properties of spices are due chiefly to essential oils, but different parts of various plants produce spices of value. Cloves are derived from the bud, cinnamon from the bark, pepper and nutmeg from the fruit, and ginger from the root. The clove tree is native to the Molucca Islands, from the flower bud of which the *cloves* of commerce are obtained. These trees attain a very old age, often yielding products for 75 to 200 years, and their branches grow to a height of forty feet. Cloves produce the essential oil of cloves, while the blossom of the clove tree yields the spice, which is gathered and dried before quite in full bloom.

The cinnamon tree is native to Ceylon, but it has been naturalized in Southern Asia and tropical America. *Cinnamon* is obtained from the inner bark, which is taken from the tree in strips about four feet long and tied into packets or bundles. The bark ferments slightly within a short time, thus causing the inner bark to become separated, which is dried and put in small crates for the market. Many species of pepper have been described, but the common grades of black and white pepper of the market are secured from a climbing shrub, and the berries, about the size of a small pea, grow in pods containing about fifteen to thirty each. Their color, when ripe, is yellowish and, when dried, they turn to a dull black. The *black pepper* usually sold in the market is obtained by crushing or grinding the whole berry, but the outer covering is removed to obtain the *white pepper*. *Cayenne pepper* is native to South America, but is grown at present in different sections of the Temperate zones as a condiment and for medical use. The nutmeg tree is cultivated in various parts of Asia, Africa, and tropical America, and yields both the *nutmeg* and *mace*. The fibers surrounding the nut are the mace, which has a reddish color when fresh, and afterward assumes a light brown tinge under exposure to the sun. The kernel or seed within the mace is the nutmeg, which, when shelled, is dried and is then ready for the market. Nutmegs are valued highly in cooking for their aromatic flavor and odor, and both the nutmeg and the mace yield a highly useful oil by compression.

Ginger is prepared from the rootstalk of a tropical plant native to the West and East Indies. It is used in cookery and medicine. White ginger, produced largely in Jamaica, is prepared by scraping off the outer covering of the roots. It is regarded superior to the black or East India ginger, in which the covering is not removed. *Mustard* is the seed of the mustard plant. It is crushed and adapted for use as a

condiment and for medical purposes. Several species are cultivated, as the white and black mustard native to Asia and Africa. The wild mustard is a very prolific plant in many sections of Canada and the United States, and the seed is sometimes employed as a condiment by mixing with the seed of cultivated species and not infrequently for medical use, especially as a poultice. *Vanilla* is the product of a climbing orchid, the fruit being known as the vanilla bean. It supplies the vanilla of commerce and yields a delicate aromatic odor used in flavoring syrups, ice cream, and confectionery. The plant is native to Florida and to many sections of Asia and the Pacific islands.

SPIDER (spī'dēr), an extensive division of animals, which includes the scorpions and mites. Although they are often classed with the in-



SPIDER AND WEB.

sects, they constitute the class of animals known as *Arachnida*. The spiders differ from most insects in that the body consists of only two segments instead of three, the head and chest being united to form one segment. Spiders have no wings and are supplied with eight legs, instead of six, as in insects, and they likewise differ from the latter in having no antennae or feelers. They breathe by means of well-developed pulmonary or lung sacs, and do not pass through several changes in life, like some insects, but their shape at birth is the same as in the adults. The organs of sight are not highly developed, although they have six or eight eyes, but they possess a keen sense of touch.

In the abdomen of spiders are four to six conical processes, seated in a fleshy formation, and these are perforated by a large number of small tubes or orifices. From these tubes are drawn very fine but wonderfully strong threads, and with them many species weave artistically complicated webs. The webs serve a number of useful purposes, but are intended chiefly to entangle the heedless insects on which they prey. Some species construct webs as a place

of abode and as a means to pass easily from place to place. They seldom leave a locality without spinning a thread. This thread they utilize as a means of descending from any height as well as to again elevate themselves, which they do by taking up the thread, but it is not used a second time. Spiders have been observed to hang suspended by a long thread with the view of being driven by the wind against some object at a short distance, in this way securing passage across a considerable space, even across a narrow stream.

Caterpillars spin their threads from the head, but spiders do so from the back part of the body. They descend with their head foremost and ascend forward, using their comblike claws to guide and manage the thread. The webs are variously constructed in different species, and they differ in strength and workmanship quite as much as do the nests of birds. The threads are gummy when first issuing from the tubes, thus facilitating their attachment to different objects and to each other, and when the web is finished the spider lies in wait for the heedless insects that may happen to rush into the snare. As soon as the insect is entangled, the spider rushes upon it, inflicts a severe wound, and fetters the prisoner with a winding silken thread. The wound is inflicted with the hooked mandibles, from which a poisonous fluid passes into the opening, whose effect is to almost instantly kill the prey. Flies are the favorite food of the spiders, but they feed with greed on various other insects. The poison is secreted by a gland near the upper joint of the mandible, and some species, as the tarantula in the southwestern part of the United States, inflict wounds that are dangerous even to man.

The spiders include many interesting species. They are found in all countries, but attain their greatest number and largest size in the tropical regions. Most species spin a silken cocoon in which to deposit their eggs. They are remarkable for being attentive to their young. The number of eggs varies greatly, ranging frequently from 50 to 2,000, but many of the young hatched from them die before reaching maturity. Female spiders spin five to seven webs in a season, but the males are seldom seen at this kind of work. They are inclined to hide during the day much more closely than the females, and at night come out to pass from web to web. Among the different classes are the *sedentary* or *common house spiders*. They are widely distributed, and are subdivided according to the manner of constructing their webs. The *hunting spiders* weave silken tubes for an abode, and rush out

to seize their prey, on which they leap with great greed. A class known as *water spiders* makes their homes among the stems and leaves of aquatic plants, constructing their webs under water, and their eggs are attached to leaves or stems of plants below the surface, but surrounding them is a water-tight structure containing atmospheric air brought down by the adult spider. The most curious nests are built by the trapdoor spiders. They are constructed in a burrow under the ground, and admission to it is by a lid or door attached by a kind of silken hinge. Some species native to South America are about the size of a man's thumb, and are able to seize



SPIDER'S FOOT,
MAGNIFIED.

and kill little birds. Spiders are preyed on by toads, wasps, and different species of birds. See *Gossamer*.

SPIKENARD (spīk'nārd), or **Nard**, an aromatic plant. The roots are three to twelve inches long and send up little spikes bearing purple flowers. The ancients gathered the roots for preparing valuable perfumes to be used at feasts and in baths, and they still have a wide use for that purpose and in medicine. Christ was anointed with the ointment of spikenard while in the house of Simon in Bethany. The plant is native to India and China, and is found in the Himalayas to elevations reaching 15,000 feet. The name is applied to an American plant of the ginseng family, somewhat resembling the wild sarsaparilla.

SPINACH (spīn'āj), or **Spinage**, a genus of herbaceous plants of the goosefoot family, extensively cultivated in gardens to be used as greens. This product is eaten as a salad, or is boiled in various ways, usually with butter. The leaves grow on long footstalks and are best when quite young. Spinach is most juicy and best flavored when the growth is luxuriant. It becomes bitter at the appearance of a long stem, which bears spike-formed flowers. Several species are cultivated, among them the prickly, smooth, and Australian spinach.

SPINAL COLUMN (spī'nal kōl'ūm), or **Spine**, the backbone of vertebrate animals, which is made up of a series of bones called the *vertebrae*. Each vertebra consists of a solid part, of an open ring, and of three major projections or processes. The human spine has 24 movable vertebrae, seven of which are known as *cervical*; twelve, as *dorsal*; and five, as *lumbar*. At the

base of the spine are five false vertebrae, which unite in the adult to form the sacrum, and below them are four small bones that unite in the adult to form the coccyx. The vertebrae comprise a succession of rings of bone, within which is a cavity called the *spinal canal*, which extends from the base of the skull to the lower end of the vertebral column. Within the spinal canal is the spinal cord, with its membranes and vessels.

SPINAL CORD, the cordlike structure situated in the spinal column of vertebrate mammals, constituting a part of the central nervous system. The spinal cord in man has an expansion just as it starts from the brain, called the *medulla oblongata*. It is from fifteen to twenty inches in length. The function is to transmit outgoing and incoming nerve impulses, and it is the seat of the centers of reflex action. It is securely lodged within the long cavity of the vertebrae and is protected by a double membrane called the *arachnoid*, within which is the cerebro-spinal fluid. A fine tissue, known as the *pia mater*, is within the arachnoid, and surrounding the whole is a tough membrane called the *dura mater*.

The spinal cord differs from the brain in that the white matter is on the outside and the gray matter is within. From the spinal cord spring 31 pairs of spinal nerves. Of this number one pair issues from the *coccyx* and five pairs proceed from the *sacral region*. Five pairs are known as *lumbar* and twelve pairs as *dorsal nerves*. Eight pairs in the region of the neck are called the *cranial*, or *cervical nerves*. Each nerve arises by two roots; the anterior is the motory and the posterior is a sensory one. When the anterior root is cut, the power of motion is lost and; when the posterior is cut, that of feeling is destroyed. Spinal congestion, meningitis, paralysis, and hemorrhage are among the diseases of the spinal cord.

SPINDLE (spīn'd'l), the slender rod or pin in a spinning wheel, by which the thread is twisted, after the fiber has been drawn from the distaff. It is usually long and slender, and in most cases is made of metal, though formerly it was exclusively of wood. The name spindle is also applied to the pin on which the bobbin is held in the shuttle of a loom, or in a spinning wheel.

SPINDLE TREE, or **Staff Tree**, the name of a genus of shrubs and small trees, of which about 300 species have been described. The *common spindle tree* is native to Europe, where it is planted for ornamentation in parks and on lawns. The wood is white, has a fine grain; and was formerly used in making spindles and

musical instruments. Crayons are made from the charcoal of this tree. A species known as *burning bush*, so called from its bright red fruit, is native to North America. It is a low shrub, and grows chiefly in moist woods. A woody climber, known as the *climbing bitter-sweet*, is one of the species.

SPINNING, the art of combining animal or vegetable fibers so as to form continuous yarn or thread. The methods of spinning differ somewhat, according to the fibers used, which may consist of cotton, flax, jute, silk, or wool. Spinning is an industry that has come down to us from ancient times, and the methods formerly practiced in Egypt are still in vogue in many countries, but they have been replaced largely by modern machinery. The ancients employed the spindle and the distaff, and all the spinning they did was by hand. A quantity of the prepared material was loosely wound upon the distaff, held in the left hand, and the thread was attached to the spindle, which consisted of a tapering piece of wood. The spinster produced a rotary motion of the spindle by a twirl of the hand, and at the same time drew out between the thumb and forefinger of the right hand a supply of the fibers until the motion of the spindle was exhausted. The spindle was drawn in as soon as the movement stopped, when the thread was wound or attached in the same manner, and the process was repeated.

A spinning wheel was invented at Nuremberg, Germany, in 1530, but it was used only for flax spinning. Later it was improved to spin other materials, and may be said to have suggested the spinning jenny invented by James Hargreaves in 1764. The advantage of the spinning jenny was that it employed a number of spindles, while the spinning wheel had only one. However, modern machinery has replaced it, and now many machines of different construction are in extensive use. The spinning machines employed at present are constructed so as to turn out a particular yarn, which permits of greater simplicity than where regulating devices are employed for adjusting so as to finish products of different grades.

SPINNING JENNY, the name of the earliest machine for spinning more than one thread at a time. It was invented by James Hargreaves, in 1764, and soon displaced the spinning frame constructed by Arkwright about the same time. The spinning jenny had a wheel or cylinder to be turned with the right hand, while the left was used to draw out the rovings of the material to be spun, which were twisted as the wheel turned. A piece of wood worked by the toe caused a wire to be let down, and by this

means the threads were pressed out and wound upon bobbins. At first the jenny had eight spindles, but later the number was increased from time to time, until as many as 120 were worked on one machine. Samuel Crompton, in 1779, invented the machine that combined the principles of both the frame and the jenny. His invention, known as the *mule jenny*, superseded all others, and was the first to employ the general principles now employed in all classes of spinning.

SPINNING WHEEL, a machine for spinning fibers into thread. It is an improvement on the ancient spindle and distaff in that the work is done through the agency of a wheel and treadle. This invention, though simple and inexpensive, cannot be traced back farther than 1850. It consists of a frame, in which the spindle is made to revolve by mechanical action, either by the hand or the foot, though the latter is used most extensively. In this machine the spinster guides the wool or other fiber with the hand, and the spindle revolves rapidly through the impulse imparted by a band from the treadle to the wheel. By carefully drawing the thread by means of the hands, it is possible to regulate the degree of fineness as well as its uniformity.

SPIRITUALISM (spīr'it-ū-āl-iz'm), the term used by philosophical writers to denote the opposite of materialism. When employed in this sense, the term embraces the doctrine that there are spiritual substances, or beings, as distinguished from material, and which are not cognizable by the senses and not revealable through any of the properties of matter. In a specific sense the term is applied to the belief that the spirits of the dead in various ways communicate and manifest their presence to man chiefly through persons called *mediums*.

The belief that departed spirits have power to communicate with the living has been held for many centuries. However, modern spiritualism dates from 1848, when John D. Fox and his wife claimed to have been disturbed by strange sounds and rappings at the door and different parts of the house. They resided in Hydeville, N. Y., and long attributed the disturbances to natural causes, but at length assumed that the rappings were brought about by reason of spirits of departed persons desiring to communicate with them. Fox and his daughters afterward became mediums and gave seances in many cities of the United States. Spirit circles were organized soon after, and many adherents rapidly joined in the view that it is entirely natural for departed spirits to communicate with the living when the proper con-

ditions are complied with by those in life. A company of mediums visited Europe in 1852, where they attracted considerable attention, and in 1855 D. D. Home made an impressive tour of the European continent. He impressed Napoleon III. very strongly by various manifestations, and made converts among leading scientists and jurists. The manifestations from the spirit world take place at seances, and are in the form of handwritings, rappings, and impressions upon the mind of the medium. In many cases actual frauds have been perpetrated, but manifestations have taken place that have led a large number of people to believe in the existence and activity of the soul apart from the body.

In 1893 the National Spiritualists' Association was formed in America. The number of spiritualists in the United States and Canada is estimated at 1,700,000. They support ninety auditoriums, have property valued at \$1,750,000, and include 10,650 professional mediums. The eighth annual convention was held in 1900. A large number of magazines and other periodicals are devoted to the spread of the doctrine of spiritualism. Much literature has been published on the subject. Spiritualism has developed with equal rapidity in Great Britain, France, and other European countries. Besides those actively affiliating with the spiritualists, there are many who belong to other organizations, but support some of their tenets. A good instance of this class may be cited in the case of Swedenborg, who alleged open daily communication with the spirit world, and claimed that he had frequent intercourse with spirits and angels.

SPIROMETER (spī-rōm'ē-tēr), an instrument for measuring the capacity of the lungs, especially the volume of air which may be expelled after the deepest possible inspiration. Several devices of this kind are in use. The most common form consists of a vessel with a float set in the top, which it fits closely, and the air is blown through a tube below, causing the float to rise. An index or graduated scale indicates the rise in inches, hence it is possible to determine the number of cubic inches of air exhaled.

SPITHEAD (spīt'hēd), an anchorage or roadstead off Portsmouth, England, situated in the channel which separates the Isle of Wight from the mainland. It is so named from the Spit, a sand bank, which extends a distance of three miles along the south shore of England. The roadstead is about four miles wide and fourteen miles long, and is a favorite anchorage for the navy of Great Britain. It is strongly

fortified, and is known as the *King's bed-chamber*, owing to its security.

SPITZ, the name of a small breed of dogs, employed chiefly as a pet. It is about the size of the spaniel, has a pointed face, and is usually white or whitish in color. This class of dogs is sometimes called *Pomeranian*, owing to its being grown extensively in Pomerania, Germany. It is not serviceable for any kind of work, but some strains are quite beautiful.

SPITZBERGEN (spīts-bērg'ēn), an island group in the Arctic Ocean. It consists of three large and several small islands. The area is about 30,000 square miles. Spitzbergen, Barents, and Northeast Land are the chief islands. The group is situated 350 miles east of Greenland and about the same distance north of Norway. The climate is extremely cold, and in the two summer months the thermometer rarely rises more than 35° above zero, though in this short season fully 100 species of plants spring up and ripen their seeds. About 50 of these plants have been described, of which the most vigorous are not over four inches in height. The coast lines are generally icebound on the eastern side, while the western coast is more or less affected by the Gulf Stream. Little is known of the interior, but it is certain that the snow line is only a short distance above the sea level on the interior mountains, which rise to heights of about 4,000 feet. The sun is below the horizon for four months in the winter, from Oct. 22 to Feb. 22, and the longest days are four months. Among the animals native to these islands are several species of bears, foxes, and reindeer. Numerous sea fowls are abundant in the fall season. No permanent settlements exist, but many explorers for northern specimens and hunters from Norway and Russia frequent the islands, the latter finding considerable profit in pursuing the walrus. The islands were first discovered by Hugh Willoughby, a British navigator, in 1553. They were explored to some extent by the Dutch in 1696. Russia claims the islands as a dependency.

SPLEEN (splēn), or **Milt**, an organ found only in vertebrate animals. It is situated between the cardiac end of the stomach and the diaphragm. In man the spleen varies more in size and weight than any other organ, though its usual length is about five inches, and its weight three to six ounces. It is a vascular or ductless gland, and the surface is covered with the peritoneum. The color is dusky red. It increases in size after a meal, and in about five hours returns to its normal form. Its functions are believed to be connected with digestion, but its exact purpose is not known. The spleen has

been removed from man without causing harmful results.

SPLÜGEN (splü'gen), a pass in the Alps of Europe, leading from the canton of Grisons, in Switzerland, to Lombardy, in Italy. The highest point in the pass has an elevation of 6,946 feet above the sea. In 1834 the government of Austria built three galleries to protect the road from avalanches.

SPOKANE (spō-kän'), a city of Washington, county seat of Spokane County, 450 miles east of Seattle. It is situated on the Spokane River and the Great Northern, the Northern Pacific, the Oregon Railroad and Navigation Company's line, and other railways. About 25 square miles are included in the tract lying within the city limits, of which the surface is greatly diversified. In the northern part, lying along and north of the river, the surface is gently rolling, but toward the south it includes a hilly and bluffy tract. The river flows in a deep gorge, and has a descent of 142 feet by a series of falls, affording immense water power for manufacturing purposes. Many substantial bridges span the river within the city limits, including those designed for railway, wagon, and street railway traffic.

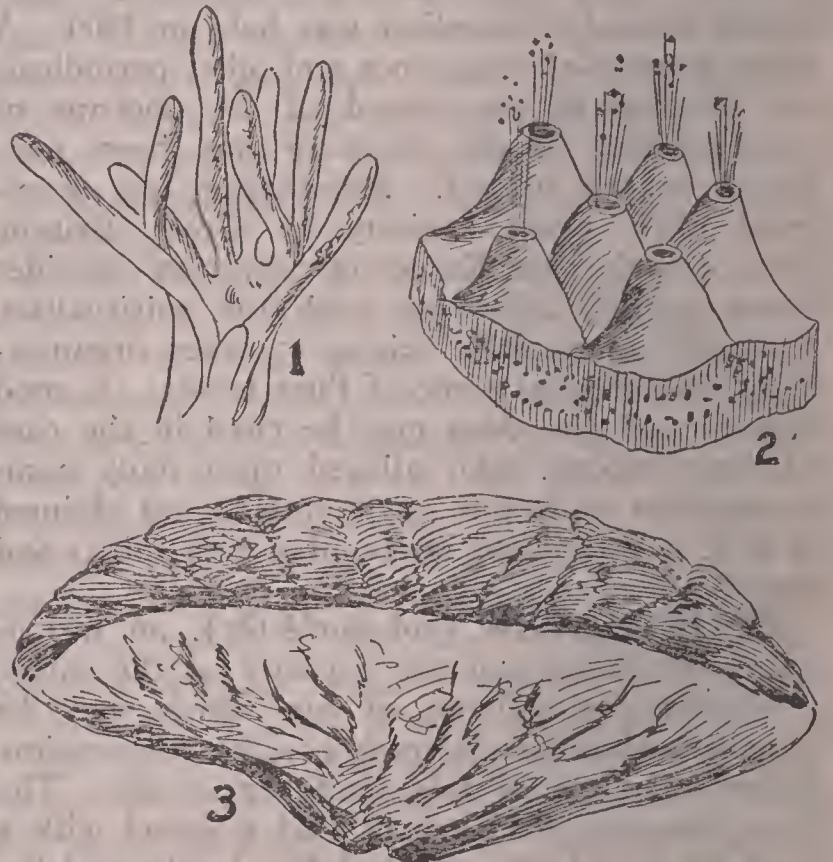
The finest residential section is in the southern part, occupying the summits of a beautiful range of hills, which overlook the city and an extensive region of the surrounding country. As a whole the architecture is modern and substantial, and the streets are finely paved with stone, vitrified brick, and asphalt. Among the larger buildings are the county courthouse, the city hall, the post office, the auditorium, the *Review* building, the Masonic Temple, the Carnegie public library, and the Spokane and Athletic Club buildings. The ecclesiastical edifices include an Episcopal cathedral and a Roman Catholic cathedral, and several fine structures maintained by the Methodist, Presbyterian, Baptist, and other denominations. It is the seat of Gonzaga College, the Saint Stephen's School for Boys, the Academy of the Holy Name, the Brunot Hall, and many hospitals and charitable institutions. The city has fine ward and high school buildings, all of which carry approved and well-articulated courses.

Spokane is surrounded by a fertile farming and pine-lumbering country. It is important as a wholesaling and a jobbing center and has a large trade in merchandise, live stock, fruits, and manufactures. Lumber products, machinery, flour, furniture, marble and granite products, pottery, brick and terra cotta, clothing and malt liquors are among the leading manufactures. It has extensive systems of waterworks,

sewerage, and gas and electric lighting. Intercommunication is provided by a system of electric railways, which has branches to Lake Coeur d'Alene, about thirty miles east, and other adjacent points.

The region was not settled until 1873, when the village was called Spokane Falls. In 1881 the Northern Pacific Railway was completed to the city, which, together with the extensive facilities for water power, caused it to grow rapidly. A fire destroyed a large portion of the buildings in 1889, but it was rebuilt rapidly and soon surpassed its former development in wealth and population. In the five years from 1900 until 1905 it more than doubled in the number of inhabitants. Population, 1905, 73,852; in 1910, 104,402.

SPONGE (spünj), an animal of the group *Porifera*, having pores in the body wall and being without tentacles. Many species of sponges have been described by naturalists, dif-



SPONGES.

1, Branching Sponge; 2, Living Bath Sponge; 3, Bath Sponge.

fering widely in form and structure. Their close resemblance to vegetable forms caused them long to be regarded members of the vegetable kingdom, but their animal nature is evident from internal structure, and from the delicate skin surrounding the body. They are mostly marine. The largest forms are common to the tropical seas, and they gradually decrease in size toward the colder zones. They grow both in deep and shallow water and are fixed in mud or to rocks at the bottom. The body is composed of an internal skeleton, or

framework, and a gelatinous substance called *flesh*. In the skeleton are many pores which open into much-branched canals passing into ciliated chambers, and during life the jelly flesh envelops all internal parts. This fleshy substance resembles a peculiarly formed protoplasm, which, when taken out of the water, has a liver color and becomes sticky. These animals feed upon the minute organisms found in the water, which constantly circulates through the pores, circulation being maintained by cell action. New individuals are produced by internal and external budding and by spermatozoa. Among the species best known are the *sheeps-wool*, the *yellow*, the *velvet*, the *glove*, the *bath*, and the *grass sponges*.

The skeletons of sponges are the sponges of the market. They are secured by diving. The diver is provided with diving apparatus and loosens the growing sponges by means of an instrument. However, in water less than fifty feet deep the sponges may be secured from a boat at the surface. One man manages the boat, while another, called the *hooker*, watches the bottom through a glass-bottomed basket, which is held in one hand, while with the other hand he manipulates a long pole to which is attached a three-pronged hook. When a sponge is found, it is detached from the bottom with the hook and is drawn to the surface. The fresh sponges are killed by more or less prolonged exposure to the air and the fleshy matter is separated from the skeleton by burial in the sand for several days, after which a process of soaking and washing follows. The skeleton becomes a useful commodity for the market and is sold extensively for various purposes.

Among the uses of sponges are those connected with the toilet and bath, washing paint work, stuffing mattresses, and filtering. Valuable sponge fisheries occur in the West Indies, off the coast of Florida, and in the Mediterranean. Those off Florida yield products valued at about \$600,000 annually, representing about 400,000 pounds of dry sponges. The finest sponges come from Smyrna. Those used for washing carriages and horses are obtained chiefly in the Bahamas. The sheepwool is the best grade of sponges and excels in value all others combined. It is sold at wholesale at about \$2.75 per pound, while the grass sponge, a coarse and cheap grade, is sold by fishermen at about 35 cents per pound. Sponge culture has been successfully introduced in several tropical regions. Fossil sponges occur in various strata of limestone, being evidence that this group of animals lived before the oldest Silurian epoch.

SPONTANEOUS COMBUSTION (spōn-tā'nē-ūs kōm-būs'chūn), a term applied to the ignition of mineral and other substances without the application of fire. This phenomenon is frequently the explanation of the origin of fires in machine shops and buildings. Phosphorus in a dry state is liable to ignite spontaneously in a temperature as low as 70°, this being an explanation why ignition often occurs where a large number of lucifer matches are kept in a bulk. Charcoal in a dry state does not undergo spontaneous combustion, but when oils are added it becomes heated and takes fire, while coals associated with pyrites ignite easily in a wet condition. Many instances are on record in which fire generated from placing large quantities of hay in a moist condition into a mow, ignition in such cases resulting from fermentation accompanied by considerable heat. In like manner fire may be caused by the fermentation of rags, tow, cotton, straw, flax, and other vegetable matter. The self-ignition of cotton waste used in cleaning machinery has been of quite frequent occurrence, especially where the cotton product was mixed largely with oily substances. Several writers cite cases of spontaneous combustion in the human body, which they allege occurred as a result of indulging excessively in the use of alcohol. The body being saturated with alcohol, combustion is thought to have taken place spontaneously, but Liebig and other writers assert that such combustion is impossible, and assign the phenomenon as due to bringing a candle or other flame in close contact with the body. It has been observed that combustion in the human body, where it takes place at all, is limited to aged persons and to the very lean or very fat who indulge excessively in the use of alcoholic beverages.

SPONTANEOUS GENERATION, or **Abiogenesis**, the term applied to the theory that living forms may originate without the intervention of living matter. The question whether under certain conditions living matter is produced by nonliving matter was debated from ancient times until the 17th century, when scientists undertook to disprove it through the use of the microscope, demonstrating the existence of bacteria and other minute organisms that could not be detected with the naked eye. However, interest was stimulated through the theory of infectious diseases and the correlation of forces, and naturalists have been led to bestow more attention upon it than at any previous period.

SPOONBILL, a genus of wading birds of the heron family, having a resemblance to the

stork and the ibis. They are so called from the large size of the bill, which is flattened and widened at the tip. These birds are widely distributed, usually frequenting the mouths of rivers and the seashore, but the species are not numerous. The *roseate spoonbill* is native to the United States and is found in many sections of the warmer and tropical parts of America, especially in Florida and the Carolinas. The color is almost pure white on the neck, with a rosy tinge on the body, which is about thirty inches long, and the bill attains a length of eight inches. It has an alar extent of fifty inches. This class is usually seen in flocks feeding in wet and marshy places,



WHITE SPOONBILL.

where these birds catch worms, insects, fish, and small crustaceans. The *white spoonbill* is native to Europe, moving northward in the spring and to the regions of the Mediterranean on the approach of fall. The color of the body is almost a pure white, but there is a tinge of yellow on the breast, while the bill and legs are black. A kind of sturgeon quite common in the Mississippi and several of its tributaries is known by the name *spoonbill*. The same name is sometimes given to the *shoveler duck*.

SPOTTSYLVANIA COURTHOUSE

(spōt-sīl-vā'nī-à), a village in Virginia, about 55 miles west of north of Richmond. It was the scene of a noted battle of the Civil War. This engagement is classed as one of the battles of the Wilderness, which extended from May 5 to June 1, 1864. The Battle of Spottsylvania Courthouse commenced on May 10, 1864, when the Union army under General Grant made an attack on the Confederates under General Lee, who were intrenched behind their earthworks. The Union army was repulsed with

great loss. It was on this occasion that Grant sent his famous message, "I propose to fight it out on this line if it takes all summer," to the Secretary of War. He repeated the assault on the 12th and compelled Lee to withdraw to his inner line of intrenchments, while Grant moved around his left on his way to Richmond, which afterward resulted in the Battle of Cold Harbor.

SPRAIN, or **Strain**, a violent stretching or wrenching of tendons or ligaments of a joint, with or without the rupture of their fibers or the displacement of the bones. Sometimes sprains are as serious and lasting as dislocations, especially if care is not exercised in the use of the part before the swelling and inflammation have fully subsided. Sprains of the back are the most serious, while those of the knee or ankle are quite common and painful. Splints should be worn where the tissues are badly fractured, and cold or hot lotions on the parts are recommended.

SPRAT, or **Garvie**, the name of a small fish of the herring family, found in large numbers in the Atlantic waters of Europe. It is about six inches long and is frequently canned and sold as a sardine. Sprats are taken in large numbers and are eaten fresh, or may be spiced, dried, or canned. The true sprat is not found in America, but several small fishes

common to the southern part of the United States are known by that name.

SPREE (sprā), a river in Germany, which rises in the eastern part of Saxony, near the boundary of Bohemia, and, after a course of 215 miles toward the northwest, enters the Elbe through the Havel River at Spandau. The valley contains rich pasture and agricultural lands and is well wooded. The Spree is navigable for 100 miles. It is connected with the Oder by the Frederick Wilhelm Canal. Among the important cities on its banks are Berlin, Bautzen, Lüben, Spermberg, and Beeskow.

SPRING, a flow of water from the interior of the earth, caused principally by the water resulting from rain or snow. When rain falls on a porous soil it is rapidly absorbed, and a spring results by the water running along an inclined layer of clay or hard rock until it emerges at some lower level. Springs are caused in some localities by water being forced upward from the reservoirs into which it has collected, principally by the pressure of com-

pressed gas, highly heated steam, or a communicating column of water. In hilly and mountainous regions springs result largely by the water soaking into the porous upper soil and continuing downward until it is intercepted by an impervious stratum, along which it runs until the layer crops out on the hill or mountain slopes. Springs in the region of plains are formed principally by the action of gases or the pressure of other bodies of water.

Springs are commonly divided into variable and intermittent. *Variable springs* are influenced by the amount of rainfall, varying at different seasons, but they do not cease flowing at any period of the year, while *intermittent*



INTERMITTENT SPRING.

springs flow only a short time after wet weather, drying on the appearance of the dry season. *Artesian*, or *flowing*, wells result when a hole is bored into the earth's crust to form an opening for the escape of water from a reservoir situated on a higher elevation. *Hot*, or *thermal*, *springs* are due to water flowing over a portion of the earth's crust that is highly heated, and *geysers* result from volcanic action or the pressure of interior gases. *Mineral springs* occur where the water soaks through or flows over mineral deposits, such as lime, silicon, sulphates, salt, carbonate of iron, and carbonic acid gas.

SPRING, the season of the year that follows winter and precedes summer, so called because it is the time when plants begin to grow in the temperate and colder zones. It begins with the vernal equinox, on March 21, and ends with the summer solstice, on June 21. In North America the spring months are March, April, and May, while in the Southern Hemisphere, they are September, October, and November. The months of February, March, and April are the springtime of Great Britain.

SPRINGBOK (spring'bök), a species of antelope, which resembles the gazelles in size and habits. It is native to the open plains of South Africa. This animal is so named from its habit of springing upward when alarmed, or at play, and its flesh is highly prized as a food. It possesses much beauty, having a pure white beneath and markings of white on the head and down the back, while the body is brown. It is larger than the roebuck, and its horns are curved in the form of a lyre. The limbs are long and delicate, and it is able to run with great swiftness. Large numbers congregate in herds as they feed on the plains and hillsides. The springbok may be taken young and tamed, but its largest size and greatest beauty are developed in the native state. The skin is much esteemed for shoes.

SPRINGFIELD (spring'fēld), the capital of Illinois, county seat of Sangamon County, 185 miles southwest of Chicago. It is situated on the Illinois Central, the Baltimore and Ohio Southwestern, the Wabash, the Chicago and Alton, and other railroads and is surrounded by a productive farming and coal-mining country. The streets are wide and well paved with brick, asphalt, and macadam. It has intercommunication by an extensive system of electric street railways. Within the heart of the city is the State capitol, which is a fine structure of stone 399 feet long and is crowned by a dome 364 feet high. About a mile from the heart of the city is the monument and mausoleum of Lincoln, in Oak Ridge Cemetery, which contains the remains of the President, his wife, and two children. The old capitol, now the county courthouse, and the residence of Lincoln, are historical buildings. It is the seat of the Lutheran Concordia College, the Bettie Stuart Female Institute, the Saint Agatha's School, and the Academy of Our Lady of the Sacred Heart. Other noteworthy buildings include the post office, the city hall, the public library, the high school, the executive mansion, the Odd Fellows' Building, and a number of fine hotels and hospitals. The city library has 45,500 volumes and there are about 52,500 volumes in the State library.

Springfield is the seat of an extensive trade in farm produce, merchandise, and coal. It has important car shops, woolen mills, and boiler and engine works. The general manufactures include brick and tile, soap, flour, clothing, and machinery. The large works of the Illinois Watch Company are located here. It is the seat of the State fair and the Illinois State Museum of Natural History. The streets are well lighted with gas and electricity and

adequate systems of waterworks and sewerage are maintained. In 1819 the first settlement was made in its vicinity, but it was not incorporated as a town until 1832. The State capital was located here in 1837 and it was chartered as a city in 1840. Population, 1910, 51,678.

SPRINGFIELD, a city of Massachusetts, county seat of Hampden County, 95 miles southwest of Boston, on the Connecticut River and the Boston and Maine, the Boston and Albany, and other railroads. The river is spanned by several bridges. Intercommunication is by an extensive system of electric railways, from which branches extend to many points in the State. In the public park system are 500 acres, but Forest Park, the most important public grounds, includes 464 acres. It is the seat of a United States arsenal, founded in 1795, which is the largest in the country. Many fine memorials decorate the squares and public grounds. These include Saint Gaudens' "The Puritan," the Soldiers' and Sailors' Monument, in Court Square, and the statues of Miles Morgan and President McKinley.

The architecture is largely of brick and stone. Among the principal buildings are the county courthouse, the Christ Episcopal church, the Saint Michael's cathedral, and the Congregational and Unity churches. Other structures include the city hall, the post office, the high school, the International American College, the Union railway station, and the Mercy, Hampden, Wesson, and Springfield hospitals. The public library contains 118,500 volumes, and several fine collections of books are maintained by the private institutions and the public schools.

Springfield has a growing foreign trade and is important as a wholesaling and jobbing center. Large investments are represented by its industries, including about 800 establishments. It has extensive machine shops, paper and flouring mills, tobacco and cigar factories, railway shops, and manufactures of automobiles, rubber goods, cotton and woolen textiles, and machinery. Systems of gas and electric lighting, waterworks, and sanitary sewerage are maintained. The streets are well paved with stone and macadam. About 2,500 men are employed in the manufacture of rifles and small arms by the government. The first settlements in the vicinity of Springfield were made in 1635, when the village was called Agawam. It was burned in 1675 as a result of King Philip's War. Riots occurred during Shay's Rebellion, in 1786. The city was chartered in 1852. Population, 1905, 73,484; in 1910, 88,926.

SPRINGFIELD, a city in Missouri, county

seat of Greene County, situated among the Ozark Mountains, 220 miles southwest of Saint Louis. It is on the Kansas City, Clinton and Springfield and the Saint Louis and San Francisco railroads and is surrounded by a region yielding large quantities of lead, zinc, and other minerals. Live stock, cereals, fruits, and grasses are grown in the vicinity. Among the noteworthy buildings are the Drury College, the Loretto Academy, the Saint John's Hospital, the high school, the county courthouse, and a United States government building valued at \$150,000. The city is improved by rapid transit, pavements, waterworks, a sewerage system, and several fine parks. Among the manufactures are machinery, flour, cotton and woolen goods, chemicals, lumber products, engines, and farming implements. It has a growing trade in farm produce and merchandise. Springfield was incorporated in 1838. Population, 1910, 35,201.

SPRINGFIELD, a city in Ohio, county seat of Clark County, on the Mad River, 80 miles northeast of Cincinnati and 45 miles west of Columbus. It is on the Erie, the Ohio-Southwestern, the Pittsburg, Cincinnati, Chicago and Saint Louis, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. The utilities include gas and electric lighting, public waterworks, sanitary sewerage, and electric street railroads. Among the manufactures are furnaces, boilers, engines, hardware, windmills, farming implements, flour, carriages, linseed oil, sewing machines, iron fencing, and earthenware. The important buildings include the city hall, the Federal government building, the public library, the county courthouse, and numerous fine public schools and churches. It is the seat of Wittenberg Lutheran College, a coeducational institution founded in 1845. Other features include the Y. M. C. A. building, the Snyder Park, the Soldiers' Monument, and the Fern Cliff Cemetery. Springfield is important as a market for merchandise, fruits, and cereals. It was platted in 1801 and incorporated as a city in 1850. Population, 1900, 38,253; 1910, 46,921.

SPRINGHILL, a city of Nova Scotia, in Cumberland County, on the Cumberland Railway and Coal Company's line and the Intercolonial Railway. It is situated on the Maccan River, nine miles south of Amherst, and is surrounded by a productive coal-mining country. The manufactures include leather, packed meat, woolen goods, and machinery. It has a number of fine schools and churches, electric lighting, and a growing trade. Within recent years it has grown rapidly, owing to the development of its extensive coal fields. Population, 1906, 5,865.

SPRING VALLEY, a city of Illinois, in Bureau County, about 103 miles southwest of Chicago, on the Illinois River and on the Chicago and Northwestern, the Chicago, Rock Island and Pacific, and the Chicago, Burlington and Quincy railroads. The surrounding country produces cereals and fruits and has extensive deposits of bituminous coal. Among the chief buildings are the high school, the public library, and the city hall. It is a market for produce and merchandise. Electric lighting, waterworks, and telephones are among the improvements. Population, 1910, 7,035.

SPRINGVILLE, a city of Utah, in Utah County, five miles south of Provo City. It is situated near the eastern shore of Utah Lake, on the Rio Grande Western and the San Pedro, Los Angeles and Salt Lake railroads, and is surrounded by a farming and stock-raising country. The industries include a beet-sugar factory, machine shops, and flouring mills. It has an academy, several schools and churches, waterworks and electric lighting. The first settlement in its vicinity was made in 1850. Population, 1900, 3,422.

SPRUCE, the common name for a class of coniferous trees closely allied to the firs and pines. Many species have been enumerated, some of which attain to great heights and yield valuable timber. The *black*, or *double*, *spruce* is native to a region extending from Wisconsin to Maine and thrives as far north in Canada as 65°. In most cases the trunk is straight, often seventy feet high, and it bears a conical head. The wood of this species is very strong and is used in shipbuilding, being alike serviceable for the hull, masts, and spars. The *white*, or *single*, *spruce* thrives farther north than the black and its leaves are somewhat longer. In this species the wood is tough and valuable for construction work. It grows in forests in Wisconsin and several species are native to the Rocky Mountains and California. In some regions the trees are from 80 to 115 feet high. Another species is the *hemlock spruce*, which attains a height of 125 to 175 feet in the native forests of Northwestern America. Another species, the *Douglas spruce*, or *fir*, is found in the western part of North America, extending far north into Canada. The *Norway spruce fir* is a valuable tree of Northern Europe, especially in Norway, and from it the white or Christiania deal is obtained. Trees 150 feet high are common in its native forests.

SPURGE, a genus of shrubs and trees native to temperate and tropical climates, including about 600 species. The representatives found in the temperate regions are mostly herbs,

while those common to the warmer latitudes include many large trees. They have a milky and acrid juice and small flowers, and are leafless or the leaves fall off early. Some closely resemble certain cacti. A number are grown as ornamental plants and for their flowers. About forty species are found in the eastern part of North America, but some of these have been introduced from Europe and Africa.

SPY, the designation applied to a person employed in the time of war to secure information regarding the intent and resources of the enemy, such information being serviceable to the military force or to the nation employing him. The term also has reference to persons engaged for the purpose of keeping officials and various government officers informed regarding probable enemies or opponents, and in this respect the duties of such employees somewhat resemble the work assigned to detectives. Spies were employed for various purposes from remote antiquity, as is evidenced by the circumstance that Moses sent Joshua as a spy to obtain information to be utilized when invading Canaan. The office of a spy is not dishonorable in itself, but the dishonor attached to Major André, Nathan Hale, and other persons acting in the capacity of spies came more largely from their connection with those who had proved traitors to their country, which is frequently the case with those engaging to act in the capacity of spies. It is undoubtedly true that attractiveness is given by the risks accompanying engagements of this kind, especially to persons fond of adventure, but by the laws of war a spy is liable to suffer death.

Many officials and sovereigns employ spies as a means of safety against those liable to attack their person or public institutions. A spy system of this kind is maintained at present by many European monarchs, especially in Russia, where the system is perfect in detail and arrangements. Spies usually dress in the uniform of the enemy and not infrequently in the form of disguise, thus causing the opposing party to be unsuspecting of their intention or designs. They are usually well paid, with the view of insuring loyalty, and are provided with signs and passwords so their identity may be made known to officers of their own country or party. Cooper's "The Spy" is a work of literary value and contains an account of thrilling incidents in the lives of spies.

SQUADRON (skwöd'rün), in military, a body of cavalry, consisting ordinarily of two companies or troops and averaging from 150 to 200 men. The squadron bears the same relation to cavalry that the battalion does to in-

fantry. A detachment of ships of war employed on a particular expedition is usually called a squadron.

SQUARE, in geometry, a figure formed of four equal sides that meet each other at right angles. Square measure relates to the superficial areas of surfaces in square units, as inches, feet, yards, miles, etc. The square in arithmetic is a number that results from multiplying a number by itself; thus, 81 is the square of 9, for $9 \times 9 = 81$. The number thus multiplied is called the *square root*, and the method of finding it in algebraic and arithmetical formulas is known as the *extraction of the square root*. A tool used by carpenters is usually termed a *square*, consisting of a rule of two limbs united at a right angle. The common rule for finding the square contents of a rectangular figure is to multiply the length by the breadth.

SQUASH, the name of several species of plants belonging to the gourd family. They are grown extensively in gardens as a wholesome vegetable for making pies, preserves, and other commodities for table use. The plant is a trailing annual similar to the pumpkin and is planted and cultivated in the same way. Many species have been originated by propagation, but writers generally class them as belonging to four distinct species. Those cultivated include the winter squash, the crook-necked squash, the autumnal, the Yokohama, and the early summer squash. See **Gourd**.

SQUATTER (skwŏt'tēr), an American term applied to one who takes up his residence on a tract of land without due authority, but whose occupancy of the same is not interfered with by the government or the rightful owner. The term *squatter sovereignty* originated with Stephen A. Douglas, who incorporated it into the Kansas-Nebraska Bill. In this sense it was applied to settlers who entered Kansas for the purpose of aiding in admitting or excluding slavery. Douglas used the phrase *popular sovereignty* to characterize his plan of leaving it to the inhabitants of each Territory to decide without the interference of Congress whether it should become a free or a slave State.

SQUID, the name frequently applied to the cuttlefish and to many decapod cephalopods. This class of animals is found in nearly all the seas. The several species are more or less valuable in the industries and as food for fishes and crustaceans. See **Cuttlefish**; **Octopus**.

SQUILL, a genus of plants belonging to the lily family. These plants have a spreading perianth, smooth filaments, and three-seeded cells. They are allied to the hyacinths and

many of the species yield beautiful flowers. The most important species is the *sea onion*, which is found on the coast of the Mediterranean. It has a pear-shaped bulb from three to six inches in diameter, which yields medicinal properties useful as an emetic and a purgative. In some cases it is prescribed for treating croup in children and to stimulate the vessels of the lungs.

SQUINTING, or **Strabismus**, a deformity of the eye, resulting from a want of parallelism between the visual axes. One who suffers with this deformity, though he endeavors to fix both eyes on the same object, is unable to direct them to the same place. The eye directed toward the object looked at is called the *fixing eye*, while the other is known as the *squinting eye*. Spasm of the internal straight muscle is sometimes the cause, and in some cases it is due to paralysis. In some instances it is possible to overcome the defect by an operation, which requires making an incision in the mucous membrane and severing the tendon close to the cornea.

SQUIRREL (skwēr'rĕl), a genus of rodent quadrupeds. They are found in all the continents except Australia. Writers have described many well-marked species, differing widely in size, color, and habits. They are very abundant in the United States and Canada. The squirrels may be divided into the three groups known as true squirrels, ground squirrels, and flying squirrels. All the squirrels have a more or less slender body, bright eyes, and small, pointed ears. They are graceful and active in their movements. Their hind feet have five toes and their fore feet are four-toed, but the latter have a thumblike projection. They are active and industrious in searching for food, which they lay away for the winter season or for a time of scarcity, and their winters are spent mostly in the state of sleep. *True squirrels* are usually of a ruddy-brown color on the upper parts, with a reddish-white below, but their color varies somewhat with the season and climate, usually taking on a grayish appearance in the winter. They live largely in trees, where they may be seen with their large, bushy tail projecting over the back and passing from tree to tree with remarkable skill. Squirrels of this class subsist largely on nuts, seeds, and acorns, and their flesh is highly valued as a food.

The *ground squirrels* make their home in burrows in the ground. This class includes several species, of which the gray, striped, and red squirrels are the most common in America. They feed on seeds, tender shoots of plants,

and various cereals. In some sections of the country, especially in the central west of the United States, they are a harmful pest to corn-fields, often digging the newly planted seed from the ground, which they locate with remarkable



TRUE SQUIRRELS.

skill. *Flying squirrels* have an extension of the skin connecting their fore and hind limbs, thus forming a sort of parachute, and by aid of this they are able to leap with considerable skill at long distances. In other details they resemble the true squirrels, but differ from the latter in that they roam about at night and are seen less frequently in the daytime. The true squirrels are widely distributed in the forests of North America and most continents and are found only in timbered sections. On the other hand, the ground squirrels are common to many places and frequent both the timber and prairie regions. The flying squirrels are mostly native to Western Asia, but there are species in North America, Siberia, and Eastern Europe. Some species of squirrels yield fur valuable as an article of commerce, especially

those of Siberia and other cold regions. See *Flying Squirrel*.

SQUIRREL MONKEY. See *Monkey*.

STABAT MATER (stā'bāt mā'tēr), a celebrated hymn written in the Latin and sung in the Catholic Church during services in passion week. The words *stabat mater*, meaning the mother stood, are the first words of the hymn, hence its name. A Franciscan monk named Jacopone, or Jacopone Benedetti (died 1306), is supposed to have been the author of the hymn. It was set to music by Haydn, Rossini, and a number of other eminent composers.

STADIUM (stā'di-ŭm), the name of a Grecian course for foot races at the places where games were celebrated, and sometimes in the gymnasia where there were no games. The stadium was an oblong area terminating at one end by a straight line and at the other by a semicircle, and ranges of seats rising above one another in steps were provided at the latter. The celebrated stadium at Olympia was 600 Grecian feet long, equal to 606 feet 9 inches in English measurement. Other stadia were at Athens, Delphi, Epidaurus, and Thebes.

STADTHOLDER (stāt'höld-ēr), the title given by certain provinces of the Netherlands to the chief executives. When Holland and Zealand revolted against Spain, in 1580, William of Orange was made the chief magistrate, or stadtholder. His son, Maurice of Nassau, was declared stadtholder in 1584, at the time the former was assassinated. The dignity continued in the house of Orange, with occasional intermissions, until 1747, when William IV. was declared hereditary stadtholder. In 1814, after the restoration of the Orange family, the title was exchanged for that of king.

STAFF, in military science, a corps of officers attached to a commander for the purpose of aiding him in executing his designs. Officers of this class are usually divided into general staff officers, staff corps, and the regimental staff. The *general staff* consists of adjutants general and assistant adjutants general, inspectors general and assistant inspectors general, aids-de-camp, etc., whose duties include the communication of the orders of the general in chief as well as the whole range of the service. *Staff corps* are confined to distinct branches of the service and include such officers as the engineers, topographical engineers, and officials having charge of ordnance, subsistence, medical service, and pay departments. The *regimental staff* includes regimental officers and certain noncommissioned officers, and their duties are similar to those of adjutants general, commissaries, and quartermasters. Schools are

maintained in many countries for the special instruction of staff officers. They are required to know the country thoroughly, to superintend the transmission of orders promptly, and to discharge complicated duties intelligibly.

STAG, or **Red Deer**, a species of large deer native to the northern sections of Europe and Asia. The male, or *hart*, has round, branching horns. They are shed annually and reach their largest size in the seventh year. The female, or *hind*, is hornless and smaller than the male. These animals have a grayish-brown color in the winter and a reddish-brown in the summer, and are classed among the handsomest of the deer family. They have an acute sense of smell and are strong, swift, and watchful. The pairing season occurs regularly in August and the young, or *calf*, is born in May. Formerly these animals were seen in large numbers in Western Europe and they are still found in protected regions, especially in Germany, Austria, and Russia. A class of deer known as the *wapiti* is nearly allied to the red deer of Europe, but is native to North America. Similar species occur in Northern Africa. See **Deer**.

STAG BEETLE, the common name applied to a large group of insects, including about 550 species. Many of these beetles are of considerable size and receive their name from the large and powerful mandibles of the males. The *common stag beetle* of Europe is about two inches long, exclusive of the mandibles, and has a black or dark brown color. During the day it lives in the trunk of trees, but flies about freely at night, often entering houses and other places where lights are burning. A species called the *horned bug* is common to the eastern part of North America, particularly New Brunswick and New England, and has a mahogany-brown color. It has spread westward and is frequently seen in the evening, especially in the branches of apple, willow, and oak trees.

STAGHOUND, a large dog used formerly for hunting the stag in Europe, whence the name. It is somewhat heavier than the greyhound, has rough fur, and is noted for its strength and swiftness. The scent is developed almost as highly as in the bloodhound, with which it is frequently crossbred.

STAINED GLASS. See **Glass**.

STALACTITE (stă-lăk'tit), the name given to masses of rock resembling icicles in form, which are found attached to the roofs in many caverns. They are caused by the evaporation of water impregnated with minerals, such as lime, pyrites, limonite, and chalcedony. The water laden with minerals of this class pene-

trates the rock, and the substances solidify as the liquid evaporates. In some instances the stalactites form columns from the roof to the floor, and in such cases the forms resemble curtains, waterfalls, and other phenomena. Sometimes stalagmites are formed, being produced by successive drops of water falling upon the floor, the growth in such cases being upward as the liquid evaporates.

STAMEN (stă'mĕn), that part of flowers which contains the pollen, or male fertilizing element. It consists of a filament, an anther, and the pollen. The *filament* is the tender stalk, or support, and attached to it is the *anther*, which forms a double-celled sac containing the *pollen*. When the anther and pollen are wanting, the stamen is said to be sterile and abortive. The *pistil* is the female part and normally occupies the center of the flower. It is composed of the ovary, with its ovules and stigma. Fertilization takes place when the pollen comes in contact with the pistil. These two essential parts are often in different flowers of the plant and sometimes on distinct plants of the same species.

STAMFORD (stăm'fĕrd), a city of Connecticut, in Fairfield County, on Long Island Sound, 32 miles northeast of New York City. It is on the New York, New Haven and Hartford Railroad and has steamboat connections with New York and other cities. Stamford is surrounded by a fertile agricultural and fruit-growing country. The notable buildings include the Ferguson Library, the Saint John's Hospital, the Stamford Hospital, the high school, the Betts Academy for boys, the Catherine Aiken School for girls, and many churches. It has manufactures of iron and bronze wares, drugs, Yale locks, musical instruments, boots and shoes, stoneware, and machinery. The streets are well graded and improved with pavements, waterworks, and electric street railways. A number of New York business men make it their residence. It is a favorite summer residence and resort. The place was settled in 1641 and incorporated as a city in 1893. Population, 1900, 15,997; in 1910, 25,138.

STAMP, a small piece of paper issued by the government and sold to the public to be attached to letters, documents, and packages liable to the payment of duty. Stamps for the payment of postage on letters and small parcels came into use in England in 1840, where their adoption was suggested by Sir Rowland Hill, and they were generally adopted in the United States in 1847. Each nation now has a system of stamps for its mail service, on which the portrait of some distinguished public man or

an ensign is printed, together with the denomination of the stamp. The different stamps used in a nation at the same time vary in number from 75 to 200, this being required to supply various denominations and stamps for different purposes. The first stamp issued in the United States was of the denomination of five cents and bore the portrait of Benjamin Franklin. Fully 125 different stamps have been in use at one time in that country.

Revenue stamps are those issued by the government to be attached to documents liable to duty. The revenue stamp system is a form of taxation, designed in the United States as a war measure to provide revenue for the government. Such a law was enacted at various times. The revenue stamp law passed at the time of the Civil War was not wholly repealed until 1883, when the last articles required to be stamped, including bank drafts, checks, and matches, were made exempt. This law yielded \$16,500,000 in 1870. Another law of this kind was enacted soon after the beginning of the Spanish-American War, but it was repealed in part by an act of Congress passed March 2, 1901. The term is applied in an extended sense to the stamps designed to be fixed on parcels requiring excise taxes, such as those containing cigars, beer, and various alcoholic beverages.

STAMP ACT, a revenue law passed by the British Parliament in 1765. It required that all paper, vellum, and parchment used in the American colonies should be stamped, and declared null and void all legal documents written on unstamped paper. The measure was proposed by George Granville, Chancellor of the English Exchequer, as a means to raise revenue. This aroused such violent opposition in America that all the colonies except Virginia, New Hampshire, Georgia, and North Carolina sent delegates to a congress at New York, which remained in session from the 7th until the 25th of October, 1765. This congress addressed a protest to the king and declared that the colonies could be taxed only by their own representatives in the colonial assemblies. The English looked on the declaration as that of an unconstitutional gathering, but continued opposition finally caused the repeal of the Stamp Act in 1766. This legislation for raising revenue is one of the causes that led to the Revolution.

STANDARD TIME, a general system of reckoning time, with the Greenwich meridian as a basis, and adopted by all the principal railroad companies in Canada and the United States. It went into general effect at twelve

o'clock, noon, Nov. 18, 1883. The system originated with Professor Abbe, of the signal bureau at Washington, D. C. It divides the continent into four longitudinal belts and fixes a meridian of time for each belt. These meridians are 15° of longitude from each other, thus corresponding to one hour of time, and the time of the four sections is known as Eastern, Central, Mountain, and Pacific.

Eastern time is used in the United States in the territory lying between the Atlantic coast and a line drawn from Detroit, Mich., to Charleston, S. C. *Central time* extends from this line to a line drawn from Bismarck, N. D., to the mouth of the Rio Grande. *Mountain time* includes the region lying between the western limit of Central time and the western borders of Arizona, Utah, and Idaho, and the remainder of the country is within the sphere of *Pacific time*. The lines bounding the different divisions are necessarily irregular, since it is aimed to change the time on trains at important railroad centers. However, Canada has *five divisions* of standard time, instead of *four divisions*, including, besides those named for the United States, the *Atlantic time*. It is well illustrated on the Canadian Pacific, on which it is *Atlantic time* east of Vanceboro; *Eastern time* from Vanceboro to Fort William, Sault Sainte Marie, and Detroit; *Central time* west from Sault Sainte Marie and Fort Williams to Broadview; *Mountain time* from Broadview to Laggan; and *Pacific time* from Laggan to Vancouver and Victoria.

According to this system of reckoning, places lying within Eastern time have twelve o'clock, noon, when those in Central time have 11 a. m.; those in Mountain time, 10 a. m.; and those in Pacific time, 9 a. m. A traveler passing from one time belt to another finds his watch too fast or too slow, according to the direction in which he is going. All points in any time division using the time of the meridian have their time pieces faster or slower than the time indicated by the sun, according as their time is east or west of the line. The naval observatory at Washington supplies the standard time in the United States. The exact hour of twelve o'clock, noon, is determined every day by astronomical examination, the chronometer of the observatory is corrected, and the correct time is communicated to all the government departments by electricity at the precise hour. Connected instruments are kept in the room of the Western Union Telegraph Company, which telegraphs the time automatically to all parts of the United States, reaching San Francisco in one-fifth of a second. To accomplish

this effectually, all business is taken off the wires three minutes before noon each day, thus supplying an unbroken connection between Washington and every point on its lines.

It must be remembered that the noon signal at Washington indicates time in Chicago for eleven o'clock a. m.; in Denver for 10 a. m.; and in San Francisco for 9 a. m. The company provides an electro-magnet to be attached to clocks, and by means of this instrument the hands on the dials are forced to the exact hour in all parts of the United States where con-

run from the main range, including one that extends to the Sea of Japan and another that runs parallel with the Lena River almost to the Arctic Ocean. The culminating peak is Mount Tehokhondo, or Sokhondo, in the southern part, which has an altitude of 8,150 feet. The range has a length of 3,000 miles and the general elevation does not exceed 3,250 feet. Fine forests of valuable timber cover many of the slopes in the southern part, but the extreme northern extension is entirely barren or is characterized by a small growth of shrubs.



STANDARD TIME IN CANADA AND THE UNITED STATES.

nections are maintained. The charge for such connection is \$15 per year, and from this source the company receives over a million dollars annually. Standard time has proven a great convenience in railroading and to the traveling public, since the objections to keeping 53 standards of time by railroad companies have been overcome, and the standards are now equal in number to the four regularly recognized time belts.

STANOVOI (stā-nō-voi'), a range of mountains in the northeastern part of Asia, situated in Eastern Siberia. It extends from the border of Mongolia, southeast of Lake Baikal, in a northeasterly direction to Bering Strait. On the frontier of China it merges with the Altai Range to form the Yablonoi Mountains. Several spurs

STARCH, an important principle of plants, which occurs in greater or less quantity in the seeds, pith, and tubers of all plants except the fungi. It is especially abundant in the tubers of the potato and in the seeds of cereal plants, as in corn. Starch abounds in the interior of many plants, as that of the sago, and in the barks and fruits, as in the bark of cinnamon and in apples. It is formed of small grains or granules, which differ in size and appearance according to the source, thus making it possible to distinguish the various kinds sold in the trade. In a pure state it consists of a snow-white powder and, when pressed with the fingers in a dry state, it causes a slight crackling noise.

Starch is insoluble in water and alcohol, but, when it is rubbed with water in a mortar with

rough sides, a small portion of the interior of the granules appears to dissolve. When it is boiled with a large quantity of water, the granules burst and a turbid liquid is obtained on cooling; this contains some soluble starch and holds in suspension the insoluble portion. It forms a gelatinous mass, called *starch paste*, when heated with water to about 150°. *Dextrine* is made by heating starch to about 120°. It is soluble in water, has a pale yellow color, and is the gummy substance used on postage stamps and as a mucilage. Sugar results when starch is boiled in a diluted form of sulphuric acid.

Starch is the substance that makes the grains of cereals and the seeds of many plants nutritive. Vegetables, herbs, and greens are constituted largely of cellulose, which is chemically allied to the starches, but it affords little or no nutriment. It is useful in distending the alimentary canal, thus giving the digestive juices a greater action on the starches. Human saliva, malt, and dilute acids convert the starch into grape sugar or glucose, under conditions of warmth and moisture. Rice contains 75 per cent. of starch; corn, 56 per cent.; wheat, 54.7 per cent.; barley, 46.3 per cent.; rye, 45 per cent.; beans, 37.7 per cent.; oats, 36.5 per cent.; and potatoes, 18.5 per cent. Thousands of tons of starch are converted annually into glucose and dextrine by treatment with heat and mineral acids. *Cornstarch* is made from corn, which is first cleaned and soaked in water for three days. The soft and pulpy grains are then pulverized in a grinding mill and the pulverized mass is strained through sieves, this serving to separate the husks and germs of the corn from the starch. The starch is allowed to settle in vats filled with water, after which the water is run off, and the starch is washed repeatedly to separate from it the gluten and other foreign substances. It is next bleached and dried, and soon after it is prepared in convenient packages for the market.

Wheat starch is made in a similar way and its higher cost causes its use to be confined to fine laundry work. *Potato starch* is obtained by crushing or grinding the potatoes, then washing the mass thoroughly, separating the foreign substances, and finally placing it in the dry room. Several hundred starch factories are operated successfully in the United States, the most important being at Oswego, N. Y., and Glen Cove, Long Island. *Cornstarch* is manufactured the most extensively, and, besides being a wholesome food, it is used for various purposes in manufactures, especially in making calico and other textiles, mucilage, and glucose. Large quantities are consumed for laundry purposes. The liver of all healthy vertebrate animals con-

tains animal starch, which is called *glycogen* from its property of being converted into *starch sugar*, or *glucose*. It has some resemblance to vegetable starch.

STAR CHAMBER, an English court of civil and criminal jurisdiction at Westminster, so named from the gilt-star decorations of the ceiling of the room in which it was held. This court was founded by Henry VII., in 1487, and consisted of four high officers of state, with power to add to their number a bishop and temporal lord of the council, and two justices of the court of Westminster. Its jurisdiction extended to cases of riot, perjury, forgery, conspiracy, libel, and other misdemeanors of public importance. Trials were conducted by a method of questioning, but the accused was given the right to confess. The latter practice developed into widespread abuse, torture being employed to extort confessions, and Parliament accordingly abolished it in 1641. This court had the power to inflict any punishment aside from death.

STARFISH, a class of marine animals, which have a starlike body composed of a central disc extending into five or more rays. They belong to the radiates, a class of animals having a central focus with raylike projections and the body covered with a leathery skin. The mouth is in the center, at the under side, and from it is an opening into the stomach, which extends by two branches into each ray. Movement is effected by peculiarly formed tubular feet, which are protruded against the bottom, where they crawl in search of food. At the end of each ray is a reddish speck, which constitutes the eye, but its sensitiveness to light is not highly developed. Reproduction is by eggs, vast numbers being laid in the spawning season. Starfishes are very greedy eaters and in many places prove a pest by devouring the bait of fishermen. They are found widely distributed in tropical seas, assuming smaller forms toward the colder waters, and extend in the Atlantic from Mexico to Greenland. They vary in diameter from one to fifteen inches. Fossil starfishes occur as early as the lowest Silurian epoch, whence they continue to the present time. See illustration on following page.

STARLING (stär'ling), a genus of birds allied to the crow family. They occur in Europe, Asia, and North Africa. The bill of the common European starling is long and pointed, the color is blackish with shadings of green and purple, and at the extremity of the feathers is a whitish speck. The female has less beautiful plumage than the male, and both sexes are more speckled in winter than in summer. This species is found in all parts of Europe, except the extreme north,

and in most parts of Asia and Africa. The nest is built of twigs and grass, usually in hollow trees and old walls. Several species build in boxes provided for them near houses. They can be taught to speak some words and whistle tunes when confined in a cage. The *meadow lark* (q. v.) of North America is an allied bird, but is larger than the European starling.

STAR OF BETHLEHEM, a bulbous rooted plant of the lily family, resembling the hyacinth. The leaves are narrow and the flowers are variously colored, usually white or yellow, and are quite fragrant. Many species have been described, some being extensively cultivated in flower gardens. Those best known are native to France, Switzerland, and Germany. Several species are indigenous to Asia and Africa. The flowers open at eleven o'clock in the forenoon and close at three in the afternoon. From this circumstance they are sometimes called *Johnny-go-to-bed*.

STAR ROUTE, the name given in the United States to the postal lines over which the mail cannot be carried by railroad or steamboat and, instead, is conveyed by stage or on horseback. They are so named because in the route book of the Post Office Department they are marked with a star (*). Routes of this kind are very numerous in the mountains and in sparsely settled districts, but short distances are covered by the mail service in this way even in densely populated districts. In 1881, during the admin-

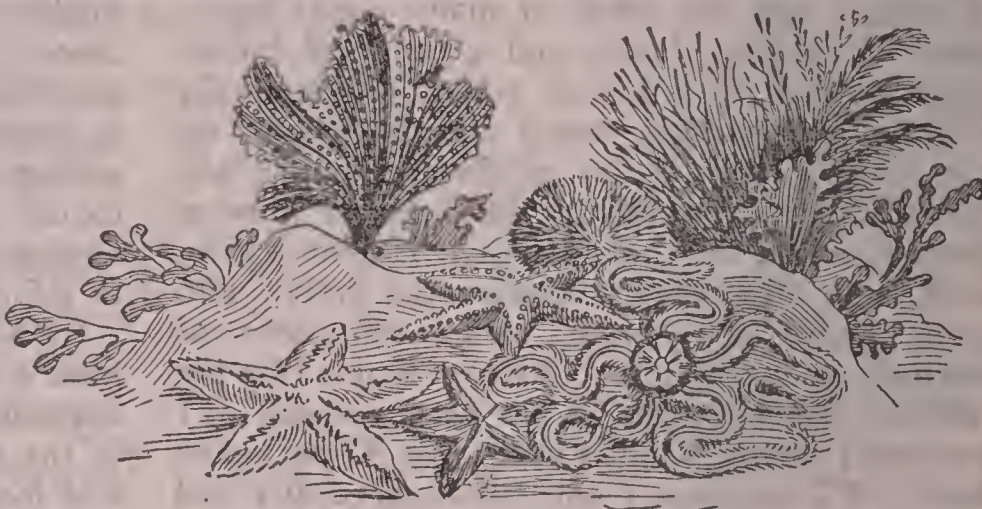


EUROPEAN STARLING.

istration of President Hayes, certain frauds, known as the *Star Route Frauds*, were discovered and exposed in connection with this service by the government. Those interested in these frauds had increased the compensation for carrying the mails from \$143,169 to \$622,808, and the profits were divided among the large contractors and some government officials. Those im-

plicated included Thomas J. Brady, second Assistant Postmaster; Stephen W. Dorsey, Senator from Arkansas; and a number of subordinates in the Post Office Department. Dorsey and Brady were tried, but not convicted, and only one of a large number indicted was ever punished. However, the irregularities complained of were ended and the combination was broken up.

STARS, the group of heavenly bodies which are situated outside of our solar system, differing from the planets in being self-luminous. All the planets present a sensible disc when examined with a telescope, or even with the naked eye, but the strongest instruments fail to show



STARFISH.

that the stars are more than mere points of light, and their light, instead of being regular, continually twinkles. It is not known definitely why the light from the stars presents a twinkling appearance to the eye, but it is thought to be due to the presence of particles of dust, vapor, and other substances within the belt of air that surrounds our planet. Careful examination has revealed a slight twinkling effect of the light coming to us from the planets, moon, and sun, but their being nearer to us causes the light to come from several points, tending to produce a steady impression, while the light emanating from the stars proceeds from an apparent point and is thus interfered with. The movement of the planets can be easily observed by the naked eye, but by superficial examination it is impossible to detect any movement of the stars. Ancient astronomers called them *fixed stars* for this reason, a term still frequently applied, but it has been successfully established that they are not fixed in space in regard to each other. They appear to move from east to west, though this apparent motion is due to the revolution of the earth upon its axis. However, some apparently pursue a path of revolution, and it is reasonable to infer that a heavenly body cannot remain permanently at rest.

Stars are classified in groups, called *constella-*

tions, for convenience in study and description, and some of them were named from their supposed resemblance to some figures, such as perching birds, contorted snakes, and fierce animals. With a few exceptions, the likeness is purely fanciful. The stars constituting the constellations are distinguished by the letters of the Greek alphabet and of the Roman alphabet, and, when the letters of the two alphabets have been exhausted, then numerals are employed. Though no magnitude in a proper sense has yet been discovered in any star, the term is applied to distinguish them according to brightness. The brightest stars visible to the naked eye are of the *first magnitude*, and the faintest of the *sixth magnitude*, while all stars that cannot be seen without the telescope are called *telescopic stars*, these ranging at present to the *sixteenth magnitude*. Astronomers assert that the number of stars of successive magnitudes increases nearly in geometric proportions, as follows:

1st Magnitude.....	20	6th Magnitude.....	5,000
2d "	65	7th "	20,000
3d "	200	8th "	68,000
4th "	500	9th "	240,000
5th "	1,400	10th "	720,000

At present it is considered that the star Centauri, in the southern heavens, is the nearest to the earth. The distance is about 200,000 times that of the earth from the sun, or 19,000,000,000,000 miles. This distance is so great that our imagination fails to grasp the thought or form a picture of the vast void across which we are gazing. Since this is the nearest of the stars, it is not difficult to realize how immeasurably farther other heavenly bodies are situated from us. It is evidenced from this that the stars cannot shine like the planets or the moon, by reflecting back the light of the sun, but instead are self-luminous bodies, and doubtless are the centers of solar systems lying far beyond our own. Few persons can discern more than 4,000 stars with the naked eye, although persons with keen eyesight may discern fully 6,000, and the most powerful telescope is able to reveal a total of about 600,000 in the northern and southern heavens. The stars seem to be irregularly distributed, with here and there groups apparently belonging to a particular system. In some portions only a few stars are to be seen and in others they are apparently crowded into close proximity, as in the *Milky Way*. The light coming to us from the stars is variously colored, but spectrum analysis has revealed that their composition is similar to that of our earth, the light indicating the presence of mercury, iron, hydrogen, magnesium, sodium, bismuth, and other familiar substances. Some shine with light of a yellow tinge, while others show traces of purple, orange, green, blue, yel-

low, red, and indigo, and the light of some is perfectly white.

The German astronomer, Friedrich W. A. Argelander (1799-1875), estimated that the total light coming from the stars is equal to one-eightieth of the average full moon. The light of some appears to undergo periodic changes by increasing and diminishing in brightness; such stars are called *periodic*, or *variable*. Others catalogued by astronomers in ancient times have entirely disappeared and are known as *temporary stars*. Powerful telescopes have revealed that some of the brightest stars really consist of two or more situated in the same part of the heavens, these being called *double* and *multiple stars*. The star Arcturus and several others are apparently coming nearer to the earth, while Sirius is receding. Nothing definite is known regarding the size of stars, since their light may be modified by a difference in their distance, size, or intrinsic brightness, and for this reason the faintest stars may not be the most distant from the earth. It is estimated that the light proceeding from Sirius surpasses that of the sun 64 times.

STARVATION (stär-vā'shūn), or **Inanition**, the condition of exhausted vitality and waste of tissue, followed by death from a want of food. Scant and impure food is the cause of slow starvation, and this form sometimes results in man from a deficiency of constituents necessary to a mixed diet. The absence of both food and water causes man to die in from five to ten days, depending upon age, vitality, and climatic conditions, but a supply of water may extend the period of life somewhat. Usually the weight of the body is reduced to three-fifths of the usual weight before life ceases. We learn from animals that hibernate, such as some species of the bear, that the body is supplied with a large per cent. of adipose tissue, which serves to sustain life, while waste is reduced to a minimum by breathing slowly and a decrease in the beating of the heart. Among the effects of starvation before death ensues are a softening of the mucous membrane, the loss of power to resist cold, severe pain in the head and stomach, and finally violent convulsions. Adults survive longer than the young.

STATE, the name applied generally to a community that is organized under permanent law and has an independent government. The conditions of organization are numerous, differing vastly in form, but the purport of the state is universally to maintain justice and the security of all its members. In a certain sense it is co-operative, especially where the right of suffrage is general or at least vested in a large part of its citizens. With regard to its character, it is

said to be paternalistic or individualistic, depending upon whether the state discharges functions that relate to the close supervision of industries and public utilities, or confines itself to the maintenance of peace, the punishment of crime, and the perpetuity of itself as a commonwealth. All states have been justified by referring their origin to God, even the maintenance of democracy, and their early development was through the influence of patriarchs that perpetuated itself.

In ancient times, Plato and Aristotle, as well as others of high repute, held to the view that the city should be the nucleus of the state, giving form and character to the public mind by reason of its higher advancement in arts and education. During the Middle Ages a powerful sentiment grew up in favor of an alliance between the church and state, and this form was discussed by such writers as Aquinas and Dante. Machiavelli, on the other hand, sought to divorce politics from theology and ethics, but advocated a strong central monarchical government. Natural rights were made the basis of government in the theories of Locke and Rousseau, while Thomas Hobbes used the theory of natural law to defend absolutism. These writers sought to solve the problem of government without making history a primary basis, while Montesquieu referred political science to the history of past events, upon which he based his theory of government.

The United States of America and the Commonwealth of Australia are divided into political divisions known as *states*. However, the name states in this sense is a designation of a division rather than that of a sovereign political organization. The states referred to do not possess many of the powers of an independent government, such as declaring war and making final decisions in judicial causes of a national character, these powers being reserved by the central or federal government. The name *province*, as used in Canada, is equivalent to the word *state*, as used in Australia and the United States.

STATE, Department of. See **United States, Departments of.**

STATEN ISLAND (stăt'ən), the largest of several islands in New York harbor, which forms the whole of Richmond County. It is separated from Long Island by the Narrows and from New Jersey by Staten Island Sound. The length is thirteen miles, the greatest width is eight miles, and the area is 58 square miles. Steamboat connections are maintained between it and New York City, to which it was annexed within recent years. The surface is of a rolling character, with soil well adapted to farming and

gardening, and it has a number of thriving villages and towns. All the shore villages and Richmond, the county seat, are reached by rapid transit. Many of the villages are noted as summer resorts, being improved by fine gardens and commodious hotels and lecture rooms. The towns have good public school and church facilities. Staten Island has numerous manufacturing establishments, including machine shops, cigar factories, and mills. It is the seat of Sailors' Snug Harbor, a retreat for disabled seamen, and has several hospitals. Population, 1900, 67,021.

STATES-GENERAL (stäts'jĕn'ĕr-äl), the name of the legislative body of the Netherlands. It is composed of two chambers, an upper and a lower, members in the former being elected by the provincial states and in the latter by the citizens. In the history of France the name of States-General has reference to the assembly made up of the nobility, the clergy, and the third estate, or the *bourgeoisie*. It is thought to have originated with Charlemagne, but the first convocation of which there is an authentic record is that of 1302, which assembled as directed by Philip the Fair, who convoked it to give greater weight to his policy in the quarrel with Pope Boniface VIII. Subsequently absolutism spread in France and there was no convocation until 1614. From that time until 1789 there was no assembly of this body, but in the latter year the Third Estate refused to abide by the regulation agreed upon between the other two orders.

STATES' RIGHTS, the doctrine that every State is sovereign within the limit of its own sphere of action, made so by the declared will of the nation as expressed in the Constitution, and that the nation may not abridge or abrogate that sphere. The rights of the national government are distinctly stated in the Constitution, and the rights of the states are limited only by the expressly declared national right. All concede that both the nation and the states have certain rights, and in this respect both have more or less clearly defined powers. The term has often been misapplied to the doctrine of *State sovereignty*, which implies that the states, at the formation of the Union, delegated a portion of their sovereignty to the national government, reserving the right to revoke the agency and resume the exercise of all the elements of sovereignty at any time by seceding.

State sovereignty was first asserted by the legislatures of Virginia and Kentucky, in 1798, when they formerly protested against the Alien and Sedition Laws, by which the President was empowered to punish sedition in the states and to remove any alien or foreigner whose presence was a source of danger. The doctrine was as-

serted by Henry Clay and the State of Maryland in 1811 and in 1819, who declared that Congress did not possess authority to charter the United States Bank. Another instance is found in the convention held in South Carolina in 1832, which declared the high protective tariff null and void, but trouble was averted by passing Clay's Compromise Bill. The doctrine of State sovereignty became the ally of slavery soon after the nullification troubles, and the Southern States carried into effect its principles by seceding from the Union, but the Civil War greatly modified the doctrine. However, in a modified form it still has a place among the live public questions. This is exemplified in the issues involved in the regulation of interstate commerce and certain legislation by the states, as in the controversy about the attendance of Japanese upon the schools of California, in 1909.

STATICS (stăt'iks), the branch of dynamics which treats of forces that counterbalance one another, hence produce no motion or change of motion. Some writers use the word statics in opposition to dynamics, in which sense the former is the science of rest, of equilibrium, and the latter that of motion, both together constituting mechanics.

STATISTICS (stă-tis'tiks), the science which relates to the collection and arrangement of important facts, such as have reference to the financial, social, intellectual, and political conditions and resources of a state or nation. Though some departments of statistical knowledge are of very ancient origin, the credit of founding the science of statistics is credited to Professor Achenwall (1712-1772), of the University of Göttingen, who treated the subject freely in his "Outlines of Political Science." In this work he called attention to the fact that the statistics of the political science of the several nations is very differently understood, and that there is no general agreement in the number and arrangement of the parts treated in books on the subject. From this work the title *statistics* came into general use, and now the collection of facts and data relating to this subject is an important function of all civilized governments. Practically all nations take a general census at stated intervals, usually every ten years, and in many cases enumerations of population and industrial data are made every five years, as in Germany and some states of the United States.

STATUTE (stăt'üt), a law established by the act of a representative assembly, such as a legislature, congress, or parliament. Statutes enacted by the lawmaking branch of the general government are termed *national*, while those of a state or province are called *state*, or *provincial*,

statutes. Where a statute is enacted by the legislature of a state or province, it must necessarily be in conformity with the written or understood constitution of the nation, otherwise it is void on account of being unconstitutional. A statute is said to be *mandatory* when it directs the performance of an act, as in the case of public officials or in authorizing the organization of corporations; *prohibitory*, when it forbids the commitment of an act; *directory*, when it does not definitely specify certain acts, as the time and manner of filing certain official reports; and *permissive*, when it leaves certain acts of a citizen optional, as the disposition of property by will.

STAUBBACH (stou'bäg), a waterfall of Switzerland, in the canton of Bern, 7 miles southeast of Interlaken. The descent is nearly 900 feet, hence it is the highest fall in Europe. In Germany the name means *dust stream*, having reference to the appearance of the water, which is quite similar to a spray of dust some distance before the valley below is reached.

STAUNTON (stän'tün), a city of Virginia, county seat of Augusta County, 38 miles north of Lynchburg, on the Chesapeake and Ohio and the Baltimore and Ohio railroads. It is surrounded by a fertile farming region. The manufactures include flour, musical instruments, carriages and wagons, ironware, and machinery. Among the noteworthy buildings are the county courthouse, the Masonic Temple, the Columbian Hall, the high school, and the public library. It is the seat of the Western State Insane Asylum, the Virginia Institute for the Deaf, Dumb, and Blind, and the Kable's Military Academy. Highland Park and Gypsy Hill Park are fine resorts. It has a growing trade in farm produce. The place was settled in 1745 and became a city in 1871. Population, 1900, 7,289.

STAVANGER (stă'väng-ēr), a city of Norway, at the head of Bukken Fiord, an inlet of the North Sea, 190 miles southwest of Christiania. The chief ecclesiastical building is a Gothic cathedral, one of the finest in the country, and it has a number of fine schools and public buildings. The harbor is safe and commodious and the city has a large foreign trade in fish, timber, and marble. It has shipyards, machine shops, cotton and woolen mills, brickyards, and manufactures of clothing. Communication inland is by railway and electric lines. The public utilities include electric and gas lighting, waterworks, and sewerage. Population, 1908, 31,546.

STAVROPOL (stäv'rō-pōl-y'), a city in southern Russia, capital of the government of Stavropol, on the northern slope of the Caucasus

Mountains, 200 miles southeast of Rostof. It has an extensive trade in sheep, horses, cattle, and merchandise. Among the features are electric street railways, stone and asphalt pavements, and several government buildings. The province of Stavropol borders on the Caspian Sea and is watered mainly by the Kuma and Kuban rivers. It produces large quantities of cereals and live stock and is important as a silk-producing region. The city in 1907 had a population of 46,445.

STEAM, the gaseous form of water, especially the gas into which water is changed by boiling. It is a colorless and transparent gas when the water has been vaporized to an extent that none is held in mechanical suspension, but is termed *wet steam*, or *saturated steam*, when a part of the water is held suspended mechanically. In the latter case it is produced under low pressure, or is affected by a low temperature, as the visible cloud of steam passing from a vessel, which is composed of minute drops of water produced by the condensation of the steam as it issues into the colder air. Water changes into aqueous vapor by surface evaporation at all temperatures, but the term steam is not properly applied to other than the vapor resulting from boiling. The boiling point of water depends on the pressure upon the surface, the purity of the water, and the nature of the vessel, but at ordinary atmospheric pressure it boils in an open vessel at a temperature of 212° . If the pressure on the surface be increased, the boiling point is raised correspondingly. Pure water boils at a lower heat than when containing a considerable per cent. of salt.

The temperature of steam is, the same as that of boiling water; the heat supplied simply suffices to convert the water into gaseous steam without raising the temperature of the steam, and as soon as the temperature is slightly lowered a part of the so-called *dry steam*, or *pure steam*, is condensed and forms wet steam. When boiling begins, the water remains at the same temperature, all the heat applied acting to change water into steam. This is ordinarily expressed by saying that the heat becomes latent in steam, and, the greater the latent heat, the more is manifested its elasticity or power of pressure. Thus heat is the power in steam which enables it to do work. If the water is boiled in a closed vessel the steam accumulates and both pressure and temperature increase, but the pressure increases more rapidly than the temperature. In the process of highly heating steam, its temperature rises until it acts like a perfect gas, when it is said to be *superheated steam*. The most important uses of steam include its service as an

agent for the production of mechanical force in manufactories, steamboats, and railway engines. It is employed extensively in brewing, distilling, warming buildings, heating baths, and for cooking purposes.

STEAMBOAT, a vessel propelled by the agency of steam, which agent acts either on a screw or on paddles. Inventors began to give attention to improvements in navigation as soon as machines were constructed to successfully employ steam as a propelling agency. Little



THE CLERMONT.

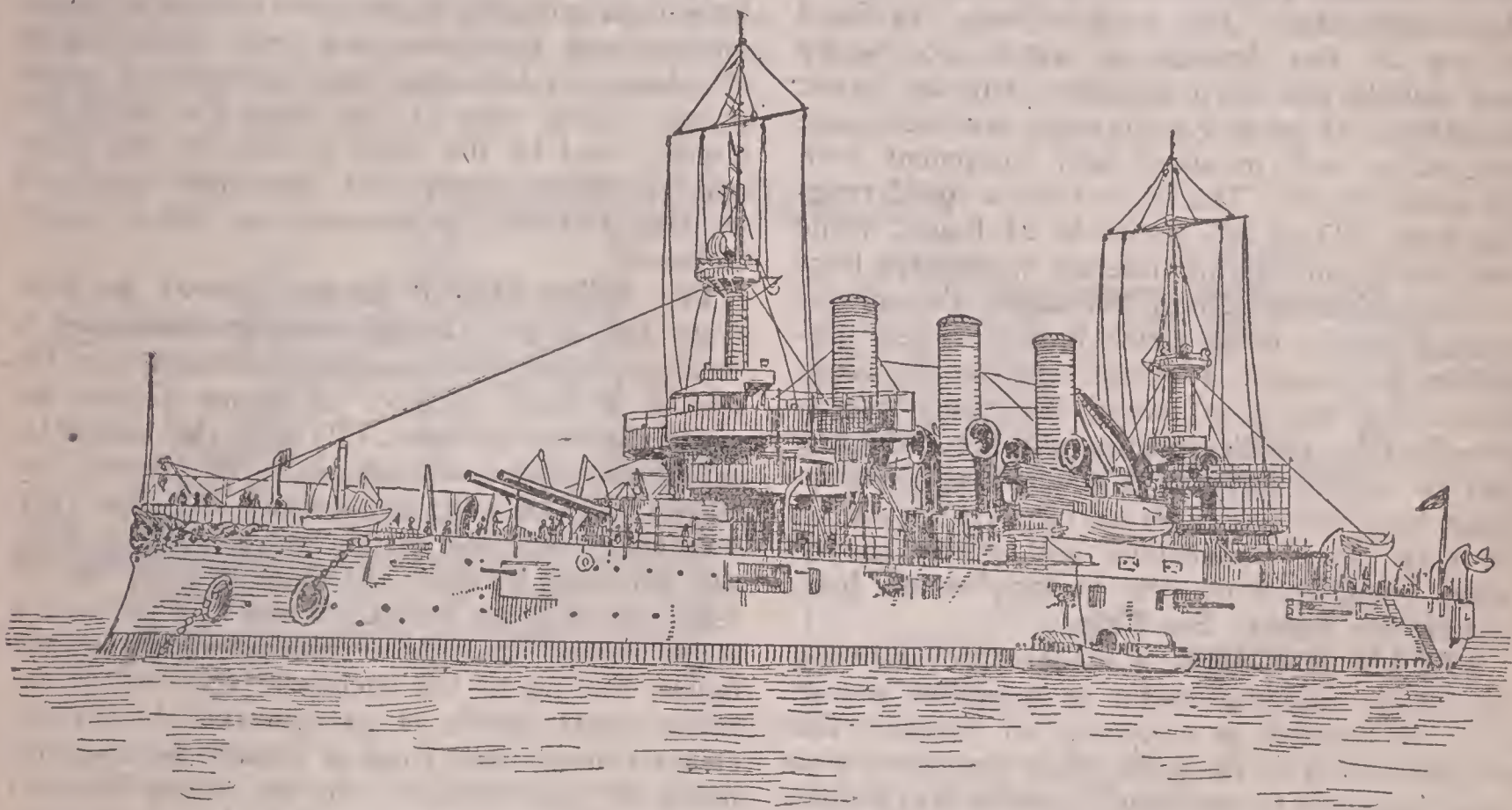
success crowned the efforts until 1736, when some progress was made by Jonathan Hulls in constructing a towboat to be moved by a steam engine setting a paddle wheel in motion. The idea had been suggested by wheel boats propelled by oxen or horses, which were used to some extent as early as the time of the Romans, but the application of steam at that time did not prove entirely successful. John Fitch and James Rumsey, two Americans, constructed vessels to be driven by steam in 1786. The paddle boat launched by Fitch moved at the rate of four miles an hour, but the one constructed by Rumsey was propelled by a stream of water issuing from the stern and did not prove successful. Extensive experiments were made about the same time in England and France, but the first really practical steamboat and the one that marks the epoch of steam navigation was built by Robert Fulton and Robert R. Livingston in 1807.

Fulton had seen a vessel named the *Charlotte Dundas*, a steamboat with one paddle wheel near the stern, constructed in England in 1801, and from it he patterned in building the *Clermont*, which was launched in 1807 and served for regular trips on the Hudson between

New York and Albany. The *Clermont* was 130 feet long and had a speed of five miles an hour. Fulton and Livingston established a yard for building steamboats at Pittsburg in 1811, at which a number of vessels were completed for river service and later several were built for use on the Great Lakes. The first steamboat passed from Glasgow to London in 1815 and from New York to New Orleans in 1818. The first steam vessel to be used in the British navy was called the *Comet*, which was launched at Woolwich in 1822. In 1838 the first two steamboats crossed the Atlantic, the *Sirius* sailing from Cork and the *Great Western* from

fiction of the common screw, which is driven by steam to propel ships through the water. It is constructed of spiral plates or distinct blades attached to a central shaft or cylinder, and is placed immediately before the stern post, at the bottom of the ship. The ships are given an onward motion because of the propeller being driven rapidly in the water by the steam engines. It soon became apparent that the screw propellers possess many decided advantages over either rear end or side paddle wheels, and consequently came rapidly into general use.

A decided advantage has been obtained in the use of iron and steel instead of wood for the



BATTLESHIP CONNECTICUT.

Bristol, both vessels reaching New York on April 23. The *Sirius* made the trip in nineteen days and the *Great Western* in fifteen, their arrival at the port of New York being watched by a large crowd of eager spectators. These vessels were of the paddle-steamer type, a form of construction used almost exclusively at first. The largest vessel of this type was the *Scotia*, launched by the Cunard line in 1861, which crossed the Atlantic in nine days. Its length was 366 feet; breadth, 48 feet; and the stroke of the engines, 12 feet. The Cunard line established regular communication between Liverpool and New York in 1840, being the earliest to make such connections, and soon after began to make regular trips between other important ports.

Captain Ericsson, in 1837, successfully applied the screw propeller, an apparatus made in modi-

construction of sailing vessels and consequently ocean navigation has become much more efficient and rapid. Formerly from twelve to fifteen days were required to cross the Atlantic, but now first-class vessels make the passage in five or six days. The *Etruria*, a vessel of the Cunard line, may be taken as a type of modern vessels constructed of steel, and is one of many excellent steamers sailing between American and European ports. It is 520 feet long, 41 feet deep, and 57 feet wide. The nine boilers indicate 14,000 horse power. However, it is exceeded in speed by many vessels. Up to 1908 the best record in sailing from Europe to America was made by the *Deutschland* (Germany), which sailed from Cherbourg, France, to Sandy Hook, N. Y., a distance of 3,045 miles, in five days seven hours and twenty-eight minutes. The trip from Queenstown, Ireland, which is

shorter than that from Cherbourg, has been made in five days seven hours and twenty-three minutes. This is the record made in 1908 by the *Lucania*. However, such vessels as the English *Dreadnaught* are much larger and have a higher speed. The *Connecticut*, which has a displacement of 16,000 tons and a speed of 18 knots, is a type of the American battleships which are now in service.

Vessels for navigating interior waters, such as rivers, canals, and lakes, are of smaller construction than those employed for service on the ocean. The depth and character of the water to be navigated determine in a large measure the construction. The smaller boats are fitted to use six feet draught of water successfully and usually are stern wheelers, but the larger steamboats of interior waterways have kept pace reasonably well in speed and equipment with the ocean liners. The latter have a speed ranging from 525 to 565 knots in 24 hours, while the best steamships for interior waterways have a speed of from 425 to 500 knots, though the smaller vessels range much lower. Screw propellers are employed extensively on the Great Lakes and the deep rivers, but many vessels propelled by paddles are in use for freighting and for towing barges and other vessels. Steamboats used for passenger service are structures of very large dimensions and much beauty, being supplied with fine parlors, steam heat, and electric lights. See **Ship**.

STEAM ENGINE, a machine for utilizing the elastic force of steam as a motive power, now constructed in a variety of forms. The power of heat to do work when combined with other elements in the form of steam was known to some extent to the ancients, though its extensive use is entirely modern. Hero of Alexandria, about 150 B. C., described the earliest steam engine, which was exhibited in the Serapeum at Athens. It was called the *aeolipile* and consisted of a boiler for generating steam, from which extended two pipes to a sphere made to rotate by the inflowing current of steam. Nothing of material interest resulted during the succeeding centuries until Baptista Porta, the inventor of a camera-obscura, in 1606, published a pamphlet in regard to the writings of Hero and mentioned a lifting pump that served to raise water by steam pressure. The Marquis of Worcester, in 1665, described a steam engine in his "Century of Inventions," but this was followed by no practical results, and in 1698 Captain Savery constructed an engine to raise water.

Considerable progress was made by German and French inventors in constructing various

devices, but James Watt is the accredited inventor of the modern steam engine, applying its principles in 1763. While observing the action of steam originating from boiling water in a teakettle, which caused the lid to rise and fall alternately, he received suggestions that led to the invention of a mechanical structure for condensing the steam in a separate vessel some distance from the cylinder. He patented a single-acting steam engine in 1769 and in 1782 obtained a patent for a double-acting steam engine, but previous to that had already introduced a method of allowing the steam to work expansively. Since then many improvements have been wrought in the construction of steam engines and their uses are very numerous in all phases of industrial and commercial enterprises. They vary in size from the small toy engine, used by the child in play, to the large and skillfully constructed machines employed in large factories, in locomotives, and in ocean steamers.

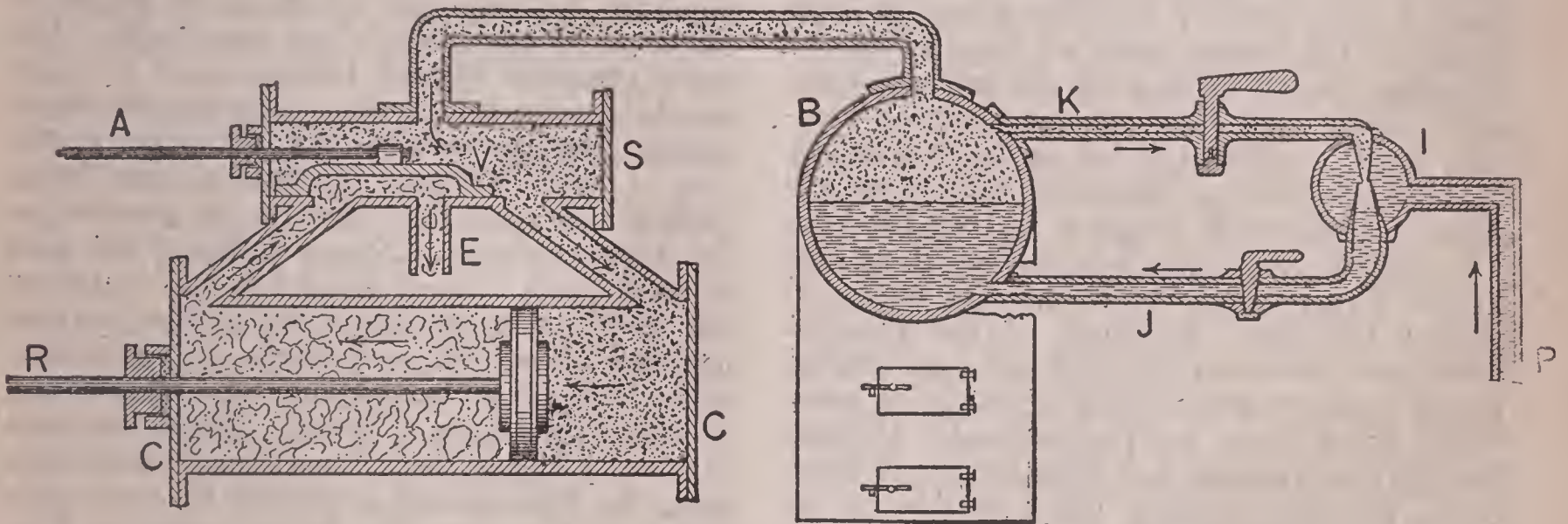
The boiler (see B in the figure) to generate the steam, though usually considered a separate device, is an essential mechanism in the use of a steam engine. A pump forces the water through the pipe (P) into the tank (I), called the *hot well*, where it is warmed by means of steam admitted through the pipe (K). The water required in the boiler is taken from the hot well through the pipe (J) by an injector or a force pump. From the boiler the steam passes through a pipe, as shown in the figure, leading to the enclosure (S), called the *steam chest*, which is so constructed that the steam cannot pass from it except by openings made for that purpose. In the simple form of the engine there are two of these openings, called *ports*, one at the front and the other at the back of the cylinder (C, C). A large opening called the *exhaust* (E) is situated between the two ports, through which the steam may escape from that side of the piston from which the steam has been cut off. The rod (A) works a contrivance (V), called the *slide valve*, which moves over the portholes and exhaust in such a manner that the steam is admitted to different slides of the piston, as it moves backward and forward in the cylinder, and opens the exhaust to allow the dead steam to escape. The alternating motion of the piston rod (R) is converted into a steady rotary motion by means of a crank and thus produces a continuous rotary motion of a wheel attached to the moving shaft; in this way continuous motion of the machinery is secured.

The two classes of steam engines are called high-pressure and low-pressure. In the *high-*

pressure engine the steam, after it has done its work, is forced out into the air through the exhaust. The puffs of steam which escape from such engines denote the speed of the piston being driven backward and forward. In the *low-pressure engine* the dead steam is condensed in a separate chamber by a spray of water, thus lowering the pressure on that side of the piston from which the steam has been cut off. A pump, called the *air pump*, removes the water from the condenser. The slide valve in both forms of engines is operated by means of a bent lever moved by an eccentric rod. An apparatus called the *governor* (q. v.) regulates to some extent the supply of steam required by the engine. The dead points of the engine are at the farthest part of the stroke of the piston, when the slide valve is arched over the exhaust and closes both ports. If the engineer

ton, England. It was constructed in 1813 for service on a railway track and was used for some time in freighting and carrying passengers. Stephenson, in 1814, built the first locomotive resembling those in practical service. His engine, called the *Rocket*, had two cylinders, one on each side of the engine, and the whole locomotive weighed a little less than five tons. The boilers of modern locomotives are tubular in form, and the engine is driven by two and sometimes by four cylinders. Waste steam from the cylinders is discharged through a pipe to the chimney of the engine and is utilized to create the draught for the boiler. The steam from the cylinders acts on cranks on the axle of the driving wheels, which are four to nine feet in diameter.

Locomotives have six, eight, and in some cases twelve wheels, two, four, or six driving



STEAM ENGINE.

A, slide valve rod; B, boiler; C, C, cylinder; E, exhaust; I, hot well; J, pipe to admit water to the boiler; K, pipe to supply steam to the hot well; P, pipe from the pump; R, piston rod; S, steam chest; V, slide valve.

opens the throttle valve, live steam fills the steam chest, but it cannot enter the cylinder unless the fly wheel of the engine be moved until the back port becomes opened. When the engine is in motion the fly wheel by its inertia continues to move and carries the crank past these points.

A locomotive is a self-propelling steam engine which travels on wheels and is used for various purposes, but mostly on railroads. The first steam carriage was patented by James Watt, in 1784, and numerous patents have been taken out in different countries, but carriages propelled on the common roads have thus far been impracticable. This is due largely to the fact that they are too expensive for individual use and because few highways are fitted for conveyances of that kind. The oldest locomotive now in existence is called *Puffing Billy* and is in the Patent Museum at South Kensing-

wheels being coupled together. They usually weigh 50 to 60 tons, but sometimes even more than 100 tons, and the speed ranges from 30 to 75 miles an hour. The capacity ranges from 4,500 to 6,000 horse power. A tender or car is attached to provide a supply of water and fuel. It is estimated that a ton of bituminous coal is consumed on level roads every thirty miles, and about two pints of oil are used to lubricate the machinery. The life of an engine is about thirty years, and the cost of construction ranges from \$15,000 to \$25,000. One of the largest engines ever built was completed in 1900 at Pittsburg, Pa., for service in hauling ore cars from Conneaut, Ohio, to Albion, Pa. The total weight is 391,400 pounds; the boiler capacity, 7,500 gallons; the steam pressure, 220 pounds; and the heating surface, 3,564 square feet. Traction engines are used extensively in propelling thrashing machines. They serve to

drive the machines and to move them from place to place.

STEAM HAMMER, a powerful machine hammer, employed in making large iron and steel forgings. It was invented by James Nasmyth (1808-1890) of Edinburgh, in 1838, and was patented four years later. A form of the steam hammer had been used in France for some time, from which the inventor secured a number of suggestions, but added several new and valuable improvements. The hammer is raised by steam to the required height, the propelling force acting against a piston, and when the steam is cut off the exhaust valve opens, thus permitting the hammer to descend. The height of the fall and the force of the blow can be regulated at will. In an improved form the hammer moves to the required height between the guides and effects a downward blow in such manner that the steam and the weight of the moving parts act together in one direction, though in most of the machine hammers the steam is used only to raise the hammer, which is allowed to fall by its own weight. Steam hammers of an enormous size are not uncommon, frequently weighing 100 to 125 tons. The largest ever made was completed in 1888 by the Krupp works at Essen, Germany, and weighs 150 tons. In some of the factories using vast machinery for steel and iron forging, steam hammers propelled by hydraulic or pneumatic power have been introduced. Machine hammers are constructed with a view of regulating the force applied, being capable of doing the heaviest forging or the most delicate work.

STEAM SHOVEL, a machine for excavating material on dry land, being a modified form of the steam dredge. The steam shovel came into extensive use about 1865 and is employed largely for excavating in railway construction. It consists essentially of a steam hoisting engine and a movable crane, both being mounted on wheels fitted to run on a track. The crane is attached by a hinge at the lower end to the frame and carries a scoop or shovel. When the scoop is lowered to the place where an excavation is being made, it is thrust into the earth by a mechanism, which causes it to be filled with earth. It is then raised by the crane and swung so as to carry the load over a car, when the latch is pulled by means of a cord, thus opening the swing bottom of the scoop and permitting the contents to fall into the car or upon the place where they are wanted. In most cases the earth is loaded in cars and transported to a locality where a heavy grade is built, but sometimes the excavated earth is

merely thrown out to the side and the railway track is afterward laid in the cut. Steam shovels are used to some extent for cutting drainage and irrigation canals. In the Lake Superior region a large number are employed for digging ore and loading it upon cars for transportation to the smelter. Where the earth to be excavated is firm or rocky, the scoop has strong steel teeth at the edge or lip.

STEAM TURBINE, a machine in which the kinetic energy of expanding steam is used to cause rotation, the force acting upon a wheel provided with vanes. In the steam engine the steam is admitted into a closed cylinder, where it produces motion by acting upon a movable piston, while in the steam turbine the expansive force of particles of steam, through the property of expansion, have an effect similar to that of water on the turbine wheel. Several styles of steam turbines are in use, some having a series of turbine wheels on one shaft. The steam transmits to each turbine wheel a rotary impulse, partly by reaction and partly by direct impulse, but the wheels vary somewhat in the size of the diameter, succeeding ones being slightly larger to adapt them to the pressure as the steam expands. Steam turbines are high in speed and a train of gearing is used to reduce the speed to a suitable velocity for working purposes. They are used chiefly on steamships, since they cause less strain and greater uniformity in the rate of speed. While machines of this kind were used at a comparatively early date, the first steamer propelled by steam turbines did not cross the Atlantic until in 1905.

STEAM WHISTLE, an apparatus for producing a loud whistling sound through the agency of steam. It is attached to a steam boiler, as in a locomotive, and the sound is produced by a rapid discharge of the steam, which issues from a narrow annular orifice around the upper edge of a cup or hemisphere, then striking the thin edge of a bell above it. The sound is produced in the manner of a common whistle or an organ pipe. The steam is shut off by a stopcock, to which a cord or wire is attached for the purpose of opening the stopcock and thus permitting the steam to rush through the opening when a signal is to be given. An instrument known as the *calliope* has a number of steam whistles suitable to produce musical tones, the length of the pipe or cup giving variations to the sound produced.

STEARIC ACID (stē-ār'ik), a product obtained from mutton suet and other fats that contain stearin. It is inodorous and tasteless, combines with numerous bases, and with the latter forms acid and neutral salts called

stearates. It is insoluble in water, but is soluble in alcohol. In fats it exists in combination with glycerin. It is used in making candles.

STEARIN (stē'a-rīn), the principal constituent of fats, obtained from fats by saponification; that is, by decomposition through the agencies of alkalies. It is less soluble than olein and palmitin, the other constituents of natural fats. In ether and alcohol it is soluble, but is insoluble in water. The chief use is in making soap and glycerin.

STEEL, a compound or alloy of iron. It contains a greater or less per cent. of carbon, and in this respect ranges between wrought iron and cast iron. Wrought iron has only a small quantity of carbon and cast iron sometimes as much as 10 per cent., while ordinary steel possesses from 1 to 2 per cent. The value of steel depends principally upon its durability and the ease with which it can be hardened or softened. The operation in which the change in hardness is brought about constitutes the process of tempering. It becomes soft and malleable like soft iron when heated and allowed to cool slowly, but, if heated to redness and plunged suddenly into cold water, it is rendered exceedingly hard. The degree of hardness can be easily regulated by the intensity of the heat applied and by the suddenness of plunging it into cold water. Steel can be welded almost as easily as iron when in a red-hot condition and melts at a lower temperature than soft iron. The color is a bright grayish-white and it is denser, finer, smoother, and more elastic than iron. It takes a brighter polish than iron, rusts less easily, and has a granular texture.

GRADES OF STEEL. Various names are applied to the different grades of steel, depending on the process it has undergone in manufacture. *German steel*, or *natural steel*, is a grade obtained from the ore or from the cast iron. *Blister steel*, or *cement steel*, is made by piling soft iron bars between layers of charcoal in fire-clay boxes, which are then heated to redness in a furnace, and the temperature is maintained for several days. In this process the iron absorbs a certain portion of carbon and is converted into steel. *Cast steel* is produced by melting cement steel. This grade is imperfect, owing to the carbon uniting in unequal quantities with the iron. In the process of making cast steel a crucible is employed and in the ordinary method a powerful wind-furnace blast is applied. *Shear steel* is obtained from cement steel, the latter being rolled or beaten into bars. Steel obtained from cast iron in the refining house is called *furnace steel*, and the grade that

has undergone only one application of the refining process is designated *rough steel*.

The most important method of manufacturing steel is named the *Bessemer process* from its inventor, Henry Bessemer. It is a cheaper and better method than was known previously and has greatly reduced the price of steel. Besides, it has been the cause of a much freer use of steel in all the more important products of the manufactories. It consists in completely decarbonizing cast iron and then adding a sufficient quantity of cast iron of the proper quality to give the whole mixture the desired amount of carbon. This is done by melting the cast iron in a furnace and then drawing the molten mass off into a large covered crucible. A blast of air is forced into the melted metal, which operates to raise the heat sufficiently to burn out the carbon. A quantity of cast iron very rich in carbon, called by the Germans *spiegeleisen* (mirror-iron), is added when the molten mass has become decarbonized and the blast is continued for a short time. This operates to remove the remaining impurities and gives the steel its proper consistency, after which it is drawn from the crucible or converter into the casting mold. Various other processes of manufacturing different grades of steel are employed with success, all of which are more or less important in obtaining the desired classes of Bessemer.

PRODUCTION OF STEEL. The United States, England, and Germany are the three most extensive producers of steel. The steel production in the United States averages about 24,108,500 tons annually, which is about equal to the combined product of England and Germany, but the steel output of the latter country exceeds that of England. In 1908 Germany produced 12,987,500 tons of steel; Great Britain, 10,468,250 tons; France, 3,325,260 tons; and Canada, 850,000 tons. Steel is used extensively for shafting, tubes, boiler plates, ship plates, nails, rivets, tin plate, firearms, machinery, edged tools, and scientific instruments. Within recent years it has gone into use largely for construction purposes, especially in erecting bridges, elevators, and tall buildings in cities.

STEEL ENGRAVING, the art of engraving on steel plates for the purpose of reproducing prints or impressions in ink upon paper and other substances. Work of great delicacy can be executed on steel, both by etching and by cutting with the graver, and the printing obtained from a plate of this kind possesses superiority in brilliancy and exactness. The art of steel engraving is comparatively modern and originated with those designing to overcome

forgery and imitation of bank notes and government securities. It is employed largely by the government in engraving securities and bank notes. In the fine arts it is used for reproducing the works of master painters. See **Engraving**.

STEELTON (stēl'tūn), a borough of Pennsylvania, in Dauphin County, three miles southeast of Harrisburg, on the Susquehanna River. It is on the Pennsylvania and the Philadelphia and Reading railroads. The surrounding country produces fruits, cereals, and coal. It is the seat of extensive manufacturing establishments, among them rail mills, blast furnaces, planing mills, bridge construction works, shirt factories, and machine shops. Electric and gas lighting, waterworks, sanitary sewerage, and electric street railways are among the improvements. It was settled in 1865 and incorporated in 1880. Population, 1900, 12,086; in 1910, 14,246.

STEELYARD (stēl'yārd), an apparatus for weighing, so called from the Steelyard, a place in London where steel was sold. The body to be weighed is suspended by the shorter arm of a lever, which turns on a fulcrum, and a weight is caused to slide upon the longer arm to produce equilibrium, its place upon this arm indicating the weight. The upper edge of the longer arm is notched to a graduated scale.

STEINBOCK (stīn'bōk), a small antelope native to South Africa. It has a reddish color, a long neck, and slightly curved horns. At the shoulder it measures about 24 inches. The flesh is highly nutritious, for which it is hunted by natives and Europeans. It is found chiefly in thinly wooded and hilly places. The ibex of Europe is commonly called steinbock among the Germans.

STELVIO (stēl'vē-ō), **Pass of**, a celebrated carriage road in Europe. It is located across the Tyrol Alps between Italy and Austria, and forms a part of the highway between Innsbruck and Milan. This roadway was completed in 1828 under franchise by the Austrian government, and is still noted for its fine construction and the beautiful scenery of the region which it traverses. It passes over heights 9,076 feet above the sea and is 33 miles long.

STEM. See **Plants**.

STENCIL (stēn'sīl), a pattern for printing letters and ornamental designs, usually made of thin brass or cardboard. The stencil contains the designs to be produced, these being cut by machinery, and in marking it is laid on the surface which is to receive the design. The paint is applied by means of a brush after the stencil has been properly adjusted, and in this way it is possible to produce ornamental work

very rapidly. Rubber stamps are now used largely for lettering, though previously stencils were employed for that purpose, and the latter are used where the designs are larger than can be produced by stamping.

STENOGRAPHY (stē-nōg'rā-fy). See **Shorthand**.

STEPHEN, the name of ten popes of Rome, who reigned within the period between 253 and 1058.

STEPPE (stēps), the name applied by the Russians to the plains occupying a part of Siberia, stretching across Southeastern Europe as far west as the Dnieper. These plains have a generally undulating surface with occasional ranges of low hills, and are mostly treeless and quite barren. In many places fertile regions of greater or less extent abound. Nutritious grasses cover most of the surface in the spring, but during the dry season of summer and fall the greater part is extremely arid and barren. A large part of this region is occupied by nomadic Tartars.

STEREOSCOPE (stē'rē-ō-skōp), an instrument whose purpose is to aid in attaining vision of a pair of properly prepared pictures, which together compose the stereograph. The first form of this instrument was invented by Sir Charles Wheatstone in 1838, but subsequently many improvements were made, and there are at present several forms of it in extensive use. The common stereoscope has a double lens, or a pair of half-lenses, set in a small box, and through these the eyes of the observer look upon two pictures stationed at the proper focus some distance from the box. Photographs taken for use in instruments of this kind are from two aspects, one as seen with the right eye and the other as seen with the left, and they are placed in a transposed position on a cardboard fitted to be held in a frame. When brought into focus, the instrument makes the two images blend into one, and they appear to the observer as only one image, which, however, is greatly intensified.

STEREOTYPE (stē'rē-ō-tīp), the name commonly applied to a plate made from a plaster or papier-maché mold, which is used in printing instead of movable type. Johann Müller, a German pastor in Holland, is credited with the distinction of having successfully produced the first solid plate for use in the printing press, which he did by setting the type and afterward applying a mechanical composition to form a solid mass. This process was utilized to a considerable extent in printing successive editions of various publications, thus economiz-

ing greatly in time and the expense usually incurred in setting up movable type with the reissuance of books and pamphlets. William Ged (1690-1749), a goldsmith of Edinburgh, invented a plaster process by which type once set up could be reproduced. He had been employed, in 1731, by the University of Oxford to manufacture plates for Bibles and prayer books, and having seen the utility of Müller's invention, he was instrumental in adding considerable value to the printer's art by originating stereotyping proper. In this process the type is set up in the usual way and the face is oiled with a brush. Plaster of Paris is moistened and made of the proper consistency and poured over the type, and, on being dried, forms a mold corresponding to the face of the type. This mold may be used to secure any number of stereotype plates, thus saving the expense of resetting type for successive editions of books.

Though used to some extent, the Ged method has been almost entirely superseded by an invention of Gerroux, a Frenchman, who in 1829 discovered the papier-maché process. Besides being cheaper, it is much more rapid than any other yet discovered. It is due to this invention that publishers have been enabled to attain the present rapidity of issuing daily newspapers and other periodicals. The type is set in the ordinary way and the form is locked up, after which it is brushed and carefully oiled. Several folds of soft paper are dampened and pasted together, and, after being placed on the type, they are beaten with a stiff brush so as to come in contact with every part of the type-face. A blanket is then spread over the top and it is placed in a steam-heated press, where it is thoroughly dried under pressure, after which the paper matrix is used as a form to cast the stereotype. It is possible to use a paper matrix several times. In newspaper offices using cylinder presses the stereotypes are made in form to fit the cylinder. The art of stereotyping has developed to such a high state of perfection that it is possible to have the stereotypes ready for the printing press in five to eight minutes after the forms are completed.

STERLING (stēr'ling), a city of Illinois, in Whiteside County, on the Rock River, 110 miles west of Chicago. It is on the Chicago and Northwestern and the Chicago, Burlington and Quincy railroads. The Rock River supplies an abundance of water power, thus making it a center for the manufacture of machinery, furniture, paper, gas engines, wire nails, and farming implements. Among the principal buildings are the high school, the public library, the hos-

pital, and many churches. It has well managed systems of waterworks and sanitary sewerage. The surrounding country is agricultural and stock raising. Sterling was platted in 1836 and in 1857 it was incorporated as a city. Population, 1900, 6,309; in 1910, 7,467.

STETHOSCOPE (stēth'ō-skōp). See **Auscultation**.

STETTIN (stēt-tēn'), a seaport city of Germany, capital of Pomerania, eighty miles north-east of Berlin. It occupies a commanding position on the west bank of the Oder River, about thirty miles from the Baltic Sea, and is noted as a railroad center. Opposite the city are the two former suburbs of Lastadie and Silberwiese, with which it is connected by two substantial bridges. The important buildings include those occupied by the government officials, the Church of Saint Peter, a Gothic structure founded in 1124, the city hall, the citadel, the central railroad station, and many fine school and church buildings. Other features include the Berliner Thor and many monuments. The streets are substantially paved with stone and asphalt and are regularly platted. It is improved with waterworks, sewerage, electric and gas lights, and an extensive electric street railway system. Stettin has many manufacturing enterprises, including shipbuilding yards, iron foundries, and engineering works. Among the manufactures are sugar, chemicals, cement, sailcloth, clothing, cotton goods, silk and woolen textiles, leather, musical instruments, hardware, and machinery. The city has grown remarkably within the last several decades, owing principally to the building of railroads and important harbor improvements. Stettiner Haff is an expansion of the Oder River north of the city and has an area of 200 square miles. It is an important waterway, having deep-sea and excellent canal connections. The city of Stettin has long been an important port. It was an influential member of the Hanseatic League. From 1648 until 1720 it was occupied by the Swedes and was a French possession from 1806 to 1813. Population, 1905, 224,119.

STEUBENVILLE (stū'bēn-vīl), a city in Ohio, county seat of Jefferson County, on the Ohio River, 62 miles below Pittsburg. It is on the Pittsburg, Cincinnati, Chicago and Saint Louis, the Pennsylvania, and the Wheeling and Lake Erie railroads. In the vicinity are productive coal mines and gas wells, giving it material advantage for manufacturing. Among the noteworthy buildings are the county courthouse, the Gill Hospital, the Carnegie Library, the city hall, the high school, and the Y. M. C.

A. building. It has Stanton Park and Altamont Park. It is the center of a large trade in coal, merchandise, and farm produce. The manufactures include pottery, glass, furniture, iron, white lead, paper, cotton and woolen goods, and machinery. Among the municipal facilities are gas and electric lighting, pavements, waterworks, sewerage, and street railways. The city occupies the site of Fort Steuben, which was founded and named for Baron Steuben in 1787. Population, 1910, 22,391.

STEVENS POINT, a city in Wisconsin, county seat of Portage County, 85 miles west of Green Bay. It is nicely situated on the Wisconsin River, on the Wisconsin Central and the Green Bay and Western railroads, and has a large trade in agricultural products, lumber, and merchandise. Among the principal buildings are the county courthouse, the Carnegie Library, the Polish normal school, and one of the State normal schools. The manufactures include flour, cigars, lumber products, railroad cars, leather, paper, ironware, and machinery. It has electric lights, pavements, street railways, public waterworks, and several parks. Stevens Point was settled in 1836 and was chartered as a city in 1897. Population, 1910, 8,692.

STICKLEBACK (stik'k'l-băk), a genus of fish common to the fresh and salt waters of northern regions, so named from the sharp, free dorsal spines, usually ranging from two to fifteen. They are among the few fishes that build nests for the reception of the spawn, which is carefully guarded by the male until hatched and the young are capable of providing for themselves. The male assumes blue and red tints at the spawning season and actively invites females to deposit spawn in its nest until it is filled with ova, and when the young life appears it provides food for several days. The female deposits from 50 to 100 eggs, which are not confined to the nest of a single male, but distributed to the nests constructed by different individuals. Sticklebacks live only from three to four years and vary in length from two to three inches. The best known and most widely distributed species have three spines, two on the back and one beneath, and range from Maryland to Labrador. In several places off the shores of Europe and in some of the interior waters of England these fishes are so numerous that they are caught and used for manure. They are seldom eaten, though their flesh is not objectionable.

STICK-SEED, the popular name of a weed native to Europe, but now found in many places of America. The stem is hairy and about two feet high, and the small flowers bloom late in

the summer. These plants produce seeds covered with small projections, hence are distributed by cattle and other animals. This weed grows in waste grounds and cultivated fields. Considerable care is required to eradicate it from cultivated land.

STILLWATER, a city in Minnesota, county seat of Washington County, on the Saint Croix River, 20 miles northeast of Saint Paul. It is on the Northern Pacific, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads and has steamboat communications with the Mississippi by way of the Saint Croix River. An electric railway connects it with Saint Paul and Minneapolis. The noteworthy buildings include the county courthouse, the State prison, the public library, the high school, the city hall, the Federal building, the city hospital, and two convents. Fine scenery is afforded by the dalles of the Saint Croix, which extend thirty miles above the city. The manufactures include machinery, flour, cement, lumber products, barrels, farming implements, and ironware. It was settled in 1843 and incorporated in 1854. Population, 1910, 10,198.

STILTBIRD, or **Stilt**, a species of wading birds. It is so called because its legs, in proportion to the size of the body, exceed in length those of any other bird. The body is about the size of that of a snipe, while the bare part of the legs measures eight inches, thus enabling it to run with remarkable rapidity. It usually nests in the marshy margin of a swamp or pond, but in some instances, especially where the ground is very wet, it builds a platform in the weeds and rushes. Several well-marked species of stilt-birds are native to North America, but the *black-necked stilt* is the most widely distributed. It is a common bird in the northeastern part of North America, extending as far north as Nova Scotia. This species is fourteen inches long and has a white tail, red legs, and a black bill. A species called the *white stilt* is native to Africa and Europe.

STING RAY, a class of cartilaginous fishes of the ray family, so called from the sharp, bony spine that projects backward. These fish have a long whiplike tail, a smooth skin, flattened teeth, and a moderately broad body. About forty species have been described. They are common to the warmer seas and some inhabit the fresh waters of South America. The sting is not poisonous, but is capable of inflicting a painful wound. Some of the species are from ten to twelve feet long, hence are powerful in defending themselves against intruders.

STIRLING (stēr'ling), a river port of Scotland, in Stirling County, on the Forth River, 28

miles northeast of Glasgow. It has railroad facilities and the harbor is safe and convenient. The manufactures include cordage, mineral oils, leather, soap, clothing, agricultural implements, textiles, and machinery. The surrounding country is agricultural and stock raising. Among the principal buildings is the castle on Castle Hill, an eminence rising considerably above the city. It was formerly a noted resort of the Stuarts. In 1452 James II. stabbed the Earl of Douglas in a room of this castle. In connection with the castle are buildings dedicated to James III., James V., and James VI. The East Church of Stirling was erected by James IV. in 1494 and is still in an excellent condition. Other important buildings include the Cowan Hospital, the Corn Exchange, the Smith Institute, and numerous educational and charitable institutions. Monk captured the place in 1651 and in 1745 it was unsuccessfully besieged by the Highlanders. Population, 1907, 18,942.

STOCKBRIDGE (stök'brīj), a town of Massachusetts, in Berkshire County, 16 miles south of Pittsfield. It is situated on the Housatonic River and the New York, New Haven and Hartford Railroad, and is surrounded by the Berkshire Hills. It is celebrated as the seat of an Indian mission established in 1736 for the benefit of the Stockbridge Indians, who were converted to Christianity under the teaching of John Sargent and Jonathan Edwards. These Indians numbered about 400 and their descendants are now living in the vicinity of Green Bay, Wis., where they engage largely in farming. Near Stockbridge, in the vicinity of Lake Mahkeenac, are the remains of the house in which Hawthorne wrote "The House of the Seven Gables." The town contains a monument of Jonathan Edwards, a park presented by Cyrus W. Field, and a public library. In the vicinity is a narrow gorge known as Ice Glen, where certain caves contain ice throughout the year. Population, 1905, 2,265.

STOCK EXCHANGE, an institution organized and maintained by brokers and capitalists, designed as a market for the purchase and sale of various securities, such as public stocks and shares. Institutions of this class are incorporated under the laws of the state where they are organized, and business is conducted on a cash basis. The New York Stock Exchange was founded in 1792 and is the largest and most important in America. Other important institutions of this kind are located at Philadelphia, Chicago, Toronto, Montreal, Boston, and San Francisco. The stock exchange of Chicago is one of the newest, but takes a high rank in the volume of business annually transacted. *Stock*

jobbing is a speculative business on the stock exchange. It is concerned exclusively with time bargains, in which there is no transfer of stock, but simply a payment of the differences by the buyer or seller according to its value above or below the price named in the bargain, the settlement being made at the time previously specified. This business partakes of the nature of gambling in many stock exchanges, while in others it is not permitted, but the actual delivery of stock is required.

STOCKHOLM (stök'hölm), the capital and largest city of Sweden, situated between Lake Mälär and the Baltic Sea, about 325 miles northeast of Copenhagen, Denmark. It occupies an attractive site on several islands and the adjacent mainland and is one of the most beautiful capital cities of Europe. Numerous substantial bridges connect the *holms*, or islands, with each other and with the mainland, and it has extensive steamboat and railroad facilities. The city was founded on an island at the mouth of Lake Mälär in the 13th century by Birger Jarl, when the government desired to make it the center of commercial enterprises with other towns of Sweden and Norway. Growth was slow until the beginning of the last century, when the building of railroads and dock improvements gave it a place as the most important commercial city of the Scandinavian peninsula. At present no European city has finer paved streets or is more carefully guarded as to sanitary regulations, while its public gardens, parade grounds, and other municipal improvements take very high rank. The streets are lighted by gas and electricity, have an excellent system of rapid transit, and are straight and regularly platted in the principal parts of the city. It has many beautiful public gardens, telephones, sewerage, and equestrian fountains. In the older quarters the pavements are inferior and the streets are narrow, but stone and brick are replacing the wooden structures.

Among the noteworthy buildings is the palace, a fine Italian structure dating from 1753, and near it is a statue of Gustavus III. Adjacent to the palace are numerous gardens, a gallery of paintings, a museum, and a splendid national library. Other buildings of note include the College of Surgery, the council house, the Saint Nicolai's Cathedral, the Church of Saint James, the observatory, and the Knight's Hall. The noteworthy statues include the one in the Hop Garden dedicated to Linnaeus, the statue of Gustavus Vasa near the Knight's Hall, and several others erected in honor of Swedish kings. Gustavsholm, the largest of the islands, is the most densely populated part of the city

and has the finest buildings, while on Ship Island is the seat of the Swedish navy, and on Ladugaard's Island are romantic glens and picturesque heights. The city is well supplied with public schools, numerous scientific and benevolent associations, and a number of institutions of higher learning. Practically all the people are Protestants and members of the Lutheran Church. Illiteracy has been reduced to a remarkably low per cent. The manufactures include cotton textiles, woolen and silk goods, porcelain, leather, glass, ribbons, sugar, tobacco products, ironware, sailing vessels, steam engines, machinery, and hardware. Stockholm has a large export and import trade, steamboat connections being maintained with all the leading ports of the world. The Danes under Christian II. captured the city in 1520, when an atrocious massacre resulted. The Treaty of Stockholm, concluded in 1855, guaranteed the preservation of Swedish supremacy. Population, 1906, 332,738.

STOCKPORT (stök'pört), a city of England, at the confluence of the Mersey and Thames rivers, five miles southeast of Manchester. It is at the junction of a number of important railroads, giving it a large trade in produce and merchandise. The chief manufactures are cotton and woolen goods, hardware, engines, spirituous liquors, and machinery. The surrounding country is fertile, supplying large quantities of cereals and live stock for its market. Among the principal buildings are the Saint Mary's Church, the free library, the free grammar school, and a museum. In Saint Peter's Square is a statue of Richard Cobden. Bituminous coal is mined in the vicinity. The Romans had a station on the site of Stockport, from which a town gradually developed that in 1644 was taken by Prince Rupert. Population, 1907, 100,986.

STOCKTON (stök'tün), a city in California, county seat of San Joaquin County, on the San Joaquin River, at the head of navigation. It is on the Southern Pacific and the Atchison, Topeka and Santa Fé railroads. The streets are well platted and substantially paved. It has systems of gas and electric lighting, sewerage, waterworks, and electric railways. The noteworthy buildings include the county courthouse, the Federal post office, the public library, the Masonic Temple, the State hospital for the insane, the Saint Mary's College, the opera house, the Pacific Hospital, the high school, and the Saint Joseph's Home. Among the manufactures are flour, woolen goods, macaroni, carriages, ironware, wagons, and farming implements. It was founded in 1849 and incorporated as a city in 1850. Population, 1900, 17,506; in 1910, 23,253.

STOICS (stō'iks), the adherents of a speculative philosophy, known as *Stoicism*, which was first taught in Greece and later in Rome. The Stoic school of philosophy was founded by Zeno at Athens about 308 B. C., and was so called because its founder taught on a porch, or *stoa*, which became the gathering place of his disciples and friends. The Stoics drew their philosophy mainly from their predecessors, especially from Socrates and Aristotle. They taught that a rational soul is inherent only in man, and, though his body is formed quite like that of lower animals, he has reason and intelligence like the gods; hence, all his other faculties should be brought into subjection to reason. In their system only one God was recognized. He was regarded the father of all men and was thought to give unity, beauty, and adaptation to matter and force, the two ultimate principles of the universe. Their system eliminated as dangerous all that interfered with purely intellectual existence. In this their system possessed its chief merit, since a close observance of these tenets led man to subdue his passions and senses, and thus he became freed from all extravagances that might lead to mere sensual pleasure and operate only to gratify personal ends.

STOKE-UPON-TRENT, a city in England, on the Trent River, 14 miles north of Stafford. It is situated on the Trent and Mersey Canal and several railroads. Among the chief buildings are the public library, the Minton Memorial building, the townhall, and the Gothic church. It has statues of Wedgewood, Minton, and Colin Minton Campbell. Pottery is the chief manufacture. The place is famous for its production of ironware, porcelain, earthenware, brick, and machinery. The surrounding country is fertile, producing cereals and fruits. It has valuable deposits of bituminous coal. The place was incorporated in 1874. Population, 1907, 33,646.

STOLA (stō'là), a long garment worn over the tunic by the women of ancient Rome. It extended to the ankles, had a flounce below and broad folds above the breast, and was secured to the body by a girdle. Courtesans and women who had been divorced from their husbands were not permitted to wear the stola.

STOMACH (stüm'ak), a dilated part of the alimentary canal, serving as one of the principal organs of digestion. The human stomach is somewhat pear-shaped and has a capacity of about three pints. It is situated on the left side of the abdomen, under the diaphragm, and the esophagus opens into it from above. The esophagus forms the tube through which the masticated food enters. An opening called the *pylo-*

rus, a constriction near the smaller extremity of the stomach, allows passage into the small intestine, which has its beginning at that part of the alimentary canal. The stomach is composed of four layers: the serous, the muscular, the areola or submucous, and the mucous coats. The *outer*, or *serous*, layer is thin, transparent, and smooth, and is a part of the lining of the abdomen. The fibers of the *muscular layer* are arranged lengthwise, obliquely, and circularly. The *areola coat*, or *submucous layer*, contains blood vessels and lymphatics. The *mucous coat*, or *inner layer*, is provided with multitudes of glands, which secrete the gastric juice. This fluid is colorless and watery. It has a sour taste and odor and contains hydrochloric acid and a ferment body called *pepsin*. The function of the stomach is to aid in digestion, and, when food enters, the gastric juice is poured out freely to change the insoluble proteids into soluble and diffusible substances, called *peptones*.

Muscular contractions serve to churn the contents of the stomach and thoroughly mix the food with mucus and juice, thus reducing it to a creamy fluid called *chyme*, which passes into the small intestine through the pylorus. This motion is independent of the will, and upon its vigorous action depends in a large measure healthful digestion. It is highly essential that the hygiene of the stomach be carefully observed, since health and bodily strength depend in a large measure upon healthful digestion. Its work is facilitated by chewing the food with care so as to mix it thoroughly with saliva. A large quantity of liquids taken at the time of eating dilutes the gastric juice, and cold water tends to check its flow for a time. A short period of rest just preceding and following a meal is healthful, and regularity in eating is likewise important, since a lapse of five to six hours between meals gives the stomach a brief period of rest. Persons with weak stomachs should be careful in the selection and preparation of their food, for the reason that skillful cookery and the choice of easily digested varieties are helpful.

Many animals have stomachs constructed quite similarly to that of man, but in others it is very different. In the kangaroo the stomach has two elongated sacs, in the camel it is divided into two compartments by a muscular band, in birds there are three small but distinct dilations of the alimentary canal, and in reptiles the stomach is a mere modification of the esophagus. Most invertebrates have a digestive tract with functions similar to those of the stomach in vertebrates. Among the diseases of the stomach are gastritis, cancer, and dyspepsia.

STONE, the name applied to all solid mineral

substances, such as clay, lime, silex, and the rocks obtained by quarrying. The last mentioned include granite, limestone, marble, slate, and sandstone, all of which are used extensively for building purposes. Durable stones were esteemed highly as material for construction work in ancient times, and their use has been extensive in all periods of history for building aqueducts, bridges, and edifices. Indeed, the ancients possessed the power of quarrying and moving stone as large as any transported in modern times, and in some cases complete structures were hollowed out of single blocks and transported long distances. Herodotus describes such a structure completed on the Isle of Elephantiné and transported by Amasis to Sais, a distance equal to the ordinary sailing of twenty days. It was about 10 feet high, 18 feet wide, and 27 feet long, outside measurement, and the room within was 24 by 15 feet and 6.6 feet high. It is estimated that the weight was 9,944,750 pounds. The largest mass of stone that has been transported in modern times is the pedestal of the statue of Peter the Great at Saint Petersburg, which weighs 3,234,000 pounds. After finding that rollers made of wood and iron were insufficient to transport this immense mass of stone, balls made of an alloy of tin, copper, and zinc were used.

Granite is the most durable stone under exposure to the weather, as in monuments and the outer walls of buildings. Sandstone is used extensively for architectural structures, but it disintegrates in climates where the atmosphere is alternately dry and wet, or warm and extremely cold. This is true likewise of marble, but this stone is an excellent material for finishing and decorating the interior. Slate is employed extensively for roofing. In modern times artificial stone made in the form of a concreted material is used extensively, especially in vases, tiles, building blocks, sidewalks, sewer pipes, tunnels, and bridges. See **Concrete**.

STONE AGE, the term applied to a period of time, or a condition of civilization, which is marked by the use of tools and weapons made of stone, instead of metals. When employed in this sense the term age does not imply a fixed number of years, but signifies a period of time in which certain conditions existed, and the period covered may be of long or short extent, or of early or recent occurrence. Besides, the stone age is of variant length and confined to different periods in the history of peoples not closely associated. For instance, the stone age is thought to have ended in Europe about the year 1200 B. C., while it existed among the Eskimos of the extreme north up to the latter part

of the last century, and it still continues among the islanders of the South Pacific. Some writers have divided the stone age into two periods, known as the *paleolithic*, or *earlier*, and the *neolithic*, or *later*. This distinction is made because the implements of the paleolithic age are found with the remains of animals now extinct, while the remains of tools of the neolithic period occur with animal remains resulting from species represented by living forms. The former are different in that they are rudely constructed and entirely of flint, while the latter are finely formed and polished and in many cases they are made of various kinds of stone.

Implements of bone occur in both periods of the stone age, but their construction is marked by greater fineness in the later period. Among the implements are arrowheads, daggers, spears, ax-hammers, knives, borers, saws, chisels, scrapers, and hatchets. Highly polished axes of fibrolite and jade have been found in the vicinity of Lake Constance, Switzerland, and near Breslau, Germany. The American Indians left many remains of stone implements, especially axes, hammers, hatchets, spears, arrowheads, and utensils for performing domestic work. Many elaborate collections of remains of this kind have been made, one of the most noted being in the State historical building at Des Moines, Iowa. A large number of remains of the stone age have been secured from the mounds of the Mississippi valley and from the cave dwellings in New Mexico and the surrounding regions. Excavations and explorations of mounds and caves have led to the conclusion that the primitive peoples practiced agriculture, reared domestic animals, and possessed apparatus for catching fresh-water and deep-sea fishes. The stone age was succeeded by the bronze age and that again by the iron age.

STONECHAT, a bird of the warbler family, native to the region extending from Central Europe to the northern part of Africa. It has a short bill and long and rounded wings. The male is finely colored, being chestnut in front and lighter backward. The female is somewhat smaller in size and duller in coloring. This bird is migratory on the continent of Europe, moving southward in winter, but remains throughout the year in England.

STONE CIRCLES, or **Standing Stones**, a class of monuments used by prehistoric people to indicate their burial grounds, of which traces still remain in many regions. In some places several stones were set upright to indicate an isolated grave, and in others a complete circle of stones was erected to inclose a burial ground. Remains of this kind are called *cromlechs* in

France, *Druidical circles* in Britain, and *dom-rings* in Scandinavia, but all show more or less relation as to time and circumstances. It is thought that these remains date from the bronze age. A remarkable instance is on the Orkney Islands, north of Scotland, where an ancient stone circle is surrounded by a trench six feet deep and thirty feet wide. It originally inclosed two and a half acres, and about a dozen stones from six to fourteen feet high are still standing.

Stonchenge is the name applied to an extensive group of standing stones in Salisbury Plain, about seven miles north of Salisbury, England.



STONEHENGE IN SALISBURY PLAIN.

which is shown in the illustration. It consists of a large central stone, around which are two circles and two ovals. The inner circle consisted originally of about forty stones, which were six feet high, and the outer of about thirty upright stones with an equal number of blocks placed across the top. The two circles are about nine feet apart and at present 43 stones still remain, though fifteen have fallen or were broken down. Besides these, a number of the stones forming the two ovals are still to be seen. The largest stones are fifteen feet above the surface of the ground and indicate that they were hewn and brought from a distance. It is thought that they are of Druidical origin, but writers differ as to the period from which they date, some placing their construction one hundred years before Christ and others in the 5th century of our era. Few traces of such remains are found in South Europe and North Africa.

STONEHAM (stōn'ām), a town of Massachusetts, in Middlesex County, 9 miles north of Boston, with which it is connected by the Boston and Maine Railroad. The features include the high school, the public library, the townhall, and the public park. It has manufactures of boots and shoes, leather, boxes, and machinery. The place was settled in 1670, but remained a part of Charlestown until 1725, when it was incorporated under the present name. Population, 1905, 6,320; in 1910, 7,090.

STONES. See **Geology.**

STONES, Precious, the term applied to rare and beautiful stones, often used as a synonym of gems, but the latter is more properly the name of precious stones after they have been engraved or cut to form articles of ornament. There are three general classes of precious stones and these are found widely distributed in many parts of the world. They include the carbon, alumina, and silica classes. The diamond is the only precious stone of the carbon class, being made up of pure carbon, and is the hardest of the precious stones. Stones of the alumina class are properly called *sapphires*. They are composed of pure alumina, but are colored differently, and include the true sapphire, the oriental topaz, the oriental amethyst, the oriental ruby, and the oriental emerald. To the silica class belong the opal, the amethyst, and the agates, which include the onyx, carnelian, chalcidony, sardonyx, and bloodstone. Precious stones of the silica class are formed chiefly of silica, and those closely related to the silica and alumina classes are the true topaz, true emerald, garnet, jasper, and tourmaline. Several substances derived from plants and animals are employed to a vast extent in making jewelry and for ornamental purposes. They embrace a fossil resin called amber and pearl, coral, and various shells.

Diamond, ruby, sapphire, and emerald are the most valuable of precious stones. To bring out the sparkle and luster it is necessary to cut and polish them with considerable care. Fine effects are obtained by making what are known as *cameos* and *intaglios*, the former having the design above the general surface and the latter having the design sunk below the surface. The best result in securing the finest color effect is obtained by cutting the surface smooth and rounded, while, on the other hand, the sparkle is brought out most prominently by cutting to form many faces or facets. Besides its use for ornamental purposes, the diamond has much value in cutting glass, other diamonds, and various stones. They are employed extensively for jewels in watches. Very beautiful imitations of precious stones are made of glass, called *strass*, or *paste*. It may be given a very fine color effect, with the result that it very closely resembles several kinds of the genuine.

STONY POINT, a town of New York, in Rockland County, 36 miles north of New York City, on the West Shore Railroad. It is situated on a rocky promontory of the Hudson River, which was fortified by the colonists in the Revolutionary War and in May, 1779, was captured by the British under Clinton. On July 16, 1779,

Washington detailed General Wayne with 1,200 men to retake Stony Point, which he did by successfully surprising the British and making a gallant bayonet charge. In 1902 a national park was established here, which includes the remains of the fort. Population, 1905, 4,385.

STOPPAGE IN TRANSIT, the term applied to the stoppage of a shipment of goods while they are on the way from the seller to the buyer, owing to the fact that the shipper has not been paid. Such stoppage is not based as a manner of right upon a contract between the parties, but is permitted in mercantile usage as a protection to the seller in a case where the buyer has become insolvent. However, stoppage in transit can take place only after the goods have left the possession of the seller and before they have been delivered to the buyer; that is, they must be actually in transit. This mercantile usage was recognized judicially in England as early as 1690.

The term *milling in transit* came from a movement in political matters in the Mississippi valley about 1885. It has reference to the right of a shipper of grain to stop a car load at some intermediate point to have the grain milled or ground, when it is to be reloaded and moved to the original destination without extra payment of freight. Milling in transit has been advocated as a political measure by those who transport grain at long distances, as from Montana or North Dakota to Chicago, and in transit utilize the water power of Minneapolis for milling.

STORAX (stō'rāks), a balsam obtained from the storax tree, known as *styrax* to the ancients. This tree is native to the region adjacent to the Mediterranean and the balsam is obtained by making incisions in the bark. It is a fragrant resinous substance, has an aromatic taste, and is used to some extent in medicine. After exuding from wounds in the bark, it hardens and forms reddish-yellow tears about the size of a pea.

STORK, a genus of wading birds which belongs to the heron and bittern family, most familiar in Holland and Germany. About a dozen species have been enumerated. The *common white stork* of Southwestern Europe is tall and stately, has a height of about four feet when standing, and the body measures three and a half feet in length. The bill is long and straight, the eyes are surrounded by naked skin, the neck is long and arched, and the color is white with slight black markings. The storks arrive in Germany and the greater part of Europe in February and March, and in autumn pass to the warmer regions of Asia and Africa, making their migratory movements mostly by night.

They build their nests principally on the roofs of houses, but in some places boxes are provided for that purpose. In Holland it is con-



WHITE STORK.

sidered fortunate for the household if a stork comes to live on the housetop, and in some countries laws have been made to protect these birds, owing to their ability to destroy reptiles and small rodents and remove offal from the streets. It is not an uncommon thing to see storks in the midst of throngs of people in some of the European cities, where they apparently move with perfect composure.

The parents show remarkable affection toward their young, while aged birds are treated with marked kindnesses. Before migrating from their summer haunts they gather in large flocks, and, having no voice, they make a peculiar clatter with their mandibles. Storks rear annually three to five young, which they feed in their nests until matured to a stage ready for flight, when they are trained by the parents to move on the wing. The food consists mostly of lizards, small mammals, insects, snakes, frogs, fishes, and offal. A species of black stork is common to Poland and northern Germany, whence it moves southward in the fall. The American stork, which is common to South America, and the adjutant bird are allied to the white stork.

STORMS, the familiar violent disturbances of the atmosphere which occur in the form of

high winds accompanied by rain, hail, snow, or thunder and lightning. All parts of the world are subject to storms, but the most violent occur in the tropical regions, where they frequently continue without intermission for several days. Practical advance in the science of meteorology has led to the discovery of the general laws governing storms and storm centers, and, connecting with this an efficient weather bureau service, it has become possible to derive considerable profit from forecasts of atmospheric disturbances. During storms the wind varies in velocity from that of a moderately high breeze to about 200 miles per hour. When the velocity of the movement per hour does not exceed 5 miles, it is called a *gentle wind*; when not exceeding 15 miles, a *pleasant gale*; when not exceeding 25 miles, a *brisk gale*; and when not exceeding 50 miles, a *storm*. Great storms move at a velocity of 60 miles per hour; violent hurricanes, at 100; and tornadoes, at from 80 to 200.

The extent of storms varies greatly, but the larger disturbances are seldom less than 500 miles in width. They frequently pass from the equatorial region of America to the Arctic Ocean, though the velocity of the wind decreases somewhat as they move to higher latitudes. The direction of storms is influenced notably by the prevailing winds, the condition of the surface, and the slopes; while the velocity is influenced by the union of currents originating from high temperatures. It is interesting to observe that storms do not proceed uniformly in the same direction from day to day and that they vary greatly in velocity in different sections, the most violent disturbances resulting in so-called *storm centers*. Observers have noted that the great storms in North America are attended by immense whirling of the wind, thus forming a species of cyclone. The storms visiting the eastern seaboard originate in the region lying between Texas and Saskatchewan, and some of the larger of these cross the Atlantic to the northwestern coast of Europe. They begin by the winds blowing toward the area of low barometer, and during the prevalence of the storm the winds are northeast, east, or southeast.

Cyclones are storms in which the velocity of the wind is much greater than usual and the air moves in whirls or eddies, but of much greater power and diameter than in whirlwinds. They are called *hurricanes* in the West Indies and *typhoons* in the China Sea and the Indian Ocean. Cyclones have their origin in marked differences of temperature, usually at the change of the monsoon after the intense heat of summer is over. They are attended by excessive

rainfall and intense lightning and thunder. Tornadoes and whirlwinds are more limited in area than the cyclones, but they belong to the same class of atmospheric disturbances. Their velocity and violence often exceed that of cyclones. It is thought that they originate from the rotary motion of the air occurring above the earth's surface, which results in a rapid movement upward of the warmer air near the surface. Storms



STORM ON THE OCEAN.

of this class, but of small extent, are not infrequent in many sections of Canada and the United States. Their course is generally toward the northeast and their extent ranges from a few yards to a mile in width, but in many cases their power is spent after traveling from 100 to 200 miles. It has been observed that these local storms have a tendency to rise and fall like a bouncing ball, thus touching the surface only at intervals.

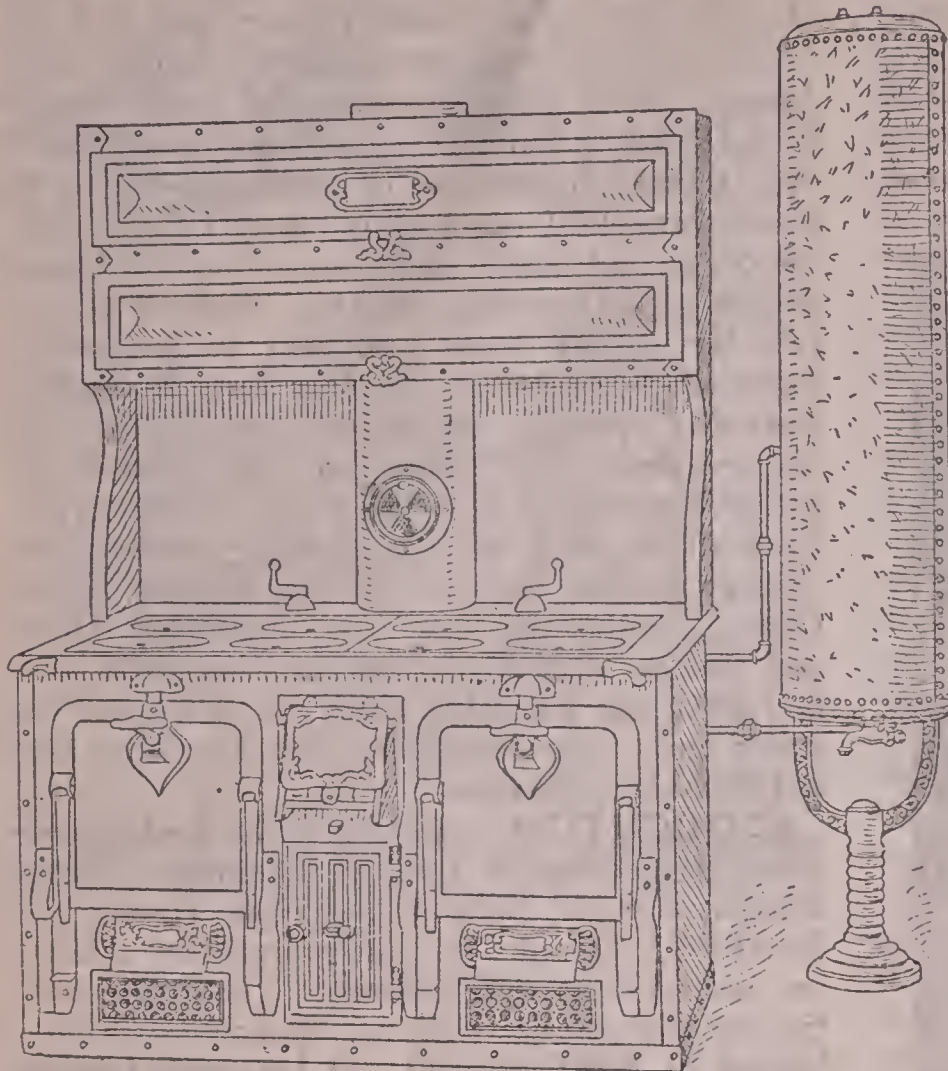
Vast storms driving fine particles of snow

frequent practically all the regions which have a plain or open surface, and are known as *blizzards*, or *snowstorms*. They occur as moderately high winds and in many sections vast drifts of snow are carried into ravines and railroad cuts, the latter being usually protected by snow fences, which serve to stop the snow that is driven along the surface. Systematic study of the occurrence and direction of winds has led to the establishment of regular routes of travel across the ocean and, when advantage is taken of them and of ocean currents, the time required by vessels for sailing from one port to another is diminished materially. Storms have a modifying effect upon the character of seasons in various sections. This is due to their influence in carrying moisture from the region of water surfaces and to their effect in causing condensation of atmospheric vapors. In the United States, Canada, and most European countries, storm and weather charts are published regularly, thus indicating the probable effect upon commercial traffic and soil productions. See **Cyclone; Signal Service; Weather.**

STOUGHTON (stō'tūn), a town of Massachusetts, in Norfolk County, 18 miles south of Boston, on the New York, New Haven and Hartford Railroad. It is surrounded by a farming and fruit-growing country. The public utilities include electric lighting, waterworks, and a library of 8,500 volumes. It has manufactures of hardware, woolen textiles, machinery, and boots and shoes. The town was incorporated in 1726. Population, 1905, 5,959; in 1910, 6,316.

STOVE, an inclosed fireplace used for cooking and for heating rooms. In former times the open fireplace was used for these purposes and the term *stove* was applied to those that were movable and to the room itself, when so heated by a fire. Stoves constructed entirely of iron are of modern invention and were probably first used in France about 1710. Shortly after they were introduced into England and Germany. Benjamin Franklin, after he visited Europe, contributed considerable to the literature on the subject of stoves. He described one of German construction as an iron box made of five plates put together and fastened by screws, leaving one side open. This side was set outside of the room, the stove itself projecting through the wall. While all trouble from smoke within the building was thus avoided, a larger per cent. of heat and the advantage of ventilation through the stove flue were lost. In 1745 Franklin invented a stove which consisted of a rectangular box of cast-iron plates. It was so constructed that the draft was downward and the heat was distributed almost uniformly from all sides.

Stoves of modern construction came into general use about 1825 and the varieties are now very numerous, including devices for heating



STEEL RANGE WITH HOT WATER TANK.

and cooking in which wood, peat, and coal are burned. Cooking stoves used at present are made largely of sheet steel, in the form of ranges, with hot water tanks attached, and those for gas are of sheet iron and steel. Heating stoves are used extensively in the smaller towns and generally in the country, but they have been displaced largely by furnace, steam, or water heating in the cities. Stoves suitable for burning gas, gasoline, kerosene, wood, and coal are used extensively for cooking. Oil and gas stoves do not heat the room, hence are preferred for summer use, while wood and coal stoves are employed extensively where service for both cooking and heating is desired.

STRAITS SETTLEMENTS, the general name of British territory in Southeastern Asia, comprising the southwestern part of the Malay peninsula and several adjacent islands. The chief divisions are the provinces of Malacca and Wellesley, on the mainland, and the islands of Singapore, Penang, and the Dindings. Besides these are a number of island dependencies, including the Christmas and Cocos islands. The area is given at 1,475 square miles. Singapore (q. v.) is the capital and most important city of

these possessions. The soil is generally fertile, the climate is tropical, and the people are a mixture of Asiatics and Polynesians. Among the chief exports are sago, copra, rattan, gums, spices, canned goods, and fruits. Tin is the chief product and the tin-smelting works are counted the largest in the world. The export and import trade is important, much of which is with the United States, England, and Germany. In 1901 the exports to the United States aggregated \$19,500,000 in Mexican currency. Few railroads have been built, but the colony has several fine canals and a large mileage of improved roads. The inhabitants include 231,980 Chinese, 216,285 Malays, and 5,142 Europeans. Population, 1906, 581,424.

STRASSBURG (sträs'boörg), or **Strasbourg**, a city in Germany, capital of Alsace-Lorraine, on the Ill River, about two miles from the Rhine. It is situated in a fertile region of southern Germany, has extensive railroad facilities, and is the seat of an important commercial and manufacturing trade. A system of canals unites the Ill with the Rhine, Rhone, and Marne rivers, thus giving it water connection with the Mediterranean and the Atlantic. As a strategical point it has few rivals, being thoroughly fortified by substantial fortresses and favored as to natural advantages. The streets are improved by substantial pavements and sewerage, lighted by gas and electricity, and supplied with electric street railways. The manufactures include watches and clocks, leather goods, cutlery, cottons, woolen and silk fabrics, musical and scientific instruments, earthenware, tobacco products, jewelry, machinery, and ironware. The Minster Cathedral is a beautiful specimen of Gothic architecture and one of the most magnificent buildings in the world. It was founded in 1015 and has a spire 466 feet high. The cathedral is adorned with fine statues, a great rose window, and excellent specimens of paintings and frescoes.

Strassburg has a famous astronomical clock, completed by Isaac Habrecht in 1570, which ranks as the largest and most remarkable in the world. It is in the tower of the Minster Cathedral. Among the buildings of note are the palace, the Saint Thomas Church, the university, the city hall, and numerous educational, charitable, scientific, and religious institutions. The Kaiser Wilhelm University is the most celebrated of its educational institutions. It has

118 professors, 1,500 students, a fine laboratory, and a library of 850,000 volumes. The city has many beautiful gardens and parks, numerous monuments, and many charitable and benevolent institutions. The city was known as Argentosatum to the Romans, who are supposed to have founded it as a point of defense against the Germans, but the latter soon came in possession of it. It became a free city of Germany in the 13th century, but was ceded to France in 1681 by the Treaty of Ryswick. The Germans conducted a siege of seven weeks in the Franco-German War and on Sept. 28, 1870, the French capitulated. Considerable damage was done during the bombardment, but the city has been greatly improved and more strongly fortified since its annexation to the German Empire. Population, 1905, 167,678.

STRASSBURG CLOCK, the celebrated clock in the cathedral, or Minster, of Strassburg, Germany. It was first built in 1352 by John, then Bishop of Lichtenberg, and was replaced by an improved structure in 1570. The present clock was built by Charles Schwilgué in the early part of the 19th century. Although a few of the original movements were restored, the present mechanical works were designed by the builder. The base is 15 feet wide and the height is 30 feet. A winding stairs on one side permits going to the different stories. Opposite the stairway is a Gothic pillar, the panels of which are decorated with figure paintings. The base of the clock contains a globe of the heavens, which shows the rising, passing, and setting of all visible stars that appear over the meridian at Strassburg. A calendar, indicating the religious feasts and the days of the month, is immediately back of the globe. Apollo, represented by a life-sized figure, indicates the day of the month, and other astronomical events are shown by the calendar in the form of an annular band.

Figures drawn in chariots appear each day, immediately above the calendar, Apollo appearing on Sunday, Diana on Monday, Mars on Tuesday, Mercury on Wednesday, Jupiter on Thursday, Venus on Friday, and Saturn on Saturday. The time of day is indicated above these figures on the dial. Two figures, one on each side of the dial, are so constructed that one of these strikes the quarter hours and the other turns an hourglass every sixty minutes. A large planetarium is on the second story and the third story has a globe which shows the phases of the moon. Movable figures in the upper part strike the quarter hour. These figures represent four periods of life, those of infancy, youth, old age, and death, and above them is a figure of Christ.

He is passed each day at noon by a procession of the Apostles. When Peter passes the Savior, a cock flaps its wings and crows three times, while Judas Iscariot, in passing, turns his face from the Master.

STRATFORD (strät'fērd), a city of Ontario, capital of Perth County, 87 miles west of Toronto. It is on the Avon River and the Georgian Bay and Lake Erie and the Grand Trunk railways, the shops of the latter being located here. The chief buildings include the county courthouse, the townhall, the Windsor and Albion hotels, the public library, and several fine schools and churches. It has manufactures of boots and shoes, flour and grist, cordage, candy, biscuits, clothing, hardware, and farming machinery. It is a port of entry and carries a large trade. Population, 1908, 15,001.

STRATFORD-ON-AVON (ā'vūn), a market town of England, situated in Warwickshire, eight miles southwest of Warwick, on the Avon River. It is noted as the birthplace of Shakespeare, and the house in which the famous writer was born is now preserved as the property of the government. The building is in a good state of preservation, but its external appearance has been much altered. The remains of Shakespeare were buried in the parish church and at the north wall are his monument and bust. Fully 20,000 visitors go to Stratford annually to visit the interesting places associated with the life of Shakespeare, this being the principal source of income to support the town. The visitors are shown the room in which he was born, the grammar school that he attended, and the theater erected in 1877 at a cost of \$150,000, which occupies the site of the old theater used in the time of Shakespeare. Other objects of interest include an American stained glass representing the seven ages, now in the window of the old church, the Shakespeare fountain erected in 1887 by George W. Childs, and the cottage of Anne Hathaway. The town has good hotel and railroad accommodations for visitors, and the surrounding country is fertile and quite beautiful. Population, 1907, 10,685.

STRATIFICATION (strät-ī-fī-kā'shūn), in geology, the arrangement of certain rocks into parallel layers, or the state of being deposited in the form of strata. Originally the materials found in stratified rocks were loose substances, as clay or sand, and were deposited by the action of moving water. The common forms of stratification are found in shale, limestone, and sandstone, and these were formed in the beds of rivers and streams and on the shores of seas. In many instances the strata lie horizontally,

but frequently they incline, when they are said to *dip*. They are either *conformable* or *unconformable*, depending upon whether their planes are parallel to each other. A group of one or more layers of the same mineral substance is called a *stratum*.

STRAW, the term generally applied to the dry or ripened stalks of certain plants, such as wheat, barley, oats, rye, and buckwheat. It is used extensively as a food and bedding for animals after the grain has been threshed out, especially that of oats, and quite frequently for packing materials in making shipments. On the large farms in the western states it is quite impossible to consume all the straw in feeding and bedding animals, but the stacks in such cases are spread out considerably to receive the water from rains, thus converting them rapidly into manure, which is afterward used as fertilizer for the land. Straw is employed in the arts in making paper, hats, bonnets, baskets, rugs, and bags. The finer products, such as hats and bonnets, are made from straw cut before it is quite ripe. Wheat is the grain sown usually for that purpose, the seed being strewn thickly so as to produce fine-grained straws. It is cut by hand when ripe and carefully dried in the sun. After being bleached in the sun and dew, it is steamed and separated into different sizes, and is then woven by women and girls into tapelike braids. These are carefully flattened by pressure and sewn together to make hats and bonnets, colors being often alternated to give the product an artistic appearance.

Within recent years much progress has been made in the manufacture of goods from straw and the price has been materially lessened, owing largely to the invention of machinery of service in preparing the materials and sewing them together. Extensive manufactories for making straw-plait work are operated in the United States, particularly in Massachusetts. The principal enterprises of this kind in foreign countries are in northern Italy, Switzerland, Germany, France, and China. Bedfordshire has been the center of the British straw-plait industry for several centuries, owing to the favorable climate for producing straw of considerable strength and a fine, bright color. *Chip hats* closely resemble those manufactured of straw, but they are made by cutting the Lombardy poplar into splints and treating them quite like the straws of grain. To secure good results, it is necessary to bury the logs of this tree in dry ground for three years, thus removing the sap, and, after becoming dried, it assumes a reddish color. Hats are made in Panama and several

South American countries from palm tree leaves.

STRAWBERRY, a genus of plants extensively cultivated for their luscious fruit. They were so named from the practice of laying straw between the rows to keep the ground moist and free from weeds. The utility of putting straw between the rows consists in keeping the berries clean, and in the colder climates it furnishes a suitable protection against freezing in the winter. Strawberries are native to America and Europe, where they are distributed quite extensively as wild plants, and from these the principal cultivated species have been developed by propagation. The plants bear trifoliate leaves, usually white flowers on scapes, and slender runners by which they are propagated. They are mostly perennial and are propagated



VIRGINIAN STRAWBERRY.

by runners, by seeds, and by divisions of the plant. The fruit is highly valued for dessert and as such is eaten with sugar and cream. It is used extensively in making jam, for pies, and in preparing a flavor syrup.

The trade in strawberries has developed into a very extensive industry in Canada and the United States, the southern-grown being shipped to the northern regions, while in the latter the fruit ripens at a later time, thus making the strawberry season one of considerable length. A nice illustration is found in New York, which is first supplied with the strawberries grown in the southern states, next by those grown in New Jersey, and finally by securing quantities from New England. Among the species extensively cultivated are the *wood strawberry*, the *alpine strawberry*, the *Virginian strawberry*, and

the *hautbois strawberry*. Many species have been developed from the wild and from seed of the cultivated varieties. Few fruits are held as highly in favor as well-grown strawberries.

STREATOR (strē'tēr), a city of Illinois, in La Salle County, on the Vermilion River, 96 miles southwest of Chicago. It is on the Wabash, the Chicago and Alton, the Chicago, Burlington and Quincy, the Atchison, Topeka and Santa Fé, and the Indiana, Illinois and Iowa railroads. The place is surrounded by an agricultural and coal-mining region. Among the principal buildings are the high school, the opera house, the Carnegie library, and many schools and churches. The manufactures include flour, glass, earthenware, vitrified clay, brick, and machinery. It has waterworks, sewerage, several parks, and a growing trade. The streets are lighted by electricity. They are substantially paved and traversed by street railways. It was settled in 1860 and incorporated as a city in 1882. Population, 1900, 14,079; in 1910, 14,253.

STREET RAILWAY, the general name of a railway operated entirely or in part upon the streets of towns or cities, designed principally to furnish intercommunication for passengers. This form of transportation was developed from the tramway, which is constructed of wooden stringers covered with strips of iron and the cars are drawn by horse or steam power. The first street railway of North America was built in New York City, in 1831, and extended from the Bowery to Harlem. It was known as the New York and Harlem Railroad and was operated as a horse-car line for many years. Though the cars were small and the speed was comparatively slow, it was pronounced a success and similar lines were soon constructed in Boston, Philadelphia, Berlin, Liverpool, and London.

Street railways operated by cable were first introduced at San Francisco in 1873, where they proved eminently satisfactory, owing to many of the streets having heavy grades. The motive power in railways of this kind is furnished by a stationary steam engine located at a central point and an endless wire cable, guided by suitable pulleys, is moved or driven at a rapid speed. This cable is in an underground conduit between the rails and a grip projects downward from the bottom of the car through a slot at the top. At the lower end of the grip are jaws that can be operated from the platform of the car. When the jaws grasp the cable, the car moves forward upon the track and it is stopped by unloosing the jaws. Many of the larger cities installed systems of cable cars, but they are now used only where the streets have steep

grades, as in Seattle and San Francisco, and to make ascent of mountains, as is the case at Mount Washington.

Electric railroads were first constructed in Berlin, Germany, in 1879. They are the most popular and serviceable of all the systems and have largely displaced horse-car lines and cable railways. They do not only traverse the streets of the principal cities, but connecting lines are maintained and operated successfully in inter-urban and rural districts. In 1909 there were 20,658 miles of electric railways in operation in the United States. Although they were confined to no particular part of the country, Illinois, Massachusetts, and New York had the largest mileage, the amount in these states being 2,390, 2,585, and 4,520 miles, respectively. In the same year Canada had 2,990 and Cuba had 375 miles.

STRENGTH OF MATERIALS, the resistance which materials offer to forces that tend to change their form. This property is frequently spoken of as the elasticity and resistance of materials and, in sciences, the strength of material is sometimes designated the *mechanics of materials*. The materials used in construction possess more or less elastic properties and spring back to their original form when the forces are removed, provided the applied forces are not so great as to cause breakage. The internal resistance that balances a structure is called a *stress*, and such temporary changes as compression, elongation, and twisting are designated *strains*. It is an established rule in engineering that the strain on materials should not exceed the elastic limit, which is a point beyond which the change of form increases to an extent greater than the force applied, and unless the force is lightened or relieved rupture results. When stresses tend to cut across a body they are said to be *shearing*, when they tend to pull it apart they are known as *tensile*, and when they operate to crush it they are designated *compressive*. Torsional stresses tend to twist a shaft and flexural stresses operate to bend, but both classes may be resolved into the three simple classes.

Changes in architecture and engineering constructions have directed attention to the study of the strength of materials. It is important to the designer of a machine or structure of any kind to know the degree of force that may be applied safely, whether the strain will be sufficiently moderate that the material will recover from it, and to what extent force may be exercised without endangering material to rupture or breakage. Besides determining what class and amount of material is nec-

essary to carry the loads, it is an item of importance to determine what is the least quantity and most serviceable kind of material that may be put into the structure. Architects and designers cannot determine these essentials by experiments as a structure is under way, but it is necessary to know what loads and forces are to be carried as well as to understand the size and kinds of materials to be used before the work of construction has commenced.

Many machines have been patented for testing materials to determine their degree of resistance. These machines differ greatly in form and method of applying force, ranging from the most delicate used in testing the finer material utilized in instruments to the heavier grades employed in measuring the strength of large and bulky objects. Bending, stretching, crushing, tension, and shearing are the common tests. Testing by tension to determine the elastic limit, maximum strength, ultimate elongation, and contraction of area is used most extensively. Before testing a given specimen, marks are made at regular intervals and measurements are taken between them, both before and after the test, and the data for computing the changes, if any, are carefully preserved. In form testing, the apparatus differs widely, but it may be generally classified under the two forms of screw machines and hydraulic machines, so called from the methods of applying the power, which in the former is by screw and wheel and in the latter by pressure transmitted through oil by means of a pump. The testing machine designed by A. H. Emery for the United States government and used at the Watertown arsenal is considered the most precise in the world. It has a capacity of 1,000,000 pounds, is extremely sensitive, and yet has the power to break a bar thirty feet long.

In studying the theory of resistance of materials we have to do with beams, shafts, and columns, all of which are dealt with in construction work. The particular forms as well as the quantity of material used depend of course upon the force to be applied and the manner in which the force acts. In buildings the stresses are steady, hence the materials offer greater resistance to forces, while in bridges and machinery the stresses vary and the structures are subject to shocks. It is estimated that the ratio of ultimate strength in timber withstanding steady strains is as 8 against 10 for varying strains and 15 for shocks. In steel the ratio for steady strains is as 5 to 7 for varying strains and 15 for shocks, while in brick and stone it is as 15 in steady strains to 25 in varying strains and 30 for shocks.

The greatest resistance to tensile strains is offered by wrought iron and steel, and wood deflects to a greater degree under a given weight than iron or steel, owing to its having a greater elastic range of action. Strength in wood depends largely upon its weight, the heavier kind being generally the stronger. Cast iron is employed extensively in the construction of bridges and foundations, owing to its ability to resist a great degree of compression. To minimize the consumption of material as well as decrease weight and increase stiffness, much material in hollow forms is employed. The utility of this is illustrated by the hollow construction of the bones of animals and many grasses. Engineers have developed formulas for calculating strength against stresses and have classed quite correctly the strains of materials, such as wood, stone, and metals.

STRIKE, an organized effort made by workmen to obtain concessions from their employers concerning wages and other matters. It consists of a refusal to work unless the demands are granted. In a thoroughly organized strike the capital of the employer lies idle, usually at a considerable loss. This condition continues until a compromise is effected or other workmen are secured. A *lockout* is a retaliatory measure sometimes resorted to by the employer, and is designed to induce the workmen to return to their employment, or as a notice to indicate that workmen are wanted who have not been implicated in the strike.

In the period extending from 1881 to 1900 there were 22,793 strikes in the United States, of which 14,457 were ordered by organizations and 8,326 took place by general agreement of the laborers. Fifty-three per cent. of those ordered succeeded, while 14 per cent. were partly successful, and the remaining 33 per cent. failed. On the other hand, of those not ordered, 36 per cent. succeeded, 9 per cent. partly succeeded, and 55 per cent. failed. The experience of the past twenty years has shown uniformly that the success of a strike depends almost entirely upon close organization of the laborers directly interested. To counteract the effect of concerted action by laborers, capital has become closely organized in all departments of the productive industries. This has had the effect of greatly prolonging strikes in which large interests are involved, such as the great anthracite coal strike of 1902, which continued about five months and cost the country \$142,500,000 by losses in business. Those having charge of organization work, both for the labor unions and operators, were confronted by a prospective strike of the miners in 1905, but the questions

involved, referring to the schedule of prices to be paid for mining, were left over to be settled in 1906.

Strikes were illegal in Great Britain until 1824 and prior to that time the participants were punished for conspiracy. However, since then many strikes have occurred each year. In 1908 Great Britain and Ireland had 485 industrial disputes, most of which involved the shipyards, textile factories, and metal workers. In the same year Germany had 3,245 strikes. They have been practically unknown in Australasia since 1894, since which time the law has required arbitration in all industrial disputes.

The following is a table giving the number of strikes and lockouts in the United States in the period of ten years, from 1891 until 1900 inclusive:

	STRIKES.		LOCKOUTS.	
	NUMBER.	LABORERS IDLE.	NUMBER.	LABORERS IDLE.
1891.....	1,717	298,939	69	31,014
1892.....	1,298	206,671	61	32,014
1893.....	1,305	265,914	70	21,842
1894.....	1,349	660,425	55	29,619
1895.....	1,215	392,403	40	14,785
1896.....	1,026	421,170	40	7,668
1897.....	1,078	408,391	32	7,763
1898.....	1,056	249,002	42	14,217
1899.....	1,797	417,072	41	14,817
1900.....	1,779	505,066	60	62,653

STROBOSCOPE (strōb'ō-skōp), an instrument for viewing a moving object by intermittent sight. The principle is explained by a cardboard cylinder perforated near the circumference with a series of openings, and the body is viewed through these perforations while the disc rotates uniformly. If the apparatus is caused to revolve, the series of views within the cylinder may be viewed with much the same effect as that produced by moving pictures. The kinetoscope and the vibroscope were evolved from the stroboscope, and in modified form it has given rise to the invention of numerous toys for children. See *Kinetoscope*.

STROMBUS (strōm'būs), the name of the shells of various mollusks, all of which have a more or less conic spire. These shells are found on a number of species of gastropod mollusks. The largest, known as the fountain shell, weighs from four to five pounds. It is used in making cameos and certain porcelain work.

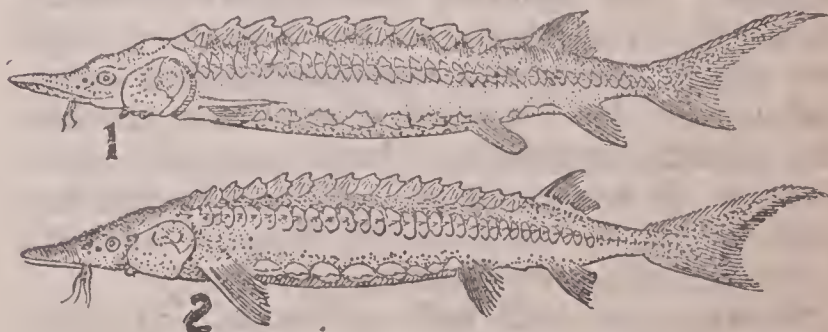
STRONTIUM (strōn'shī-ŭm), a metallic element belonging to the alkaline earths. It has a pale yellow color, decomposes in water, and burns with a crimson flame. In nature it is found in various combinations, but is closely associated with barium and calcium. It occurs

in the ashes of certain plants and in sea and mineral waters. The chief use is in making fireworks, since it burns with a bright red flame.

STRYCHNINE (strīk'nīn), an extremely poisonous compound, which is derived from several species of the *strychnos nux vomica* trees or shrubs. These plants are native to tropical regions. They are of the order *Loganiaceae*, having opposite leaves and dense, aggregated clusters of white, bell-shaped flowers. They occur in the tropical parts of America and Asia and yield, besides strychnine, brucine and other powerful drugs. Strychnine is a white, crystalline compound and in small doses is a stimulant, but when administered in larger quantities is a powerful poison and causes tetanic spasms. It has been in use since 1818, when it was discovered in Saint Ignatius' beans. See *Poison*.

STUCCO (stūk'kō), a kind of plaster prepared of a mixture of a ground chalk, or marble, with pure lime as a cement, in such proportions and so worked as to procure a durable and uniform surface susceptible of polish. It is used for covering walls and for making internal decorations, and a mixture of coarser material with cement is employed for external work. Sometimes pulverized alabaster or gypsum is used instead of marble, mixed with rich lime, carefully slaked and sifted, and then troweled on a rough coat until the surface is perfectly smooth. Other varieties are made of plaster of Paris, mixed with a saturated solution of alum or sulphate of potash, then dried in air and baked at a dull red heat. This preparation is pulverized and sifted and is then slaked with a solution of alum. Several kinds of stucco were used by the Greeks and Romans for decorating public buildings, both internally and externally.

STURGEON (stūr'jūn), a genus of ganoid fishes, having five rows of bony shields and four barbels in a transverse row before the



1, Common Sturgeon; 2, White Sturgeon.

small, tubeless mouth. The snout is long and pointed, the body is elongated, and the eyes and nostrils are on the sides of the head. The gill covers are large, the fins are well developed, and the snout is covered with bony plates. In

the spring they ascend the rivers to spawn and return to the sea in the autumn. The species which are common to the fresh-water lakes do not descend to the sea to spawn. Many species have been described. They vary in size and somewhat in general characteristics, but the flesh of nearly all is edible, both in the fresh and salted forms. A kind of pressed and salted food called *caviare* is made of the roe, and a fine grade of isinglass is obtained from the air bladder.

Sturgeons are mostly sea fish, but are found in large numbers in the bays and larger rivers. Important sturgeon fisheries occur both off the Atlantic and Pacific coasts of North America, and a fresh-water species is common to the Great Lakes, where it is caught in large quantities. The *common sturgeon* of America and Europe is from six to twelve feet long. A familiar species of the Gulf of Mexico, the *shovelnose*, is peculiar for its prolonged snout. The most important sturgeon fisheries of Europe are in the Caspian and Black seas, where the *white sturgeon* is found in abundance. It attains a length of 20 to 25 feet and a weight of 3,000 pounds. It yields most of the isinglass and caviare of the market. The *sterlet* is found in the Volga and Danube and is seldom more than three feet in length, but is noted for its delicate flesh. Lake Baikal, in Siberia, has important sturgeon fisheries.

STUTTGART (stüt'gärt), a city in Germany, capital of the kingdom of Württemberg, 115 miles northwest of Munich. It is beautifully situated on the Neckar River. The surrounding hills are covered with orchards, gardens, and vineyards. The streets of the newer part are broad and the buildings are handsome, but the older section has many structures which date from an early period. It has gas and electric lighting, electric urban and suburban street railways, systems of sewerage and waterworks, and beautiful gardens and parks. Königsstrasse, a beautiful and spacious thoroughfare, extends diagonally from southwest to northeast through the city. Among the manufactures are cotton and woolen fabrics, jewelry, chemicals, machinery, musical instruments, furniture, and confectionery. It has an extensive domestic and foreign trade, the latter being largely with the United States and European ports.

Stuttgart is well built of stone and brick. Near the center of the city is the royal palace, which is surrounded by a royal park, whose walks are free to the public. The cathedral dates from the 15th century. Other buildings of note include the government mint, the royal theater, the museum of arts, the palace of jus-

tice, the polytechnic school, the conservatory of music, the city hall, and the union railroad station. The royal library has 550,000 volumes, with which are included 9,000 Bibles in 80 languages and 2,500 specimens of early printing. The city has a remarkably large book trade and publications issued here are sent to all parts of the world. Among its notable monuments are those of King William and Schiller, the latter by Thorwaldsen. The first mention of Stuttgart occurs in 1229. It was made the residence of the counts of Württemberg in 1320 and has been the royal residence almost without intermission. The importance of the city as a commercial city dates from the Franco-German War. Population, 1905, 249,286.

STYLITES (stī'lits), or **Pillar Saints**, a class of Christian saints of the early church, who occupied lofty pillars as an evidence of penance. This practice was indulged in to realize the two fundamental ideas of Christianity, separation from the things common to this world and aspiration after those of heaven. The pillars were high columns with a platform above, so limited that the occupants were obliged to stand continually in the open sky, and were protected only at the sides by a railing. Simeon the Syrian (390-459 A. D.) was the first Stylite, and commenced the practice at Antioch in 420, where he spent thirty years on a pillar having a top four feet square. The pillar was only 10 feet high when he began this practice, but it was afterward increased to 36 and later to 72 feet. His life was one of great austerity, but it is evident that he descended at times, since it is mentioned that he wrote epistles and cured the sick by his touch. After his death the Stylites became numerous and the practice continued down to the 12th century, when it was forbidden.

STYPTIC (stīp'tik), a remedy employed in surgery to check the flow of blood, as in treating a wound. Formerly alum and tannin were used extensively as styptics, but they have been displaced by other agencies, since they are inclined to cause unclean clots or produce secondary hemorrhage. Capillary bleeding is arrested by cold or by cautery. The vegetable styptics used at present include turpentine, oak bark decoction, and gallnuts in the form of powder or an infusion. Among the mineral styptics are the nitrate of silver and the sulphates of zinc and copper.

STYX (stiks), in Greek mythology, a river of the lower regions, which flowed around Hades seven times. Across this stream the shades of the departed were conveyed by Charon, an unshaven boatman. It was so named

from Styx, the daughter of Oceanus, who dwelt in a grotto at the entrance of Hades and confirmed the solemn oath of the gods. The sea goddess Thetis dipped her son Achilles in the River Styx and thereby rendered him invulnerable, except in the right heel, by which she held him.

SUAKIM (swä'kēm), or **Suakin**, a town and seaport of Egypt, on an island in the Red Sea, connected with the mainland by a railroad bridge. It is about 630 miles northwest of the Strait of Bab-el-Mandeb and is a favorite place for Mohammedans to embark in traveling to Mecca. Formerly it was of considerable importance for its commerce, but its trade has declined considerably with the construction of railroads and the improvement of the Nile. It has manufactures of cutlery, clothing, jewelry, and small arms. The trade is chiefly in gums, ivory, and tobacco. The Turks founded Suakim. It became a British possession in 1882 and is the residence of a number of officials. Population, 1906, 12,500.

SUBLIMATION (süb-lī-mā'shūn), a process of distillation in which the vapors condense in a solid form. In this process solid substances are converted into vapor through the agency of heat and on cooling again assume a solid form, when the resulting substance is called a *sublimate*. It takes place naturally in the fissures and craters of volcanoes and the products of a sulphurous character are deposited upon the walls. The number of mineral substances that vaporize by heat and become solid again on cooling are numerous, and the number of such increases with the degree of heat that is applied. Camphor, benzoic acid, and other vegetable substances possess the same property. Sublimation is employed in the arts and manufactures as a means of separating volatile from fixed bodies, usually for obtaining the former in a purer state. Some sublimates assume a solid and compact form, such as camphor and the sublimates of mercury, while others form a fine powder, called *flowers*, as the flowers of sulphur. In some cases the vapor is changed chemically by contact with the oxygen of the air, when the sublimate is of a different composition from the original body, as when oxide of zinc is produced by subjecting the metal, or its ores, to heat exposed to the air.

SUBMARINE NAVIGATION (süb-mā-rēn' nāv-ī-gā'shūn). See **Torpedo Boat**.

SUCCESSION WAR (sük-sēsh'ūn), the general name given to an armed conflict resulting from rival claims of succession to the throne. Four of such wars are historical, since

they disturbed the peace of Europe and were accompanied by great loss of life and property. These wars rose from the conflicting claims to the thrones of four countries, those of Spain, Poland, Austria, and Bavaria, in the order named.

THE WAR OF THE SPANISH SUCCESSION began in 1701, after the death of Charles II., who died childless. Louis XIV. of France, son of the eldest sister of Philip IV., and Emperor Leopold I. of Austria, son of a younger sister of Philip IV., were the principal claimants to the throne. Fearing that the union of Spain with Austria or France would disturb the balance of power in Europe, other nations became interested in the conflict. Leopold transferred his claims to his second son, the Archduke Charles, and a majority in Spain favored the Austrian party, but Louis nominated Philip of Anjou, his grandson, and the latter was recognized as the heir. He proceeded to Spain shortly after the death of King Charles and was recognized as monarch, in 1700, and Leopold immediately sent an army to Italy under Prince Eugene, who defeated a French army at Chiari the following year. Louis XIV. unwisely recognized James Edward Stuart, the Pretender, and this caused William III. of England to enter an alliance with Holland and Austria against France. However, Bavaria and some of the other German states joined the Bourbons of France and Spain. Queen Anne succeeded to the English throne in 1702 and continued the policy of William by declaring war.

Marlborough, with an allied army of Dutch, English, and Germans, in 1702, invaded the Spanish Netherlands. At the same time the Margrave of Baden invaded France, but was defeated by Villars. The armies under Eugene and Marlborough were united, in 1704, and at Blenheim defeated the Franco-Bavarian army under Tallard. About the same time the English captured Gibraltar and Barcelona. In 1706 the French and Bavarians under Villeroy were defeated at Ramillies by Marlborough, and Eugene won a brilliant victory over the French under Marsin at Turin. Archduke Charles had previously, in 1704, invaded Spain by crossing Portugal from Lisbon, and the Bourbon forces were driven across the Pyrenees, to which Peterborough with an English army contributed materially. In the Netherlands, at Oudenarde, in 1708, Eugene and Marlborough defeated a large army of Bourbons, and the following year they gained a victory over Villars at Malplaquet.

An armistice was concluded between England

and France in 1712, but Eugene, aided by Holland, carried on the war. Prussia, Holland, England, and Savoy agreed to the Peace of Utrecht, in 1713, and the war closed the following year with the Treaty of Baden. Philip was left in possession of the throne of Spain; Gibraltar and Minorca were ceded to England, which received Arcadia from France; Austria received Naples, Sardinia, the Duchy of Milan, and the Spanish Netherlands; Savoy received Sicily; and it was agreed that the crowns of France and Spain should not be united in the same person. Queen Anne's War is the name applied in America to the conflict between the French and English as a part of the War of the Spanish Succession.

THE WAR OF THE POLISH SUCCESSION began in 1733, immediately following the death of Augustus II. of Poland and Saxony. Stanislas Leszczynski was elected king by the diet, but the nobles preferred Augustus, son of the late king, who was supported by Austria and Russia. Stanislas was supported by France, which country declared war upon Austria and invaded Lorraine. In the meantime Sardinia took up arms against Austria and Spain undertook the conquest of the Two Sicilies, which it had lost by the War of Spanish Succession. The Austrians were defeated at Bitonto in 1734 and were compelled to relinquish the Two Sicilies. Augustus III. was made King of Poland, but the duchies of Lorraine and Bar were assigned to Stanislas for life.

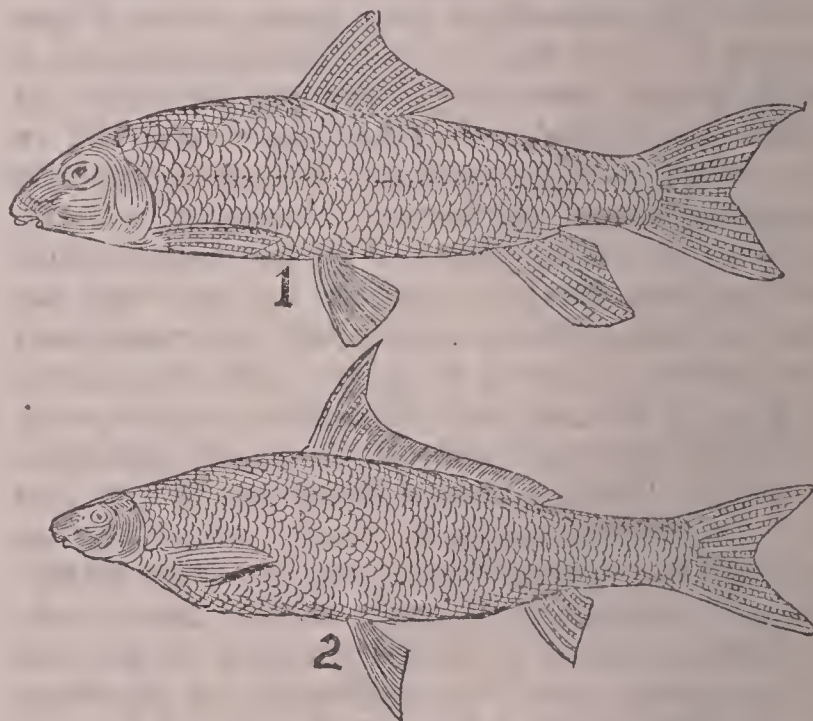
THE WAR OF THE AUSTRIAN SUCCESSION began in 1740, after the death of Charles VI. Maria Theresa ascended the throne with the support of most of the powers, but Frederick the Great seized Silesia, while Charles Albert of Bavaria claimed the throne of Austria as a descendant from Ferdinand I. The latter was crowned emperor in 1742 as Charles VI., and was supported by Prussia, France, Bavaria, Spain, Saxony, Sardinia, and Naples. Maria Theresa had the united support of Austria, Hungary, England, and Holland. The policy of France to gain unusual advantages caused Frederick to become displeased and as a result Saxony and Prussia concluded the Peace of Dresden with Austria, thus terminating the second Silesian War. Marshal Saxe gained substantial victories in the Austrian Netherlands, where he defeated the allied army of English, Dutch, and Austrians. Charles VII. died in 1745 and his son, Maximilian Joseph, relinquished his claim to the throne of Austria and concluded peace. Francis I., the husband of Maria Theresa, was elected emperor in the same year. Marshal Saxe won several successes against the Austrians, but

peace was finally concluded at Aix-la-Chapelle in 1748. By the terms of this treaty the Hapsburgs lost Silesia, which became a part of Prussia. Spain received Parma and Piacenza. In America this contest is known as King George's War, during which the French lost Louisburg, in 1745.

THE WAR OF THE BAVARIAN SUCCESSION followed the death of Maximilian Joseph of Bavaria, in 1777. Having no legitimate heirs, Charles Theodore of the house of Wittelsbach claimed the throne. He was supported by Joseph II. of Austria, but was opposed by Frederick the Great, who declared war and invaded Bohemia. Saxony supported Prussia. Catherine II. of Russia was hostile to Austria, which induced Maria Theresa to conclude the Treaty of Teschen in 1779. As a result of this treaty the crown of Bavaria passed to Charles Theodore, while Saxony received a money indemnity, and Austria was given a small district on the east side of the Inn.

SUCHAU. See **Soochow.**

SUCKER, a genus of soft-rayed fishes of the carp family, having the mouth usually protractile, with thick and fleshy lips adapted for suck-



SUCKER.

1, Common Sucker; 2, Missouri Sucker.

ing in food. About thirty species are found in the fresh waters of America, of which the *common sucker* is the most abundant. It attains a length of twelve to eighteen inches and, like other species of suckers, is hard to catch with a hook, owing to its difficulty in taking bait. The *buffalo sucker* is two to three feet long and is found in the large rivers of the Mississippi valley. These fishes are somewhat bony, but quite well flavored. They are caught mostly with nets. The largest of the genus is the *Mis-*

souri sucker, which is from two to four feet long.

SUCRE (sōō'krā), or **Chuquisaca**, the capital of Bolivia, situated on a tableland 8,975 feet above the sea, 125 miles southeast of Lake Poopo Choro. The streets are regularly platted and well improved by grading and paving. Among the noteworthy buildings are the cathedral, the national university, the school of industrial arts, and several colleges of arts and sciences. The city was founded by Pedro Auzures, an officer of Pizarro, in 1538. It occupies the site of an Incas town called Choque Chaka, meaning bridge of gold. The surrounding country contains valuable deposits of silver and other minerals, but the most noteworthy mines are those producing silver ores. It has a considerable inland trade and manufactures of clothing, furniture, hardware, jewelry, and machinery. The Pilcomayo River has its source in the vicinity of the city, and in the region of its headwaters are valuable forests and soil of considerable fertility. The inhabitants are mostly of Spanish extraction, but a considerable portion of the people are Indians. Population, 1908, 40,500.

SUDAN (sōō-dān'), or **Soudan**, the Arabic name of a vast region in Central Africa. It is bounded on the north by the Sahara Desert, east by Egypt and Abyssinia, south by the Congo Free State, Cameroon, and Upper Guinea, and west by Senegambia. The Sudan has an area of about 2,500,000 square miles and a population variously estimated from 15,000,000 to 80,000,000. The inhabitants are mainly of Negro blood, differing in stature and habits and slightly in color, according to the region occupied. They are classed mainly as to location in the three general divisions known as Western, Central, and Eastern Sudan. In *Western Sudan* the French have obtained the predominating influence, chiefly by moving eastward from Senegambia. This region includes a large part of the Niger and Senegal valleys and is divided into a number of native states, but all are now more or less tributary to the French.

Central Sudan embraces the northern part of the Niger Territories, Cameroon, and French Congo, and the regions tributary to Lake Tchad. The drainage is almost exclusively into Lake Tchad, which has no outlet to the sea, but a portion of the southern region is drained into the Niger and Congo rivers. *Eastern Sudan*, often called the Egyptian Sudan, includes the divisions known as Darfur, Kordofan, Senaar, and several others, thus including a part of the upper Nile region and the towns of Khartoum and Fashoda. The Sudan region may be de-

scribed as being moderately elevated and diversified by rolling plains, level plateaus, and somewhat elevated highlands in the southwest. In the northern part are many sandy wastes extending from the Sahara, but there is a gradual transition to the well-watered and arable interior, and the height of fertility is reached in the vicinity of 10° north latitude.

The distribution of plant and animal life in the Sudan is greatly varied, owing to vast difference in the soil, climate, and distribution of moisture. Among the principal productions are corn, sugar, tobacco, rice, cotton, indigo, and many kinds of fruits. Cattle, horses, sheep, camels, and goats are reared in many sections, especially by the people of Arabic extraction. Honey made by wild bees forms an important article of commerce. Ostrich feathers, ivory, rubber, palm oil, wax, iron, gold, silver, gums, salt, timber, and building stone are obtained in abundance. In many sections large herds of wild animals are met with, especially elephants in the swamp regions of Lake Tchad, the rhinoceros in the Wadai, crocodiles in the large rivers, and the zebra, antelope, giraffe, and wild ass in the eastern steppes. In some regions are vast numbers of hippopotami, monkeys, serpents, birds of song and plumage, and fish.

A large part of the Sudan is still under government by native chiefs, but within recent years the French, Germans, Portuguese, and English have established protectorates or annexed different tracts to their colonial possessions. Portuguese influence has been manifest largely through the Congo Free State, English through Egypt and the Niger Territories, German from Cameroon, and French from Senegambia. Trade stations have been established in all the sections tributary to water courses, or caravan routes, and railroad building has made material progress.

SUEZ (sōō-ěz'), a seaport in Egypt, at the Red Sea terminus of the Suez Canal, 75 miles east of Cairo, with which it has railroad connection. It was a small Arab village of little importance until the Suez Canal was constructed and a canal was built from the Gulf of Suez to the Nile, but it is now the seat of considerable trade. Suez has immense store and ware houses, a good harbor, and a large stone causeway to carry the railroad to the harbor of Port Ibrahim. The noteworthy buildings include a handsome Greek church, two hospitals, a custom-house, several schools, and a number of government buildings. A canal from the vicinity of Suez to the Nile was maintained in ancient times by the Ptolemies, but at various periods fell into a state of decadence. Population, 1908, 18,762.

SUEZ CANAL, the great ship canal across the Isthmus of Suez, a strip of land that separates the Red and Mediterranean seas. It extends from Port Said on the Mediterranean to Suez on the Red Sea, a distance of 98 miles, 21 miles of which consists of small lakes. The honor of conceiving the idea of constructing a ship canal without locks across the Isthmus of Suez is due to Napoleon I., a project he formed when the French occupied the town of Suez in 1798. A concession to build the canal was granted to M. Ferdinand de Lesseps, a French engineer, in 1854, and work began under his direction on April 25, 1859. The canal cost \$90,000,000 and was formally opened for the passage of vessels on Nov. 17, 1869. It was originally from 196 to 327 feet wide at the surface, 72 feet wide at the bottom, and 26 feet deep, but a large increase in the canal traffic has caused the commission to widen and deepen it materially. Side basins are maintained in several places to facilitate the passage of vessels, and the fresh-water canal from Suez to the Nile runs almost parallel to it from Suez to Ismailia, whence it passes west to the Nile. The latter is 9 feet deep and 35 to 40 feet wide and supplies fresh water for irrigation and domestic use, but it is also navigated.

In 1887 a system of electric lights was stationed along the canal to facilitate the movement of vessels at night. Steamships sail at a speed of from five to six knots an hour and require sixteen to twenty hours in making the passage, which costs about \$500. The canal is under the direction of a canal commission, which has a lease of the land on both sides of the canal for 99 years and holds annual meetings at Paris. Few American merchant vessels use the canal, but it is the seat of a remarkable traffic, the majority of which is carried by English and German vessels. About 4,000 vessels pass through the canal annually, having a gross tonnage of 14,500,000 tons and paying about \$22,575,000 in tolls. A fine bronze statue of Lesseps was unveiled at Port Said on Nov. 17, 1899.

SUFFRAGE (sŭf'frāj), the privilege of participating in the government of a state or nation by voting at an election for officers or a change in the fundamental law. Two theories have been advanced regarding the suffrage, one of which implies that it is a privilege extended by the government to be exercised under certain restrictions, and the other that it is a natural right, like liberty. The latter has come to be the common view held by people of progressive nations, but the former principle is the one on which the majority proceed in practice. Suffrage was limited more or less in the English

colonies of North America. The general limitations included that the individual must be a male freeholder, possess property of a certain value, or pay taxes of a certain amount. These restrictions were gradually removed after the Revolution, though the Constitution does not guarantee the right of suffrage to the citizens of the United States, but, instead, permits the states to fix the qualifications of the voters.

The Fourteenth Amendment to the Constitution provides for the reduction of representation of a State in Congress, in proportion to the number of citizens deprived of suffrage, except for crime. This was intended to guard against the disfranchisement of the Negro population. The Fifteenth Amendment forbids the denial to a citizen of the right to vote on account of race, color, or previous condition of servitude. This amendment does not guarantee a vote to every citizen, but provides that, if any citizen vote, others shall not be forbidden to vote for any of the above reasons. Male suffrage was provided for by the states as soon as they were formed, but there are still restrictions of various kinds, among them the payment of taxes, ability to read and write, and several others. The territories have no voice in the Federal elections, and neither have the inhabitants of the District of Columbia, which is under the immediate control of Congress. Female suffrage has been placed on an equality with male suffrage in several of the states and some form of suffrage has been given women in nearly all, especially in relation to school matters and the voting of bonds. The states that have authorized female suffrage at general elections include Wyoming, Colorado, Idaho, and Utah.

SUGAR (shōōg'ēr), a sweet, crystalline compound derived chiefly from the juice of the sugar cane and sugar beet. However, it occurs in many other vegetables. Among the various sources of sugar are the sap of some trees, the seed, flowers, and fruits of some plants, the juices of various roots and grasses, and the milk of animals. Sugar was first made from sugar cane in India, whence the art of manufacture was carried to Arabia, and later it was introduced by the Moors into Spain. The Spanish colonists brought sugar cane to the West Indies, where it proved a plant of great value, and in 1751 it was introduced for culture in Louisiana.

SUGAR CANE. The plant known as *sugar cane* is not met with in a wild state, but is thought to be a native of tropical Asia, where it was developed by carefully cultivating allied species of grasses. The leaves are broad, smooth, and from three to five feet long. The stems have a

shining effect, growing usually to a height of seven to twelve feet. Within the stem is a sweetish pith, which supplies the juice essential in the production of sugar. It requires a rich soil and an abundance of moisture during the growing season. Low land is the most suitable, especially where the soil is of a rich, alluvial character. The plants are propagated by cuttings of the top joints, which are planted in rows five to seven feet apart.

CANE SUGAR. About one-half of the sugar sold on the market is obtained from sugar cane.



SUGAR CANE.

The stems are first stripped of their leaves and the seed tops are clipped off, and they are then cut a short distance above the ground. After expressing the juice from the stems by means of a cane mill, it is conducted into tanks and carefully strained into a receptacle. From this it is drawn off into a series of pans to be evaporated by heat until it becomes granular, after which the dry sugar is separated from the syrup by means of machinery. In the ordinary process of evaporating the juices, common

brown sugar is formed, usually called *raw sugar*, and this needs to go through a refining process before the higher grades of marketable sugars are obtained. This is done usually by dissolving the raw sugar in hot water, and, after adding a solution of lime or sulphuric acid, it is passed successively through bags made of cloth and through animal charcoal, which serve to remove all impurities and take out the color. The liquid mass is then boiled a second time to take out the dampness, and the sugar crystals resulting are perfectly white.

Granulated sugar is made by separating the syrup from the crystals in a machine that revolves rapidly. By placing small quantities of the granulated sugar, before it is completely dry, into molds and drying, *lump sugar* results. *Loaf*

sugar is the product which is obtained when the refined liquid sugar is evaporated in pans. Many widely different processes are employed in manufacturing sugar, several distinct kinds of machinery being used in the making of the various classes of products. Cane mills are usually constructed with two or three rollers, between which the sugar cane is crushed and the juice is collected in pans below. Horse power is used to propel the mills in small plantations, but in the larger establishments steam power is applied.

BET SUGAR. Beet sugar is a product of the sugar beet, the juice of which yields from 10 to 20 per cent. of sugar. It is made in practically the same way as cane sugar after the juice has been secured by crushing the root. The product obtained from the sugar beet has entered very largely into direct competition with the product secured from the sugar-cane plantations of the West Indies, the East Indies, Australasia, and the tropical regions of America, Asia, and Africa. Germany is at present the largest producer of beet sugar, the annual yield averaging about 1,975,000 tons. The countries taking next rank are Austria-Hungary, France, Russia, Belgium, Holland, and the United States. Austria-Hungary produces annually about 1,200,000 tons, and France, 850,000 tons. In 1908 the United States produced 250,000 tons of beet sugar and about an equal amount of cane sugar. The beet-sugar industry has made rapid progress in Canada the last decade, notably in Ontario.

OTHER CLASSES OF SUGAR. A fine quality of sugar is made from the sugar maple, especially in New England, Ohio, West Virginia, New York, Pennsylvania, New Brunswick, and Ontario. The sap of the sugar maple is obtained in the spring as the sap flows upward, and is evaporated and treated quite like the sap obtained from other sources. Large quantities of maple sugar are used in making confections. A class of sugar known as *jaggery* is obtained from several species of palms. It is a dark colored raw sugar and is produced in comparatively large quantities. Other plants which yield sugar include the sorghum plant and the ordinary field or Indian corn.

CONSUMPTION OF SUGAR. The total consumption of sugar in the world, in 1908, was 14,500,000 tons, of which 7,190,000 tons were beet sugar. Much of the raw sugar consumed in the United States is imported and refined by domestic manufacturers. The annual consumption in that country averages 2,525,000 tons, of which only about 20 per cent. is wholly of domestic production. In 1908 the consumption was 2,519,847 tons, or 65.2 pounds per capita, of which 1,950,014 tons were imported. England con-

sumes 91.6 pounds of sugar per capita, the largest in the world. Switzerland consumes 60.3 pounds; Canada, 54; Sweden, 38; France, 36; Germany, 34; and Russia, 14.

COMPOSITION OF SUGAR. Sugar is composed of various proportions of oxygen, carbon, and hydrogen. The constituents in all kinds of sugar are the same, but they differ materially in the relative quantities. *Grape sugar* occurs in the juices of various fruits, such as the currant, apple, peach, and grape. It varies in quantity from 1 to 15 per cent. *Glucose*, or *starch sugar*, is a kind of grape sugar and is made by boiling starch in sulphuric acid and water, the action of the acid being to unite some of the oxygen and hydrogen of the water with the carbon, thus forming a syrup. The acid is afterward removed by adding carbonate of lime, which operates to combine the sulphuric acid with the lime and thus frees the carbonic acid. Afterward the sugar is crystallized by boiling the mixture and thereby evaporating the water. Other sugars are those made of barley, honey, and various allied substances. See **Beet; Molasses; Sorghum.**

SUGAR CANE. See **Sugar.**

SUICIDE (sū'ī-sīd), the crime of a person who kills himself with malice aforethought. Suicide is uncommon, though not entirely unknown, among uncivilized peoples. It is resorted to more generally in the highly civilized countries than those that rank as semicivilized, and the crime appears to have gained in extent more rapidly within the last century than at any other equal period in the world's history. Although the ancients did not regard suicide a crime or even as dishonorable, it was less common anciently than now. That this means of ending their lives was chosen by Demosthenes, Cleopatra, Hannibal, Mark Antony, and Themistocles is assigned to some event in their lives or marked changes in conditions, such as caused them to act from the impulse of despair. On the other hand, the Scriptures furnish numerous examples of suicides through revenge or remorse, such as those of Samson and Judas Iscariot.

Suicide is usually looked upon as the result of insanity, or as a symptom showing that the brain is diseased. Some writers are inclined to look upon the act with such dread, both from the standpoint of ending mortal existence wrongfully and from the viewpoint of passing into eternity under the most unfavorable circumstances conceivable, that they regard suicide by a sane person impossible. On the other hand, there are writers who believe a sane person may commit the act after careful deliberation and as

considerately as he might consummate a matter of business. However, the majority of suicides are known to be due to melancholy and the excessive use of intoxicants, such as opium and alcohol. Statistics show that two-fifths of those suffering from melancholia make suicidal attempts upon their lives. Those engaged constantly in work or under the heavy pressure of business, especially where they are exposed to worry and strenuous competition and are barred from a calm consideration of the higher phases of life, are exposed to the dangers of this crime. Frequently suicide is suggested during a state of excitement by the sight of means to destroy life, such as a weapon or a torrent of water. The tendency is undoubtedly inherited in many instances, since suicides, like some diseases, may be traced to a number of members belonging to the same family. An attempt to commit the crime is punishable in some countries, as in a number of the states of the United States. Formerly the laws of England worked a forfeiture of the goods and chattels belonging to the suicide and the body was buried ignominiously, usually with a stake thrust through it, but this practice fell into disuse at the time of George IV.

Suicides are more numerous among men than among women, the proportion being about three to one. Children at the age of five years have committed the act, and even persons over ninety, but the greatest number occur between the ages of 40 to 44. Suicides are more numerous among single than among married people, and the rate is higher in large cities than in towns and country districts. The greatest percentage is among military men, but the rates are comparatively high in the professional and commercial classes. Laborers are less prone to the act than artisans. The principal means of ending life are hanging, shooting, drowning, poisoning, and jumping from heights.

The notable suicides mentioned in history include the following:

Sappho.	B.C. 7th C.	Marcus Salvius Otho....	69
Themistocles.....	449	Thomas Chatterton.....	1770
Empedocles.....	435	Robert Clive.....	1774
Demosthenes.....	322	Charles Pichegru.....	1804
Hannibal.....	183	Sir Samuel Romilly.....	1818
Mithridates.....	63	Robert Stewart	
Cato the Younger.....	46	Castlereagh.....	1822
Brutus and Cassius.....	42	Admiral Robert Fitzroy.	1865
Mark Antony.....	30	Louis II. of Bavaria.....	1886
Cleopatra.....	30	Crown Prince of	
	A. D.	Austria.....	1889
Judas Iscariot.....	29	José Manuel Balmaceda.	1891
Nero.....	68	Georges Boulanger.....	1891

SULIOTES (sōō'lê-ôts), the name of a race of people who occupied the valley of the ancient Acheron, in European Turkey, where they settled in the 17th century to escape the oppression of the Turks. They descended from Greek and

Albanian shepherds and were named Suliotes from the mountains of Suli in the south of Albania, where they supported themselves by rearing cattle and pursuing agricultural arts. By the close of the 18th century they had increased to considerable numbers and were successful in resisting the attacks of the Turks. Their government was in the form of an independent republic, with the center of influence at the village of Suli, which was finally taken by the Turks in 1822, and the Suliotes moved southward to different parts of Greece. An effort was made to regain their former possessions by Marco Bozzaris, but he was ultimately required to retreat into Greece. The Congress of Berlin, in 1878, recommended that the region formerly occupied by them should be annexed to Greece, but this recommendation was not complied with.

SULKY (sŭlk'y), a light vehicle with two wheels, fitted with a seat for one person and drawn by a single horse. Vehicles of this class are used extensively for training horses or driving them in races. The driver occupies a seat quite near the horse, usually over the rear end of the shafts. Sulkyies of modern construction are very light, and the better grade have ball bearings and pneumatic tires.

SULLIVAN'S ISLAND, an island six miles below Charleston, S. C., lying between its harbor and the ocean. It is the site of Fort Moultrie and is a popular summer resort and residence of Charleston business men. Ferryboats connect it with Charleston. Fort Moultrie was evacuated on Dec. 26, 1860, by Major Anderson.

SULPHATES (sŭl'fāts), the salts of sulphuric acid, some of which occur as native minerals, while others are prepared artificially. The *sulphates of aluminum* are of value commercially and embrace the alums, a class of double salts, formed of aluminum sulphate with the sulphates of ammonia, potash, or soda. *Ammonium sulphate* is made largely from the ammoniacal liquor of gas works, and is employed as a fertilizing agent. *Nickel sulphate* consists of green crystals and is used in nickelplating. The *sulphate of quinine* is employed in medicine; the *sulphate of zinc*, or *white vitriol*, is used in surgery and in calico printing; and the *sulphate of iron*, or *green vitriol*, is of great value in medicine, for making inks and dyes, and in calico printing. The *sulphate of copper*, or *blue vitriol*, is used in preparing green coloring matters and in surgery. Other important sulphates include those of cobalt, calcium, mercury, silver, and uranium.

SULPHONAL (sŭl'fō-nal), a substance used in medicine to produce sleep. Though poisonous in its nature, it is harmless as a hypnotic

agent when administered in proper quantity. It is best taken with hot milk, since it is not highly soluble in water. Its advantage over chloral is that it has no depressing influence upon the action of the heart. If taken in excessive doses, it is liable to cause eruptions of the skin and various functional disorders.

SULPHUR (sŭl'fŭr), a nonmetallic element of a lemon-yellow color, which is widely diffused in the mineral kingdom, both in the free state and in combination with other substances. *Metallic sulphates* and *metallic sulphides* are the terms applied to substances that contain it in combinations, hydrated sulphate of lime being the most abundant of the former and metallic ores of the latter. Elementary sulphur is met with extensively in the organic world, forming an essential component of the albuminoids, a class of compounds occurring both in animal and vegetable structures. Animal hairs contain about 4 per cent. of sulphur. The essential oils of garlic, onion, and mustard embrace a considerable quantity. Sulphur in the free state is most abundant in volcanic regions, the most extensive deposits being in Sicily, where about 400,000 tons are produced annually. Extensive deposits occur in California, especially in the vicinity of Borax Lake, and in Canada, Mexico, Iceland, Germany, France, Italy, and Spain.

Sulphur has neither taste nor smell, is a poor conductor of heat and electricity, and is not soluble in water. When rubbed or melted, it emits a peculiar odor, and may be easily melted and volatilized. It fuses at 257°, and, when its temperature is raised to 790°, it rises in vapor that condenses in the form of a fine yellow powder known as *flowers of sulphur*. Roll sulphur, or brimstone, is made by melting and pouring it into molds. It takes fire in the air at a temperature below redness. Its combustion is attended by disagreeable fumes and in unison with oxygen it forms sulphur dioxide, called also sulphurous acid gas and sulphurous oxide. It unites directly with other elements when highly heated, which may be seen by the circumstance that copper burns brightly in sulphur vapor. Sulphur is used in the manufacture of matches, gunpowder, and sulphuric acid. It serves an important purpose in bleaching, in vulcanizing India rubber, and in many other operations. The chief sources of supply in North America are in Louisiana, Nevada, Texas, California, and Ontario. Some of the most productive sulphur mines of the United States are in Calcasieu Parish, Louisiana.

SULPHURETED HYDROGEN (sŭl'fŭ-rĕt-ĕd hĭ'drō-jĕn), an inflammable gas found in certain mineral waters and produced by the de-

composition of organic matters that contain sulphur. It is emitted during a volcanic eruption, and may be produced artificially by burning sulphur vapor in hydrogen. The odor is nauseous and the substance is deadening if it is inhaled in large quantities. During volcanic action it sometimes overcomes man and animals. Sulphureted hydrogen is colorless, is soluble in water and alcohol, and has the property of turning blue litmus paper red. This gas is somewhat heavier than air and, if mixed with 1.5 volumes of water and ignited, it explodes. It is used in analytical chemistry and for the manufacture of metallic sulphides. In some instances it is employed to purify sulphuric acid. Sulphureted hydrogen is called *hydrogen sulphide* and *hydro-sulphuric acid* by some writers.

SULPHURIC ACID (sŭl-fŭ'rĭk), or **Oil of Vitriol**, an acid discovered in the latter part of the 15th century by Basil Valentine (born about 1414). It is a colorless, oily liquid. Sulphuric acid is tasteless, reactive, and intensely acid. When coming in contact with animal and vegetable substances, it has the effect of quickly charring them. The specific gravity is about 1.72. It is soluble in water, for which it has so strong an affinity that it causes the formation of water in many substances which do not contain that element. Sulphuric acid is obtained in small quantities by boiling sulphur in nitric acid, but it is produced on a larger scale by the distillation of green sulphate of iron, and by the oxidation of sulphurous acid through the agency of nitric acid and hyponitric acid. There are many uses of sulphuric acid, especially in making alum, soda, and phosphorus. It is employed in refining petroleum, in making fertilizers, and in treating various diseases, especially in painter's colic and cholera. In medicine it is used as a tonic, an astringent, and a refrigerant. It is given as an aid in indigestion and as a remedy in cases of typhoid fever.

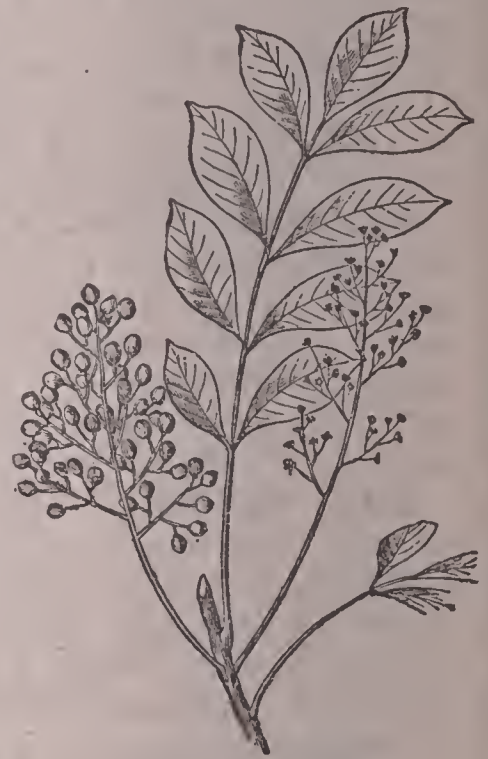
SULTAN (sŭl'tan), an Arabian word, meaning *mighty one*, applied as the title to the Emperor of Turkey. This sovereign, although formerly a temporal autocrat, is now limited by a constitution, but he is still recognized as the caliph or successor of Mohammed the Prophet. The mother of the eldest son of the Sultan is called the *hasseki sultan*, and the term *sultana* is the general form applied to women.

SULU ISLANDS (sŭl-lŏ'), or **Jolŏ Archipelago**, an island group of the Philippines, lying between Mindanao and Borneo. The northern coasts are washed by the Sulu, or Mindora, Sea, and its southern, by the Celebes Sea. It includes about 150 islands. All are of volcanic origin. The area is given as 1,050 square miles.

The chief island is Cagayán Sulu, with a length of 36 miles and a breadth of 12 miles. It contains the town of Sulu, or Joló. The archipelago is divided into three divisions, known as the Sulu, Tapul, and Tawi Tawi groups.

The soil is generally fertile and the climate is favorable, but the archipelago is subject to hurricanes. Among the productions are rice, tropical fruits, gum mastic, timber, coffee, pearl shells, edible birds' nests, resins, and various minerals. Horses, cattle, goats, and buffaloes are grown in abundance. The inhabitants are mostly of Malay descent and the chief religion is Mohammedan, whose adherents are known as *Moros*. Spain long claimed sovereignty of the islands, but they were ceded, along with the Philippines, to the United States in 1898. The archipelago has innumerable villages and several growing seaports. Population, 1908, 52,836.

SUMAC (sŭ'măk), or **Sumach**, a genus of trees and shrubs, which includes about fifteen species that are native to North America. About 100 species have been described, most of which are widely distributed, except in the coldest regions. In the *Virginian sumac*, which is found in many sections of North America, the leaves are pinnate and the flowers are small. The wood and bark yield an acrid juice of value in the arts.



POISON SUMAC.

In most species the flowers are yellowish-green, usually growing in a cluster, and are followed by a group of reddish-colored fruit. In early autumn the leaves assume a scarlet hue and soon fall to the ground. The most widely distributed species is the *smooth-leaved sumac* of the United States, which grows to a height of ten or twelve feet. It yields properties of value in tanning and for medicine. The *poison oak* of North America is a shrub from one to four feet high, and a closely related species known as *poison ivy* is a vine quite largely distributed. *Swamp sumac*, or *dogwood*, is common to the swamps, where it grows as a shrub to a height of fifteen feet. The seeds of this species yield an essential oil used in candle making. The *Venetian sumac* and *elm-leaved sumac* are spe-

cies native to Europe, where they are utilized largely for tanning, dyeing yellow and black, and in medicine. *Japan sumac* is native to Japan. It yields a varnish of value for lacquer work. This varnish is made from the juice, which is secured by cutting a wound in the tree, and on exposure to the air it becomes thick and black. A vegetable wax is obtained from the oil of the seeds and is used for candles. Much of the sumac sold in the trade is obtained from Sicily.

SUMATRA (sōō-mā'trā), an island in the Indian Ocean, lying southwest of the Malay peninsula, from which it is separated by the Straits of Malacca. Sunda Strait separates it from Java, and Banka Strait lies between it and the island of Banka. It is 1,112 miles long and is divided into nearly equal parts by the Equator. The width is 245 miles and the area is given at 184,768 square miles. The Barisan Mountains traverse near the western coast, their peaks ranging from 1,500 to 6,000 feet, but the elevations culminate in the volcano Indrapura, height 12,575 feet. Along the western coast is a plain only a few miles in width, which is covered with dense forests and has extensive jungles, while the eastern part of the island is a plain with fertile soil. This plain is traversed by numerous rivers, including the Jambi, Indragiri, Siak, Musi, and Bangka, all of which have a general course toward the east. The eastern shore has a number of important inlets, and off the eastern and western shores are numerous islands of more or less fertility.

In the interior of Sumatra the climate is hot and the presence of large marshes makes various fevers quite prevalent, but the coast and highland regions are generally healthful. Monsoons and earthquakes are not infrequent. Rains fall copiously in all months of the year. Among the minerals are limestone, granite, serpentine, basalt, sandstone, saltpeter, coal, copper, lead, iron ore, sulphur, silver, alum, and mineral oils. The flora is very extensive, including many kinds of valuable forest trees, fruits, flowers, grasses, shrubs, and berries. It has an abundance of wild animal life, especially the rhinoceros, leopard, elephant, tapir, antelope, tiger, bear, ant-eater, bat, deer, numerous monkeys, and many species of insects. Crocodiles and hippopotami abound in the rivers. Salmon and other fisheries are abundant. The domestic animals include horses, buffaloes, goats, swine, sheep, and poultry.

The natives of Sumatra belong to the Malay race and are largely Mohammedans. They are active, intelligent, tall, and quite industrious, but are extremely fond of opium. Polygamy prevails in many sections of the island. A modi-

fied system of castes is prevalent, largely for the reason that the Mohammedan faith is not wholly understood. It has an extensive trade with Holland and other European countries and with the United States. The exports include pepper, gold, sappan wood, cotton, precious stones, raw silk; tobacco, sulphur, coffee, camphor, and tropical fruits. Among the chief imports are drugs, rice, textiles, clothing, and utensils.

Marco Polo discovered Sumatra in the 13th century, but trade relations with the Europeans were not established until 1508. The Dutch founded settlements in 1601. They gradually developed various industries and established their seat of influence at Padang in 1666, and in 1881 acquired full control of the entire island. Since then it has been one of the most productive island possessions of Holland. It is divided into six districts, known as West Coast, East Coast, Benkulen, Palembang, Lampongs, and Acheen. The principal seaports include Acheen, or Achin, and Benkulen. Population, 1905, 4,029,505.

SUMBAWA (sōōm-bā'wā), an island of the East Indies, belonging to the Sunda group of islands, situated between Java and Flores. It is separated from Lombok by Atlas Strait. The length from east to west is 160 miles. It has an area of 4,850 square miles. The surface is mountainous and volcanic. Tembora, on the northern coast, is an active volcano and has a height of 8,940 feet above the sea. Gold, rice, wood, fruits, and live stock are the principal products. The island is a possession of Holland. A large majority of the inhabitants are Malays who adhere to the Moslem faith. Population, 1905, 150,024.

SUMMER, the warm season of the year, following spring and preceding autumn. It begins with the summer solstice, about June 21, and ends with the autumnal equinox, about Sept. 22. In Canada and the United States summer comprises the months of June, July, and August, and in England it includes the months of May, June, and July.

SUMMIT (sŭm'mīt), a city of New Jersey, in Union County, 12 miles west of Newark, on the Delaware, Lackawanna and Western Railroad. It is the residence of many business men of Newark and New York. The chief buildings include the Arthur Home for Orphans, the public library, and several schools and churches. It has manufactures of silk textiles, clothing, and machinery. Electric lighting, waterworks, and sewerage are among the public utilities. Population, 1905, 5,673; in 1910, 7,500.

SUMPTUARY LAWS (sŭmp'tŭ-ā-rŷ), the

name of statutes that aim to regulate private expenditures, such as extravagance in the purchase and use of clothing. Laws of this kind were deemed essential in ancient Greece and Rome, where legislation was directed with the view of avoiding extravagance in dress, entertainments, and even funerals. The purpose of such laws was not solely to prevent extravagance, but likewise to overcome crime, poverty, and immorality. Costly banquets and funerals were prohibited by the laws of Solon, and the early laws of Rome limited the expenditures and specified the number of guests that might be entertained at banquets. In England, during the reign of Edward III., the kinds of clothing that might be worn by certain classes were prescribed and not more than two courses were permitted at a meal. In the colonial times Massachusetts undertook to regulate the cost of funerals. At present the tendency of government is to guarantee personal liberty, leaving it to the individual as to the habits, occupation, food, drink, and clothing that he may see fit to adopt. However, legislation is directed toward the protection of public health and public safety. Prohibition of the liquor traffic is a form of sumptuary legislation.

SUMTER (sŭm'tēr), a city in South Carolina, capital of Sumter County, 43 miles east of Columbia, on the Southern and the Atlantic Coast Line railroads. The surrounding country is fertile, producing cereals, tobacco, vegetables, and fruits. It has a growing trade in cotton, live stock, and merchandise. The noteworthy buildings include the county courthouse, the high school, two academies, and a number of churches. Among the manufactures are cotton textiles, furniture, cigars, and earthenware. Electric lighting, sanitary sewerage, and waterworks are among the improvements. Population, 1900, 5,673; in 1910, 8,109.

SUN, the central luminary of the solar system. It is the center of gravity and the main source of light and heat, and is regarded by astronomers as a star. The sun is important and magnificent above all other objects in the universe, and, obedient to the power of its attraction, all other bodies journey around it. Light and heat are scattered throughout space by its radiant energies, thus making the existence of every form of life activity either directly or indirectly dependent upon it. The transformation of solar energy is the basic cause of every variety of animate or inanimate motion upon the earth.

The sun was worshiped in ancient times, when it was held in veneration as the lord of the day. It was thought for ages that this central lumi-

nary moves in a mysterious way while the earth is at rest, and, though astronomers sought to arrive at accurate theories regarding its influence on planetary bodies, it was left for the astronomer Copernicus (q. v.) to announce, in 1530, that the sun is the center of the solar system and around it move all other heavenly bodies within the sphere of its influence. Since then much progress has been made in studying its influence and relation to other heavenly bodies, and spectrum analysis has aided in determining to a large extent its general constituents.

The mean distance of the sun from the earth is placed at 93,000,000 miles, the diameter at 866,500 miles, and the density at one-fourth that of the earth. Thus the surface is 12,000 and the volume 1,300,000 times that of the earth, but the mass is only 332,000 times as great. The entire mass of the sun is estimated at 750 times greater than that of all other bodies in the solar system, and the period of axial rotation is placed at 25.8 days, being estimated at that figure by the movement of sun spots. However, recent investigations have led to the view that the sun-spot belts have a peculiar surface drift. Until lately it was thought that the portion of the sun visible to the naked eye constitutes the whole luminary, but now it is believed that around that central sphere, technically called the *photosphere*, there are three or four concentric envelopes. These are known as the *chromosphere*, the inner being the *corona* and the upper, the *atmosphere*. Besides these there is probably an outer corona.

It is thought that the *sun spots* are cavities in the concentric envelopes and that they result from unequal velocities of neighboring portions of the solar atmosphere. The sun spots are called *maculae*, and the name *faculae* is applied to the brighter part of the sun surface, while the term *mottlings* is used to designate the parts ranging between the maculae and the faculae. The photosphere exhibits a network of polygonal and other figures when examined under the telescope. Among the figures are pores and domes, the former appearing to be downrushes of vapor, and the latter, luminous clouds. Astronomers assert that there is an immediate connection between the sun spots and rainfall, basing their conclusions upon observations of famines in India for the past thirty years. It is asserted that the absence of rainfall, from which famines result, uniformly occurred at periods when the temperature of the sun showed considerable variations from the normal, the famines following the lower temperatures.

Johann K. F. Zöllner (1834-1882), a German physicist and astronomer, expressed the view

that the sun is in a liquid state and that the temperature is sufficiently high to melt a covering of ice equal to forty feet in thickness in a minute, but there is no certainty as to the exact temperature at the surface. Spectrum analysis has proven conclusively that the solar atmosphere contains the following substances: zinc, iron, copper, nickel, cobalt, manganese, titanium, chromium, calcium, sodium, sulphur, barium, hydrogen, potassium, magnesium, aluminum, silver, and cerium. It has been observed that jets of hydrogen are thrown to a height of 175,000 miles in twenty minutes and disappear in thirty minutes, while incandescent hydrogen clouds reach an altitude ranging from 20,000 to 80,000 miles. The amount of heat proceeding from every square foot of the sun's surface is thought to be equivalent to the mechanical effect of the action of 7,000 horse power, but no approximate estimates of the amount of light sent forth have been agreed upon. The heat of the sun raises vapor from the earth, thus producing rain and supplying necessary elements for the growth of plants and the sustenance of animals. Stored up in coal, it supplies us with fuel, and in many other ways provides essentials to life and industry. The powerful and enduring energy of the sun is supposed to be maintained by meteors falling into it and by a constant contraction of its volume.

SUNBIRD, the name of a bird found in the Eastern Hemisphere, chiefly in the warmer parts. Several species have been described, all of which are small and somewhat resemble the humming birds of America. They feed partly on the nectar of flowers, which they gather by their long bill while perching instead of fluttering in the air. A part of their food consists of insects, chiefly minute forms found within the flowers. The male has a bright plumage during the breeding season, but is somewhat dull at other times. A number of species build their nests in the limbs of trees, roofing them over with tips of the leaves.

SUNBURY, a city in Pennsylvania, county seat of Northumberland County, at the confluence of the western and eastern branches of the Susquehanna River. It is situated 50 miles north of Harrisburg, on the Pennsylvania and the Philadelphia and Reading railroads, and has a growing trade in coal and merchandise. The surrounding region produces lumber, coal, cereals, and fruits. The notable buildings include the county courthouse, the Mary M. Packer Hospital, the public library, and many churches. Among the manufactures are flour, nails, carpets, furniture, cigars, clothing, and machinery. It has electric street railways, waterworks, and

sanitary sewerage. It was settled in 1772 and incorporated in 1797. Population, 1910, 13,770.

SUNDA ISLANDS (sūn'dà), a chain of islands in the Malay Archipelago, situated between the China Sea and the Indian Ocean. They are divided into the two groups known as the Lesser Sunda and the Greater Sunda islands. The former includes Bali, Flores, Lombok, Ombai, Sumbawa, and a number of others, while the latter embraces Banca, Borneo, Celebes, Java, Madura, and Sumatra. These islands are so named from the Sundanese, a race of Malaysians, who somewhat resemble the Japanese. All the islands, except a part of Borneo, belong to the Netherlands.

SUN DANCE, an annual religious ceremony practiced by many tribes of the American Indians, as a thanksgiving to the sun god. Formerly the ceremony was accompanied by extreme fasting and tortures, but they are no longer permitted, although the sun dance still survives among the Sioux, Cheyenne, and other tribes. The management is in charge of certain priests and warriors and the ceremonies continue about a week, but the dance proper is conducted only about four days and nights. A period of fasting usually precedes the dance, and those who take an active part are partly stripped and painted. The dancers take their position in a half circle about a pole at the center, at the top of which is a sacred object, and they constantly look upward so as to face the sun. Between the teeth is a whistle fitted to produce a shrill sound, and the songs of the sun dance are chanted to the beating of a powerful drum. Within the lodge of the medicine man is the sacred pipe and other ceremonial objects. The dance is interspersed with feasting, addresses, and the initiation of new members into the societies. The night is spent in story-telling and various games, and at a specified time the ears of the children born during the year are pierced. Formerly, during the time of prospective peace, the sacred pipe was passed around the circle, but it remained unused at the time of impending war.

SUNDAY, the first day of the week, kept as the sabbath among most Christians in remembrance of the resurrection of Christ. Laws for the observance of Sunday were enacted as soon as the Christian religion was recognized, and Constantine, in 321, prohibited all business on that day, except necessary agricultural labor and the manumission of slaves. Laws for the observance of Sunday are in force in all Christian nations, but in some states an exception is made for those who observe the seventh day of the week.

SUNDAY SCHOOLS, the organizations

maintained for the purpose of giving instruction in religion to the young. They are held either on Sunday or on the Sabbath. The Protestant denominations commonly have their Sunday-school meeting immediately preceding or following regular services on Sunday, but the denominations that keep Saturday as the day for regular worship hold them on Saturday, and usually denominate them Sabbath schools. The patriarchs of ancient times conducted family instruction for the children, and with the early rise of Christianity religious teachings were given alike to old and young. Instruction of the young in religious matters was greatly neglected in the Middle Ages, but with the beginning of the Reformation it became apparent that the preservation of Christian practices is quite impossible without some systematic organization that will answer the requirement of training the rising generation in religious conduct and tenets.

Martin Luther was the first Protestant leader to organize Sunday schools, and those instituted by him and his fellow-reformers resulted in a general awakening of religious thought. Entire schools were frequently made up of adults, who attended them with devoted eagerness to read and study the Bible, and at that time many of the schools for children necessarily taught the rudiments of reading before religious instruction could be comprehended. Sunday schools were first organized in England by Robert Raikes, publisher of the *Gloucester Journal*, who, in 1781, formed several local organizations in the poorer districts of his city, largely with the view of overcoming widespread profanation of the Sabbath. These children were employed during the week in factories, and on the Sabbath spent their time in idleness and play. Hence, the Sabbath school became a source of great blessing to them and the community. Teachers were at first employed for twenty-five cents a day and the children were kept in the Sunday school the entire day, except the brief period they attended church services.

The popularity and value of these organizations spread rapidly and brought forward many volunteer teachers, a plan that is at present in vogue in all Sunday schools. In 1784 Raikes published an article in the *Gentleman's Magazine*, in which he minutely described the organization and objects of Sabbath schools, thus calling general attention to these institutions. Rowland Hill in the same year established the first Sunday school in London, and by 1789 about 300,000 Sunday school members were enumerated in Great Britain. The Philadelphia Society for the Support of Sunday Schools was organized in 1786 with the view of

effecting organizations whereby children could be gathered into Sunday training classes. Schools were soon started in Boston, New York, and other cities. The New York Sunday-School Union was organized in 1816, and the American Sunday-School Union in 1824. At present all the Protestant evangelical churches have Sunday-school organizations. The non-evangelical and Roman Catholic churches give religious instruction to the young either in Sunday schools or in parochial schools maintained largely for the same purpose. In many communities both classes of schools are maintained. The latest figures place the Sunday schools in the United States at 140,680, with 1,503,640 teachers and 11,682,832 pupils. In 1908 Canada had 10,890 Sunday schools, with 86,640 teachers and 702,680 pupils. The Sunday schools of the world are estimated at 268,840, with 2,875,550 teachers and 26,545,780 scholars.

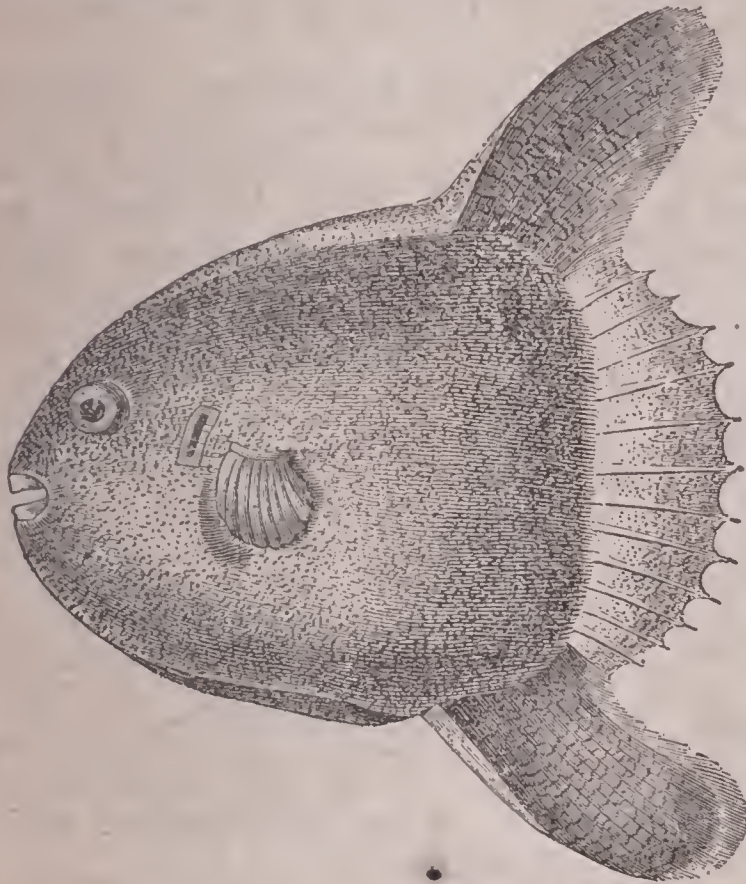
SUNDERLAND (sūn'dēr-land), a seaport city of England, in Durham County, thirteen miles northeast of Durham. It occupies a convenient site at the mouth of the Wear River, has extensive railroad facilities, and has a commodious and safe harbor. Sunderland has a large export trade in coal and imports of grain, timber, and raw material for manufacturing purposes. Shipbuilding is an extensive industry. Among the manufactures are cordage, ironware, sailing vessels, anchors, earthenware, glass, engines, and machinery. The city contains a number of excellent public buildings, among them an orphan asylum, an infirmary, numerous hospitals, and excellent educational and scientific institutions. It has a fine public library and several parks, the latter including People's Park, with a monument built in honor of Havelock. Several bridges across the Wear River connect the two parts of the city, each of which has extensive docks and fishing stations of considerable extent. The region surrounding Sunderland is one of the most productive coal districts of England. The surface is fertile, producing fruits, grasses, vegetables, and cereals. Two stone piers with lighthouses are situated at the entrance of the harbor. The city dates from the early part of the 14th century, but its commercial importance commenced with the last century, when the Durham coal trade began to develop. Population, 1907, 156,029.

SUNDEW, a genus of plants native to America, found chiefly in bogs and marshes. The common sundew has rounded leaves that spring from the root, forming a rosette, and in the center is a tall stem with a raceme of flowers on one side of the upper part. The leaves are fringed and covered with hairs, which se-

crete a sticky fluid. When small insects come in contact with the hairs, they are caught and held firmly by the enfolding hairs, and are digested through the action of the secretion.

SUNDIAL. See **Dial.**

SUNFISH, a genus of marine fishes of the family *Diodontidae*. They are so called from the compressed form of the body and because



SHORT SUNFISH.

of their habit of coming to the surface when the sun shines. The body is short and of a circular form, terminating in a short and abrupt tail. They have two large fins, a dorsal and an anal, by which they move through the water in a vertical position. In some instances they effect movement by rolling the body over and over. Only two species are known, the short sunfish and the oblong. The *short sunfish* is quite round when young, but its body gradually assumes a compressed form and attains a length of three to seven feet. The *oblong sunfish* is somewhat larger, its body attaining a diameter of from eight to twelve feet. These species occur in all the seas. The sunfishes have a leathery skin and soft, white flesh. An oil useful in medicine is secured from the liver. Sunfishes have no swimming bladder or teeth, cutting edges of bone serving instead of the latter. The name is sometimes applied to several species of small, flat fishes common to streams and lakes.

SUNFLOWER (sŭn'flou-ēr), a genus of plants of the aster family, which have large, cordate leaves and terminal, flat, circular heads of flowers. They are herbaceous plants. About

fifty species have been described, all of which are native to America. The stems of some species attain a height of six to fifteen feet, and the larger heads have a diameter of twelve inches. The size of the flowers depends on pruning off a number of the buds, usually two or three being sufficient to develop the largest form. Sunflowers are cultivated in many sections of Canada and the United States for ornamental plants and for their seed, which is



SUNFLOWER.

A, Single floret; B, Seed.

valuable for cage birds and domestic animals. They are grown in fields in Southern Europe, where the flowers yield excellent food for bees and the seeds are used to feed cattle and poultry. Both annual and perennial species are grown and all bear yellow flowers. Fertile and well cultivated land yields from 30 to 48 bushels of seed to the acre. The seed contains 16 per cent. of protein and 21 per cent. of fat. These plants are so named from the ideal resemblance

of the large flowers to the golden rays of the sun, with which they were formerly believed to move as that luminary passes through the heavens.

SUNNITES (sūn'nīts), the orthodox sect of Moslems, so called from their adherence to the *Sunna*, or tradition of prophetic laws. They are distinguished in this respect from the Shiites, or heterodox Mohammedans. The Sunna embraces three distinct departments, including the remarks and counsels of Mohammed, his deeds and practices, and his silence upon certain usages. The last mentioned is looked upon by the Sunnites as an indication that the Prophet made manifest his opinion by abstaining from doing or saying certain things, hence his silence holds an important place in the doctrines of this sect. The Sunnites are the largest branch of Mohammedanism and have their following chiefly in Persia, Asia, Turkey, and Syria. They are subdivided into four sects known as Hanifites, Hanbalites, Malikites, and Schafites.

SUNSTROKE (sūn'strōk), a very dangerous affection of the nervous system, caused by exposure to the direct rays of the sun, especially in the tropics and in the hottest part of the year in the Temperate zones. It is especially frequent and dangerous among overworked and badly fed soldiers under exposure to heat, and is quite common in the large cities and in harvest fields. The early symptoms resemble those attending simple apoplexy, commencing with faintness, abnormal heat, thirst, dryness of the skin, and prostration. Later the action of the heart becomes violent and the temperature may rise to 115° Fahr., which is sometimes followed by vomiting, and finally coma results. It has been found that from 40 to 50 per cent. of those attacked by sunstroke die, and that those recovering are quite generally impaired in bodily health or mental vigor.

SUN WORSHIP, a form of nature worship which dates from remote antiquity. It was practiced throughout the period of human history to a considerable extent among peoples somewhat higher in the scale of civilization than the nomadic tribes. In this form of religious worship the sun and moon are regarded as companions, sometimes as brother and sister or husband and wife, and they are held to be the rulers of the earth. It was the chief worship among the Aryan tribes, from whom it descended to certain classes of Brahmans, and is still practiced in some parts of India. The ancient Persians connected their god Mithra with the sun, as also did the Greeks their Helios and the Egyptians their Ra. The Spanish con-

querors of Mexico found a people who maintained splendid temples dedicated to the sun, among whom the priests of the sun were the predominating influence. Sun worship flourished in Peru and to some extent among the Indians of North America. The Peruvians held the sun to be the ancestor and founder of the dynasty of the Incas, who made sun worship the state religion and reigned as the representative of the sun god.

SUPERIOR, a city in Wisconsin, capital of Douglas County, on Lake Superior, seven miles south of Duluth, Minn. Communication is furnished by the Northern Pacific, the Chicago and Northwestern, the Great Northern, the Duluth, South Shore and Atlantic, and other railroads. It occupies a fine site at the mouth of the Saint Louis River, on three bays or inlets of Lake Superior, and has a well-sheltered harbor. Bridges, ferries, and electric street railways connect it with Duluth. The streets are regularly paved and improved by sewerage, pavements, waterworks, and gas and electric lighting. It has manufactures of lumber, brick, ironware, furniture, machinery, and farming implements. The trade in coal, lumber, wheat, and merchandise is very extensive, the city having abundant facilities to handle large quantities of these commodities. It has large flouring mills, wharves, and shipyards.

Superior has many large and substantial buildings, the construction being chiefly of brick and stone. They include the county courthouse, the public library, the two high schools, the Saint Mary's Hospital, the business college, and many business blocks and churches. It is the seat of a State normal school. The vicinity was visited by Du L'Hut in 1680, when he established a trading post here, but it was not platted until 1855. In 1881 the Northern Pacific Railway was built to this place and four years later it became a city. Population, 1910, 40,384.

SUPERIOR, Lake, the most westerly of the Great Lakes of North America, the largest body of fresh water in the world. It is bounded on the south by Michigan and Wisconsin, and its other boundaries are formed by Minnesota and Ontario. The length from east to west is 415 miles; greatest breadth, 165 miles; and the area, 31,200 square miles. It has fully 1,760 miles of coast line, the principal inlets in the United States being White Fish, Keweenaw, and Chaquamegon bays. The lake surface is 602 feet above sea level. The mean depth is given at 480 feet and the greatest depth at 1,010 feet. Lake Superior receives the drainage of an area equal to only 85,000 square miles, this being due to its location near the watershed between the

Mississippi River and Hudson Bay. Many small streams flow into it, the most important being the Saint Louis, Pigeon, Nipigon, Flag, Union, and Fire Steel rivers. Within it are many islands and island groups, including the Apostle Islands, Isle Royale, Manitou, and Grand, under United States jurisdiction, and Caribou and Michipicoten under that of Canada. Keweenaw Point is the most important projection into the lake. It comprises the County of Keweenaw and a part of Houghton, in the State of Michigan.

The southern shore is generally low and sandy, but has a number of remarkable cliffs, among them Pictured Rocks, 300 feet high. The northern shore is formed quite largely of cliffs ranging from 200 to 1,500 feet above the lake. A line drawn from Saint Mary's River to a point north of Isle Royale, and thence to the mouth of the Pigeon River, constitutes the boundary between the United States and Canada. Lake Superior is remarkable for its clear water. It has valuable sturgeon, trout, whitefish, and other fisheries. Copper and iron deposits of vast value abound on its shores and many of the islands, especially in the vicinity of Duluth, Superior, Houghton, and Port Arthur. It is important as a route of trade and travel in the summer season, particularly in transporting grain, live stock, lumber, coal, copper, iron, fish, and manufactures. The Saint Mary's River, at the southeast end, is the only outlet, connecting it with Lake Huron.

SUPERNATURALISM (sū-pēr-năt'ŭ-ral-iz'm), the doctrine of a divine agent in revealing to mankind a knowledge of God, in the grace which renews and sanctifies men. It stands in opposition to the doctrine that physical or natural causes are the agencies which thus influence. The term *rationalism* stands in contradistinction to supernaturalism. It maintains that reason must be exercised in judging religion. According to supernaturalism, the miracles and revelations recorded in the Bible were wrought by a divine and supernatural influence. See **Miracle**.

SUPREME COURT. See **Courts**.

SURABAYA (sōō-rā-bā'yà), or **Soerabaya**, a city of Java, on the Strait of Madura, near the mouth of the Romo River. It is the largest Javanese city. The surrounding country is fertile, producing fruits, sugar cane, cereals, and spices. The manufactures include tobacco and cigars, furniture, clothing, sugar, rum, and textiles. It is the seat of a mint, an arsenal, a cannon foundry, and several government buildings. A number of the streets are paved and they are generally lighted with electricity. Waterworks and a sewerage system have been

established. The city has a large trade with Holland, to which country it belongs. Population, 1907, 147,822.

SURAKARTA (sōō-rā-kār'tà), or **Soerakarta**, a city of Java, capital of a government of the same name, situated about fifty miles south of the city of Samarang. It occupies a fine site on the Solo River and is the seat of many beautiful palaces and temples. The government of the Netherlands maintains several schools in the European part of the city, including a normal school for training Javanese teachers and a military academy. The city has a number of hospitals, a citadel, and numerous churches. A railroad line extends from the city to Samarang, thus facilitating the transportation of produce to the coast. Population, 1907, 100,695.

SURAT (sōō-răt'), a city of India, in the Bombay presidency, on the Tapti River, 150 miles north of Bombay. It is surrounded by a rude wall of brick, has ample railroad facilities, and produces clothing, cotton and woolen goods, toys, earthenware, cigars, and machinery. Surat has a large trade in cereals, cotton, live stock, and merchandise, much of which is export trade. Among the principal buildings are those maintained by the British government, several Hindu temples and Mohammedan mosques, an old citadel, and a number of schools, hospitals, and churches. Surat was a fishing village in the 13th century, but soon after rose to prominence as the place from which the Mohammedans embarked for their pilgrimages to Mecca. The Portuguese came in possession of it in 1512 and it was afterward held by the Dutch and French, but in 1800 was annexed to the English possessions. Though of considerable military and commercial importance, it is not as enterprising as it was at the beginning of the last century, when it had a population of three-quarters of a million. Population, 1908, 120,063.

SURGERY (sŭr'jēr-ÿ), the branch of the medical practice that relates to external injuries, deformities, and other morbid conditions to be treated directly by manual operations or by the application of instruments. It was practiced with success among the Egyptians about 410 B. C. Surgical instruments for reducing dislocations of the bones are mentioned by Hippocrates, the celebrated Greek physician and writer of six surgical treatises, in the early part of the 4th century B. C. Grecian surgeons were the most skilled of the ancient practitioners, and by them surgery was introduced in Rome. Considerable progress in surgery was made in the prosperous period of Arabia. Andrew Vesalius

(1514-1564), a native of Basel, Switzerland, is considered the founder of modern surgery, owing largely to his successful practice and an excellent treatise published by him in 1543.

The more correct views of the circulation of the blood published by Harvey, in 1616, and his lectures on surgery, aided greatly in developing the practice. The invention of improved surgical instruments by Fabricius, of Hilden, Germany, gave practitioners valuable assistance in treating complicated organs, such as the urethra and the ear. Others eminent in the surgical practice include John Hunter, Ambrose Pare, Pasteur, and Von Gräfe. A multiplicity of instruments is employed in modern surgery. Among the most recent additions of value to the practice are skin grafting, nerve stretching, successful excision of cancerous affections, radical cure for hernia, and the invention of instruments and the discovery of medicines rendering operations less painful and much more effectual. The discovery of the Röntgen, or X-Ray, and radium, have added materially to the efficiency of surgical practice. See **Anaesthetics; Antiseptic; Bacteriology; Medicine; X-Ray.**

SURINAM (sōō-rī-nām'), a river of South America, in Dutch Guiana. It rises in the mountains of the south central part, has a general course toward the north, and discharges into the Atlantic 16 miles below Paramaribo. The entire length is 380 miles. It is navigable for the largest vessels about 40 miles and for ships drawing ten feet for about 100 miles. Valuable forests abound in the valley of the Surinam. Farming is carried on extensively between Paramaribo and the ocean. The Cottica River, a navigable channel, joins the Surinam near its mouth.

SURMULLET (sūr-mūl'lēt), the name of a species of mullet found in the tropical seas. It is a common fish in the Mediterranean, where it obtains a weight of from six to ten pounds. The flesh is highly esteemed for food and was prized as an article of commerce by the ancient Romans.

SURREY (sūr'rī), a light vehicle with four wheels, usually provided with two seats and drawn by one or two horses. - The body is box-shaped and is built somewhat like that of a phaëton.

SURVEYING (sūr-vā'ing), the science of determining the area and configuration of portions of the surface of the earth and representing them on maps. It is a branch of applied mathematics and includes land surveying and marine surveying. *Land surveying* is the art of applying the principles of geometry and trig-

onometry to the measurement of land, either on a small or a large scale. *Marine surveying* has reference to the measurement of shoals, coasts, and harbors, including a complete determination of the contour of the bottom of a

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

N. W. $\frac{1}{4}$ OF N. W. $\frac{1}{4}$	E. $\frac{1}{2}$ OF N. W. $\frac{1}{4}$	N. E. $\frac{1}{4}$ 160 Acres.
S. W. $\frac{1}{4}$ OF N. W. $\frac{1}{4}$ 80 A.	N. W. $\frac{1}{4}$ 80 A.	
S. $\frac{1}{2}$ 320 Acres.		

SUBDIVISIONS OF THE TOWNSHIP.

harbor or other bodies of water. In *plane surveying* the surface is looked upon as a plane; this form is used in measuring small areas. *Geodesic surveying* is employed to determine the latitude and longitude of places and the relative length of terrestrial arcs in different latitudes. This art or science is called *geodesy*. *Topographical surveying* involves all the operations incident to finding the contour of a portion of the earth's surface, such as hills, valleys, water courses, and embankments, and the various methods of representing them upon a plane surface. *Hydrographical surveying* is the term employed to designate the surveys which locate inlets, shore lines of harbors, and other matters incident to coast lines. A *reconnaissance survey* is one hastily made for military and other purposes. *Railroad surveying* embraces surveys intended to ascertain the best line of communication between two given points. *Mining surveying* relates to the determination of the situation and position of the shafts, galleries, and other underground excavations of a mine already built, or surveys for the construction of mines not yet opened. The principal operations in surveying land include laying down base lines and driving triangles on either side of the base. Among the instruments used are the Gunter's chain, for measuring the linear dimensions to ascertain the area of a given tract of land; the theodolite, for determining the accuracy of angles; the surveyor's cross, for raising perpendiculars; and instruments known as the transit, plane table, zenith sector, azimuth, etc.

When the early settlements of America were founded, the claims to land were governed largely by streams, hills, and other natural demarkations, thus making the individual possessions quite irregular in outline. Soon after

the establishment of the nation under the Constitution, and before it had acquired new territory, a general system of surveys for all public lands was devised. Accordingly all land owned and offered for sale by the general government was laid out in townships, each six miles square, as nearly as the spherical form of the earth's surface would permit.

In surveying a tract of country the government, both in Canada and the United States, first establishes a line in a north-south direction, called the *principal meridian*, and then a line crossing it at right angles, parallel to the Equator, called the *base line*. Lines six miles apart are next run in both directions, those parallel to the principal meridian forming the *range* and those parallel to the base line the *township*, each being numbered consecutively from the point of beginning. A tract six miles square is called a township and consists of 36 sections. Each section is one mile square, thus containing 640 acres. The sections are numbered from 1 to 36, beginning at the northeast corner, as shown in the diagram. In describing land it is customary to give the fractional parts of a section, as the south half, the east half of the northwest quarter; the southwest quarter of the northwest quarter, etc. Interference in regularity by the curvature of the earth's surface and the contour of the region surveyed requires correction lines at the north and west sides of each township, where the sections are usually fractional, while all others are intended to include the exact number of acres in a section of regular size. Sections 16 and 36 were set apart for school purposes.

SUSA (sōō'sā), an ancient city of Persia, which was situated on a plain near the Karun River, a stream flowing into the Persian Gulf. It is mentioned as Shushan in the books of Daniel and Esther, and is thought to have occupied a large tract near the modern village of Sus. Tracings of its name and plan have been discovered on Assyrian monuments dating from the reign of Assur-bani-pal, about 600 B. C., when it formed a part of Babylonia, but later it came under the Persian rule of Cyrus. Subsequently it became the capital of Persia and was the seat of great riches. When Alexander the Great conquered it, in 325 B. C., he obtained vast treasures of gold, silver, and precious stones from its palaces and citadels, and in 315 B. C. it fell under the control of Antigonus. It was so completely destroyed soon after by the Arabs that even its site was forgotten. Recent excavations have led to a discovery of the lost city. Among its extensive ruins are traces of the palace described in Esther. In several places on

its former site are remains of monuments bearing numerous cuneiform inscriptions.

SUSQUEHANNA RIVER (sūs-kwē-hän'nā), an important stream of Pennsylvania, which is formed in Northumberland County by the union of its eastern and western branches. The eastern branch rises in Otsego Lake, in southeastern New York, and is 250 miles long; while the western branch has its source in the Allegheny Mountains of Pennsylvania, and has a length of 200 miles. The main stream of the Susquehanna has a course of 150 miles, extending from the union near Northumberland in a southwesterly direction until it is joined by the Juniata, when it assumes a southeasterly course and flows into Chesapeake Bay. The branches afford fine water power and both they and the main stream have valuable fisheries. The Susquehanna is a wide and shallow stream and is navigable only during high water in the spring, when large rafts of logs are floated down the current. Among the cities on its banks are Harrisburg and Wilkesbarre, in Pennsylvania, and Oswego and Binghamton, in New York.

SUTLEJ (süt'lěj), a river of northwestern India, one of the five great rivers in the Punjab. It rises in an elevated lake of Tibet and flows through the Himalayas, where the sides of its narrow gorge attain a height of several thousand feet. The general course is toward the southwest, entering the Indus River at Mithankot. It is known as the Ghara River below the confluence with the Beas. The entire course is 875 miles.

SUTTEE (süt-tě'), a form of funeral sacrifice formerly practiced among certain castes of India, but now prohibited by statutory law. The sacrifice consisted of the widow being burnt with her dead husband on the funeral pyre, but, if he died at a distance, the widow was sacrificed on a pyre erected for that purpose. Evidences have been collected to prove that suttee was enforced as early as the invasion of Asia by Alexander the Great, and that the practice originated from a mistaken notion of the Vedas and other Hindu books. Many of the widows met the obligation with cheerful alacrity, but others were driven to it by fear of disgrace or priestly threats, and in some cases by sheer violence. It was instituted as a religious rite from the notion that great men should be accompanied into the other world by their wives, weapons, horses, and favorite jewels, either by having them burned or buried along with the deceased. In the period between 1813 and 1828 the suttees in Calcutta alone numbered annually from 300 to 600. When the question of prohibiting it was under discussion, the Brahmans

quoted the Vedas in favor of the practice, but several European scholars had shown conclusively that the text had been misunderstood and falsified. The practice was prohibited by law in British India on Dec. 4, 1829, but it is still secretly consummated in some of the principalities by the natives of certain castes and descendants of ancient families.

SWABIA (swā'bī-à), or **Suabia**, in German *Schwaben*, an ancient duchy of southwestern Germany, so called from the Germanic Suevi, a class of people who occupied it in the 5th century. It had been called Alemannia previous to that time, from the Alemanni, its inhabitants before the Swabian invasion, who had driven out the Celts in the 1st century B. C. Swabia included about 13,000 square miles in the 5th century, when the Swabians and Alemanni were united under Swabian dukes. In 1080 the region became a possession of Count Frederick of Hohenstaufen, who made it the nucleus of Germany, and for centuries it was the most powerful and progressive of the German possessions. After the extinction of the Swabian line, the country became involved in prolonged wars, and from 1512 until 1806 it formed one of the ten circles into which Germany was divided. The most disastrous wars were the Peasants' War of 1525 and the Thirty Years' War from 1618 to 1648. The duchy is now divided among Hohenzollern, Baden, Bavaria, Württemberg, and Lichtenstein, though Württemberg possesses the larger part. A division of Baden called Swabia has an area of 3,732 square miles. The seat of government is at Augsburg.

SWALLOW (swöl'lō), an extensive genus of birds found in all parts of the world. They are distinguished by a short, depressed bill with a wide gape, long, pointed wings, the tail more or less forked, and weak feet. Swallows are birds of powerful flight and spend more time on the wing than other birds. It is not unusual to see them soaring high in the air, describing great circles, usually flying singly and uttering shrill screams. They feed chiefly on insects,

which they catch while flying, and some species even scoop water from the surface of ponds and streams while on the wing. The nests are built of straw and feathers, usually under the eaves of buildings and on rocks, and some species find a home in small houses built for that purpose.

The *common swallow* is native to Europe, Asia, and Africa. It attains a length of about nine inches and has a steel-blue color on the back and wings, with reddish markings below. It is frequently called *chimney swallow* from its habit of building nests near the chimneys of houses, where it lays its eggs and rears the young. Two broods are produced in a year. This species migrates to the warmer parts in the winter, and its return to Western Europe is a harbinger of spring. The song is



SWALLOWS AND NEST.

a mere twitter, which is heard most frequently as the birds gather in large flocks in autumn to migrate. The *sand martin* is a species widely distributed in America and Europe. It has brownish plumage and is found largely along sandy banks of rivers and in sandpits, where it excavates galleries for nesting purposes. These galleries are often three to five feet long, more or less tortuous, and are excavated with the bill. The *purple swallow* is widely distributed in America and is so named from its purple-bluish color. Other species include the *cliff swallow* of North America, the *fairy martin* of Australia, and the *window swallow* of Europe. Swallows, like owls, eject

the undigested portions of their food in small pellets or castings. They closely resemble the swifts, which are often mistaken for swallows, and also the sea-swallow, or tern. The fairy martin of Australia is a small species, and, like the allied species of China and the East Indies, builds flask-shaped nests that are gathered and sold in the market as edible and highly favorite food. This food is dissolved in water and used in preparing gravy and soup.

SWAMP. See **Marsh**; **United States**, sub-head **AGRICULTURE**.

SWAMPSCOTT (swömp'sköt), a town of Massachusetts, in Essex County, twelve miles northeast of Boston. It is on the Boston and Maine Railway and is finely situated near the shore of Massachusetts Bay, hence is popular as a watering place. The chief buildings include the public library, the townhall, the Phillips School, and many fine hotels and summer residences. It has electric lighting, sewerage, and waterworks. Fishing is carried on extensively in the vicinity. Population, 1910, 6,204.

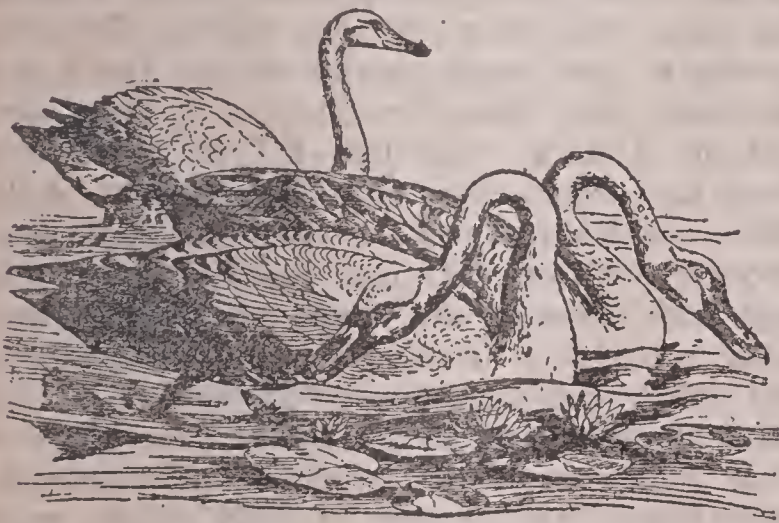
SWAN, a genus of web-footed birds of the duck family. They are among the largest and most beautiful of aquatic birds. Naturalists

regions. It has been domesticated as an ornamental bird for gardens and parks, for which purpose it is kept extensively in America and all the European countries.

The *American swan* breeds in the northern part of North America, usually laying ten to twelve eggs in the rushes near the water, and in the fall moves southward to the Carolinas. While its appearance is much like that of the common swan, it is somewhat smaller. It is remarkable that all the species of swans native to the Northern Hemisphere are white, while those of the Southern Hemisphere are black or have black markings. The South American *black-necked swan* is white, but has a black neck and a bright red knob at the top of the bill. It has been domesticated and is reared as a park or barnyard ornament. The *black swan* of Australia is black with white markings and has a reddish bill. It is usually seen in flocks of eight or ten. It has been tamed and is grown to some extent. An American species called the *trumpeting swan* is noted for its musical cry and is singular for having a large cavity in the breastbone in which the windpipe coils before passing to the lungs. Swans were formerly eaten to a considerable extent, but are now reared only on a limited scale for ornament and their feathers. The female lays from five to ten eggs, which are hatched in six weeks. It was once erroneously supposed that the swan sings a song just before dying, called the *song of the dying swan*.

SWANSEA (swön'sê), a seaport city of Wales, in the County of Glamorgan, at the mouth of the Tawe River, 43 miles northwest of Cardiff. The harbor in Swansea Bay, an inlet from Bristol Channel, is well improved by wharves and masonry. It has communication by steam and electric railways. The surrounding country is noted for its extensive deposit of coal, thus making it a favorite point for smelting ores brought from the mines of England. It has extensive manufactures of cordage, pottery, leather, ironware, tin, tar, sailing vessels, chinaware, and spirituous liquors. Swansea has an extensive export and import trade, fully 2,500 vessels entering the port annually. Among the leading buildings are the customhouse, numerous hospitals, and several fine educational and religious institutions. Anciently it had a fine castle, but this structure was dismantled in 1647. Population, 1907, 97,842.

SWEAT, or **Perspiration**, the fluid which is exuded through the pores of the skin. The glands that secrete sweat are made of tubes that are twisted in the form of a knot, leading to a surface by a somewhat spiral duct. At



SWANS.

recognize a number of well-marked species, more or less widely distributed, and they are migratory in a wild state. The neck is long and arched and when swimming it is bent in an S-shaped curve. Swans have a hiss resembling that of geese, which is heard chiefly when the bird is disturbed. They defend themselves by striking blows with the wings. Young swans are called *cygnets* and have a bluish-gray color, with a dark-hued bill. When full grown, the *common swan* measures about five feet and weighs fully thirty pounds. The feathers are a pure white, and it takes great pride in washing and keeping them clean. This species is native to the northern and western parts of Europe, whence it moves in the fall toward the tropical

the surface of the skin these ducts terminate in openings called *pores*. The sweat consists of water with numerous solids in solution, is saltish to the taste, and serves to expel certain waste materials which collect in the blood. The effect of sweating is both to cool and cleanse the body. It is estimated that from one to four pounds of this fluid pass away from the skin in 24 hours. The portion which is evaporated as fast as it is carried to the surface of the skin is called *insensible perspiration* and that which accumulates on the skin is termed *sensible perspiration*. In some diseases, as in rheumatism and tuberculosis, the sweating is profuse, while in some fevers it is greatly diminished. The former condition is called *hyperidrosis*, while the latter is termed *anidrosis*.

SWEATSHOP SYSTEM, the name applied in certain classes of manufacturing, especially those in which the work is done in the homes or in small workshops at very low wages. Factory labor is not subject to it, since it is more highly skilled and adapted to the use of modern methods and machinery. In most cases it embraces the older methods of doing the work in small shops, a survival of ancient methods, in which the workers are in competition with the newer systems. Sometimes the laborer is employed and contracted to a subcontractor, or sweater, who makes a small margin of profit between the wages paid to the workers and the contract prices established as a standard. It has been more common in the manufacture of clothing and cigars than in any other lines. Legislation has been directed against this system in many countries, with the view of prohibiting the employment of children and improving the sanitary conditions of the smaller and overcrowded workshops. Trades unions and the establishment of larger corporations have done much to relieve the unfavorable conditions formerly very harmful to the health of laborers.

SWEDEN (swē'den), called *Sverige* in Swedish, a kingdom of Northern Europe, occupying the eastern part of the Scandinavian Peninsula. It is bounded on the west and north by Norway, east by Russia, the Gulf of Bothnia, and the Baltic Sea, and south by the Baltic Sea, the Cattegat, and the Sound. The length from north to south is 965 miles, the breadth is from 150 to 225 miles, and the area is 172,878 square miles. It is formed of three principal divisions, which are Norrland in the north, Svealand in the center, and Gotland in the south. The coast line of 1,375 miles is deeply indented by gulfs and the mouths of rivers. To Sweden belong many islands of the Baltic Sea,

including Oland and Gotland, and the Aland Archipelago.

DESCRIPTION. Sweden is separated from Norway by the Kiolen Mountains, or Scandinavian Alps, but these highlands are chiefly in Norway, where they are more rugged and precipitous in character. In Sweden they form a plateau about 4,000 feet high, from which occasional peaks rise to a greater altitude. From the boundary these highlands slope gradually toward the east and decline into hills of moderate elevation to the seashore. Sarjektjakko, 6,850 feet, and Kaskasatjakko, 6,810 feet, are the highest summits. The greatest elevations are in the northwest, where Kebnekaisse attains a height of 7,004 feet. In the southern part the country is very level. Here the great plain of Scania, the most fertile tract of the peninsula, covers considerable territory. The northern part is bleak and rocky and barren and snowclad hills give the country a grand aspect.

The drainage is chiefly toward the east and south into the Gulf of Bothnia and the Baltic. While the rivers afford much water power, they are too rapid for extensive navigation. The Tornea and its largest northern tributary, the Lainio, form the boundary with Russia. Among the rivers that flow into the Gulf of Bothnia, passing in their order southward, are the Kalix, the Lulea, the Pitea, the Skelleftea, the Gidea, and the Indals. The Dal Elf is the largest river that discharges into the Baltic. Lake Wener, which receives the Klar Elf, discharges through the Gota Elf into the Cattegat. The beds and banks of the rivers are more or less rocky and many are connected with the lakes that fairly dot many parts of Sweden. Vast canal improvements have rendered the lakes of great utility for inland commercial enterprises. Lake Wener has an area of 2,014 square miles and other lakes include Wetter, Malar, Tornea, and Hjelmars. These and other lakes are situated in the southern part of Sweden. Stora Lulea is in the northern part.

The climate is colder than in Norway, since the country is shut off from the influence of the Atlantic by the Kiolen Mountains. In the southern part it is quite favorable, but the northern section has an extremely long and cold winter. The summers and winters succeed each other with scarcely an intermission of autumn. At Stockholm the mean temperature is 25° in January and 61° in July, and in the northern part the thermometer falls as low as 40° below zero. The mean annual rainfall is 20 inches, but it is scant in the north and quite abundant in the south, where it is 35 inches. Snow covers the entire country in winter, when

the skee and sleigh are used extensively. The climate is singularly healthful in all sections of the country.

MINING. Sweden is rich in mineral wealth, but the output of coal is not sufficient to supply the local demand. This mineral is obtained chiefly in the southern part and the annual output is placed at 275,500 tons. Iron is the most important and valuable mineral product, yielding annually 2,790,000 tons, most of which comes from the district lying north of the Arctic Circle. Since the product is nearly free from phosphorus, the iron of Sweden is unsurpassed in the world, especially for the manufacture of steel. Large quantities are exported to foreign markets. Copper is mined extensively in Falun and large zinc ore mines are worked on the north side of Lake Wetter. Other minerals include alum, lead, manganese, cobalt, silver, and tin. A superior quality of granite is quarried for monuments and construction purposes. Clays, limestone, sandstone, and sand for glass making are widely distributed.

AGRICULTURE. Sweden is less mountainous and broken than Norway and is better adapted to agriculture, which is the leading industry. Fully three-fourths of the inhabitants are engaged in farming and most of the holdings average in size from five to forty acres. The best farming district is in the southern part, where the soil is fertile and the climate quite favorable, and the tilling is conducted with great care. Oats and rye are the chief cereals. Next in order on the basis of acreage are barley, potatoes, wheat, and pulse. Hay is grown successfully and is an important crop. Sugar beets are cultivated in the southern part, since this enterprise receives encouragement by the government. Other crops are flax, tobacco, hops, apples, and small fruits. Cattle raising is the most important live-stock enterprise and dairying is conducted on a high plane. Other live stock includes horses, sheep, swine, poultry, and reindeer.

MANUFACTURING. The manufacturing enterprises have progressed materially the last decade, owing to aid extended by the government in developing foreign and domestic trade. However, a lack of coal has made it impossible to produce sufficient to supply the demand in the more important lines. Lumber is sawed in large quantities, both for home use and exportation. Textile fabrics, flour and grist, machinery, paper pulp, beet sugar, pipe tobacco and cigars, clothing, and canned and cured fish are the leading manufactures. Stockholm and Göteborg are centers for the manufacture of cotton and woolen goods and large linen factories are

located at Norrköping. The steel goods, armor plates, cutlery, and nails made in Sweden are highly esteemed. Motala and Eskilstuna are the principal centers of iron and machine works.

COMMERCE AND TRANSPORTATION. Sweden has a large coastwise and foreign trade. The imports exceed the exports. Among the leading exports are lumber, minerals, metal goods, oats, and dairy products. The imports consist mainly of wheat, cotton, machinery, coal, and textiles. Foreign trade is carried on chiefly with Great Britain, Germany, Denmark, Russia, Belgium, and Norway. The railway lines in operation equal 7,750 miles, but they are confined largely to the southern part. An important line crosses the northern section, passing through the iron range from the Gulf of Bothnia to West Fiord. About 30,500 miles of telegraph and twice that number of telephone lines are in service. Canal construction received early attention and important connections are thus maintained with the rivers and lakes of the southern part. The highways are in an excellent condition, many having been improved by grading and paving with macadam.

GOVERNMENT. The government of Sweden is a constitutional monarchy and the crown is hereditary in the male line of descent. If there is no direct heir, the king is chosen by a majority vote of the national legislature, but the choice is limited to a member of the Lutheran Church. Besides having general executive power, the king has important functions in connection with legislative enactments of the diet or parliament, whose decrees he may veto for cause. He is aided by a council of state and negotiates treaties, presides in the supreme court, and nominates military and civil officials. Legislative authority is vested in the diet, known as the *Riksdag*, which consists of two chambers. In the upper chamber are 150 members chosen by provincial and municipal councils for nine years, while the lower chamber consists of 230 members elected for three years by property holders. Every male citizen between the ages of 20 and 25 years serves for a brief period in the national guard, and all over 21 years of age may vote under a limited property restriction. The *krona*, valued at 26.8 cents, is the monetary unit. An army of 36,775 men and officers constitutes the peace footing.

EDUCATION. An excellent system of public schools is maintained, with gratuitous admission and a limited compulsory period. The per cent. of illiteracy is remarkably low, practically all inhabitants of school age being able to read and write. Both the common schools and the

universities are modeled on the system of Germany. Two excellent universities are maintained, one at Lund and the other at Upsala, and the courses of secondary schools are articulated with those of these institutions. Fourteen normal schools are maintained for the instruction of teachers and many institutions of a charitable and benevolent character have been provided, such as those maintained for the deaf and dumb, feeble-minded, and homeless. Navigation, agricultural, and mining schools are numerous.

INHABITANTS. The density of population is thirty to the square mile. Practically all the inhabitants are Scandinavians. Lutheran is the state religion and the people hold chiefly to that faith, though religious liberty is granted to all except the Jesuits. The Roman Catholics number 8,750 and the Jews, 2,300. Stockholm, on an inlet from the Baltic Sea, is the capital and largest city. Other cities include Göteborg, Malmö, Norrköping, and Gefle. Population, 1907, 5,377,713.

LANGUAGE AND LITERATURE. The Swedish people belong to the Scandinavian branch of the Germanic family and are characterized as industrious and persevering. They are largely of a tall, robust stature, and have blue eyes, light hair, and a light complexion. It is probable that their language had its beginning more than 4,000 years ago, but nothing is known of it prior to the Christian era. The dialect is closely allied to that of Denmark and less closely to the Norwegian and Icelandic. German had a wide influence upon the language in the time of the Hanseatic League and the introduction of Protestantism, and a considerable element of Latin was injected through the clergy.

The more recent literature dates from the 13th century, but there is a translation of the Bible, known as the Ulfilas' Gothic translation, which was made in the 5th century and is considered the oldest writing in the Germanic-Swedish tongues now extant. Heroic and chivalric ballads from the 13th century are numerous, while lyrics and biblical translations of the 14th century are quite extensive. In 1478 the University of Upsala was founded, and the art of printing was introduced at Stockholm in 1483. The adoption of Christianity in the 16th century brought hymns and poems into extensive use, but a complete translation of the New Testament was not made until 1526, when that beneficial work was completed by Olaus Petri. Laurentius, in 1541, translated the Old Testament and wrote numerous hymns and poems. "Svensk Kronika" is a historical work written by Olaus, who is the author of a number of

dramas. "Captive Cupid" is a poetic production of Stjernhjelm (1598-1672).

Swedish literature was greatly extended in the reign of Gustavus Adolphus, who imported large libraries, founded schools, and invited learned men from abroad to assist educationally. The name of Linnaeus stands preëminent among the naturalists of Sweden and of the world, and both his writings and pupils exercised a wide influence. In the 18th century many theological writers were added to the list. The literary men of that period include Olof von Dalin (1708-1763), Swedenborg (1688-1772), Tobern Olof Bergman (1735-1784), Linnaeus (1707-1778), Celsius (1701-1744), Karl Wilhelm Scheele (1742-1786), who also wrote in German, and Kark Mickel Bellman (1740-1795). Mörk (1714-1763) is an eminent Swedish novelist; Berzelius (1779-1848), a celebrated chemist; Geijer (1783-1847), one of the noted historians; and Tegnér (1782-1846), one of the chief poets. Tegnér's most noted work is called "The Story of Frithiofs" and has been translated into many European and Asiatic languages. Fredrika Bremer (1801-1865) is a Finnish poetess who wrote many fine productions in the Swedish. Other eminent poetesses include Baroness Knorring and E. S. Karlén. Victor Rydberg is one of the most recent writers and the author of "The Last Athenian," a famous novel. Edgren is a recent dramatist; Struidberg, a novelist; and Snoilsky, a poet.

HISTORY. The early history of Sweden is wrapped in legendry. In the primitive historic stage numerous tribes occupied the different sections. In the southern part were the Goths, from whom the region is still called Gothland, and in the central part or Svealand were the Swedes. These two groups comprised the most powerful of the native tribes. Christianity was introduced in 829, but the old pagan religion was not overthrown until in the reign of Ingiald (1080-1112), when the temple of Upsala was burned. Eric the Saint succeeded to the throne as ruling sovereign in 1155, and under his direction Christian doctrines were disseminated by the building of churches and schools, but he was slain five years later by Magnus Henriksen, a Danish prince, and Sweden became subject to Denmark until 1523. In the latter year Gustavus Vasa succeeded in defeating the Danes and was made king. In 1529 he adopted the Lutheran faith as the national religion. Though he found an empty treasury and an exhausted country, he established the material industries, built cities, and founded highways and institutions of learning. He was succeeded by his son, Eric XIV., who reigned only eight

years, owing to a loss of his reason, and his brother ascended the throne as John III. It was the desire of John to restore the Catholic faith, but he died in 1592, to be succeeded by his son, Sigismund. The latter had been brought up in the Catholic faith and followed the course of his father in seeking to restore Catholicism, though he had previously promised to support the Protestant faith, and was accordingly deposed, in 1604, and the crown was given to his uncle, Charles IX.

Charles IX. died in 1611 and was succeeded by his son, the celebrated Gustavus Adolphus, who took a leading part in the Thirty Years' War by invading Germany to defend Protestantism, but lost his life in 1632 at the celebrated Battle of Lützen. The latter had left his noted minister, Oxenstiern, to administer the government in his absence, and he was appointed regent for his daughter, Christina. In 1654 Christina renounced the crown in favor of her cousin, Charles Gustavus, who assumed the title of Charles X. After conducting successful military enterprises in Denmark, Poland, and Russia, he died suddenly and was succeeded by his son, Charles XI., in 1660. This sovereign was only four years old when his father died and thus ruled under a regency until 1680, when he assumed the government. He greatly extended the power of the king, reorganized the army, and encouraged industrial arts. On his death, in 1697, he was succeeded by his son, Charles XII. This military genius conducted extensive operations against Poland, Denmark, and Russia, but was finally defeated at Poltava on July 8, 1709, thus being required to yield to the military superiority of the Muscovites. He subsequently pursued a scheme to conquer Norway, but on Nov. 30, 1718, was killed at Fredericks-hall. Ulrica Eleonora, his second sister, succeeded him on the throne. She was assisted in the government by her husband, Frederick of Hesse-Cassel.

Both Eleonora and her husband, Frederick I., were mere puppets in the hands of the nobles, and Sweden was dominated by a powerful oligarchy. The two parties were known as the French, or *Hats*, and the Russians, or *Caps*, the former favoring French and the latter Russian predominance in Sweden. Frederick died in 1751 and was succeeded by Adolphus Frederick of Holstein-Gottorp, the latter giving favors to Russia. He died in 1771 and was succeeded by his son, Gustavus III., who overcame the two factions and recovered the former power of the crown. Factional disagreements were the cause of his assassination in 1792, and he was succeeded by his son as Gustavus IV.

This sovereign lacked ability to cope with the difficulties of his time and he was finally deposed in 1809, being obliged to renounce the crown in favor of his uncle, Charles XIII. Charles was soon after required to cede a fourth of his territory to Russia. The dominant party elected Jean Baptiste Bernadotte as crown prince in 1810 with the erroneous idea of conciliating Napoleon.

Sweden joined the allies against Napoleon in 1814, but Denmark declared in favor of France, thus bringing on a war with the Danes. The peace of 1814 gave Sweden possession of Norway, but it lost Pomerania to Denmark, thus confining its sovereignty to the Scandinavian peninsula. Bernadotte succeeded to the crown in 1818 as Charles XIV. and reigned successfully until his death, in 1844, when he was succeeded by his son, Oscar I. His reign was peaceful and enabled Sweden to begin material industrial development, and on his death, in 1859, he was succeeded by his son, Charles Louis Eugene, as Charles XV. He died in 1872 and his brother, Oscar II., was crowned as his successor.

The long reign of Oscar II., a period of 36 years, was signally successful. It witnessed extension of the right of suffrage, the enlargement of the merchant marine, the building of canals and railroads, and the larger development of the industrial and mining enterprises. One of the problems of the dual kingdom under this sovereign was to satisfy the people of Norway, who finally declared their independence in 1905. The separation was brought about without bloodshed, largely through the self-restraint of King Oscar, who now governed under the regency of the Crown Prince Gustaf. On the death of his father, in 1907, the latter was crowned king as Gustaf V.

SWEDENBORGIANS (swē-dən-bôr'jĭ-ans), or **New Jerusalem Church**, the followers of Emanuel Swedenborg. The tenets of this society of religious worshipers embrace the belief that God is a trinity, not of persons, but of principles corresponding to the soul, the body, and the operative energy in man. Heaven and hell are believed to exist in this world as states of the soul, and it is assumed that these states are perpetuated in the spiritual world. Since the soul is thought to have a spiritual existence of its own, the material resurrection of the body is denied. Salvation implies faith, repentance, and obedience to the moral law. It is claimed that the last judgment occurred in the spiritual world in 1757, at which time Swedenborg received a revelation, and the new church then established marks the second dispensation

of Christianity. The first Swedenborgian church organized in America was opened at Baltimore in 1792. At present there are 175 ministers, 212 societies, and 10,990 members in the United States. Among the educational institutions are the New Church School at Waltham, Mass., and Urbana University, Urbana, Ohio. The Swedenborgians have a considerable membership in France, Germany, England, and other European countries.

SWEETBRIER, or **Eglantine**, the name of several species of the rose, found native in many parts of Europe. It grows wild in pastures and neglected fields, and under favorable circumstances sends out numerous shoots or suckers. The leaves are fragrant and the flowers, which appear mostly on the lower branches, are fragrant and of a light rosy color. Sown in rows along walks, the foliage may be clipped into shape to form low and ornamental hedges. Several species have been naturalized in America.

SWEET FLAG, the name of a plant found in marshes of the Northern Hemisphere, described in medical works under the name *Acorus Calamus*. The leaves are long and slender, the stem is aromatic, and at the upper part of the latter is a greenish spike of flowers. The medicinal properties, which are derived chiefly from the root, serve as a tonic and a stomachic. A preparation made from this plant is used in preparing a hair powder.

SWEET PEA, a flowering plant grown in gardens and parks. The seed is planted early in spring, usually in rich and well-cultivated ground, and is covered with two or three inches of loose soil. When the plants are about three inches high, a trellis is constructed along the rows as a support to prevent them from falling to the ground. The sweet pea blooms early in summer until the beginning of fall, provided the pods are not allowed to ripen. About 100 species have been cultivated for their flowers, which are variegated in colors and highly fragrant.

SWEET POTATO. See **Potato, Sweet**.

SWEET WILLIAM, the name of a species of pink, cultivated extensively as a flower in gardens. Several species grow wild and bear pale lilac-colored or bluish flowers in spring and early summer. See **Pink**.

SWIFT, a genus of birds of the swallow family, so called because of their rapid flight. They are widely distributed and include numerous species, most of which are migratory birds. Though the outward appearance is quite like that of the swallow, there is a marked difference in structure. Their flight is more

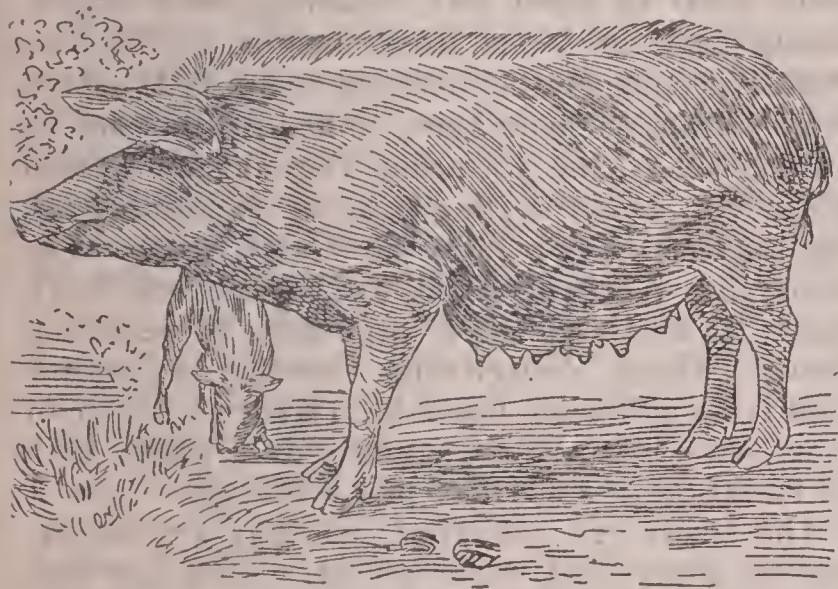
rapid and steady, and they have a scream instead of a mere twitter, while a number of species are larger. They are seldom seen at rest, but remain almost constantly on the wing. The *American swift* is about five inches in length, but measures twelve inches in extent of wing. Its color is brownish-black and its nests are built largely near to or on buildings. The *common swift* of Europe is larger than the swallow, its wings measuring fully eighteen inches when expanded. It is a familiar bird around houses, where it builds a nest of twigs broken from trees, and in many instances utilizes small houses constructed for nesting. Several species of swifts build edible nests, especially those of Madagascar and the East Indies. The *esculent swift*, or *swallow*, is the bird most noted for building edible nests. In this species the female lays two eggs.

SWIMMING, the act of moving in water by natural means of propulsion, as by the movements of limbs, fins, or other organs of the body. As an art, swimming is exceedingly useful, both as an exercise for the body and as a protection to life, and for these reasons it is quite important that all young persons acquire skill in moving safely in the water. The human body, when the lungs are inflated, is slightly lighter than an equal volume of fresh water, thus making it quite easy to float on the surface. Salt water being heavier than fresh, it is still less difficult to swim in salt-water lakes and the sea than in fresh water. When in the water there is a natural tendency for the head to sink while the body is in a floating condition, hence it is of much importance to keep the head above water and the lungs inflated with air as much as possible. In order to keep the head above water, the swimmer must endeavor to keep the body up to the shoulders below the surface.

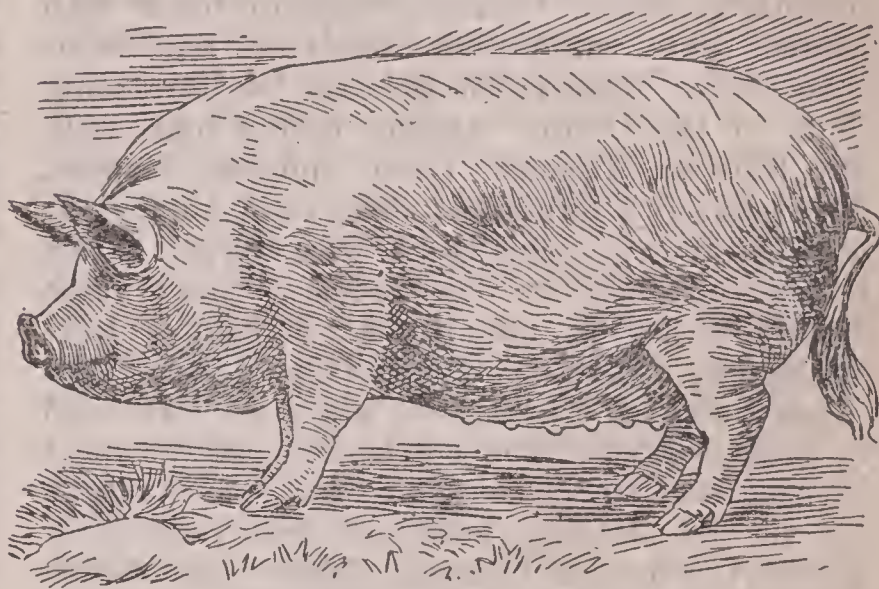
When learning to swim, it is best to frequent a quite sandy beach of limited depth, thus avoiding the danger of getting into water too deep for safety. Greater security is insured by attaching corks, inflated bladders, or air belts near the shoulders. Movement forward in swimming is produced by the arms and legs being extended and adducted consecutively. Various skillful arm movements should be practiced, such as over-hand, half-circle, and side movements. Skillful swimmers employ these either singly or in different combinations. Most swimmers aim to move forward on the breast, especially in making long distances, but well-trained swimmers are able to make considerable speed by swimming on the side or back. Beginners are usually prevented from readily learning the art of swimming for want of confidence, and later

often develop overconfidence to such an extent that fatal results are not infrequent.

A swimmers' union was organized in the United States in 1888, whose purpose is to develop swimming into a more popular and highly accomplished art and to give annual swimming contests. Among the best records made by contestants are the following: 440 yards in 5.51 minutes; 880 yards in 12.45 minutes; 220 yards in 2.38 minutes; 300 yards in 3.46 minutes, and 150 yards in 1.38 minutes. The Olympic games of 1908, in England, brought several of the best swimmers of the world into competition. Various conditions are essential in order to secure the best results in the matter of speed. It is possible to swim with greater rapidity with the current than against it, or even with the wind, and the depth of the water influences materially. One of the remarkable instances of swimming is that of Matthew Webb, who, in 1875, swam from Calais, France, to Dover, England, making the distance across the English Channel in 22



UNIMPROVED HOG.



CHESTER WHITE FEMALE.

hours, but he was driven by the tide in a zigzag course, so the distance actually swam was about 50 miles.

Many animals have a greater or less capacity for swimming, either in or on the surface of the water. Fishes are the best swimmers. They effect a rapid forward movement by means of their fins and tail, but some species propel themselves by undulations of different parts of the body. Some crustaceans swim by flapping their shells, and others by ejecting water from the body. Quadrupeds swim easily, the head being so placed as to remain naturally above the surface.

SWINE, or **Hog**, a genus of hoofed mammals. They include species that are highly important for food and other products. The neck is very thick and strong, the head is prolonged, the eyes are small, and the nose is slightly trun-

cated. Stiff bristles cover the thick skin of most species. Underneath the bristles are short, curled hairs. The feet have four toes, all separately hoofed, but only the two front toes reach the ground. In a wild state the male has enlarged bristles on the back of the neck that form a kind of mane, but this disappears in the highly domesticated species. The tail is short and fleshy. Their food consists of almost every kind of vegetable and animal substances, but in a wild state they cannot be reckoned with the beasts of prey, though poorly fed swine often attack chickens and other small domestic animals. Two or more litters of young are brought forth each year, usually ranging from five to fifteen in number, thus making them the most prolific of domestic animals.

The domestic hog is a descendant of the wild boar, which is still found in some parts of Europe and Asia, but the breeds have been improved remarkably by careful husbandry, making them larger in size, finer in quality, and more

docile in spirit. Hogs are clean but savage in the wild state, and in the domestic state partake largely of their surroundings, being highly clean and quite intelligent under careful treatment. No animal is more important in the productive industries, though its flesh is considered unwholesome in some of the warmer countries. The flesh of swine was not admissible as a food under the Mosaic law, and it is still prohibited by the Jews and Mohammedans. *Lard* is the fat of the hog rendered under high temperature, and is considered the most valuable of the fats for many purposes. The skin is tanned for use in bookbinding and saddlery, the bristles are used for brush making, and the hoofs yield mucilage. *Pork* is the name generally applied to the flesh, which is eaten in a fresh or salted state, and is converted to a large extent into bacon, sausage, and hams. Vast quantities of cured

pork are consumed in the military and naval service, largely because it takes salt more readily than any other flesh.

The culture of swine is a highly important industry along with farming. Corn is the favorite food, which is fed either ground or from the ear, but barley, rye, wheat, and other cereals are fed to a considerable extent, though chiefly in a ground condition. The gluttonous disposition of the hog makes it possible to rear herds in rapid succession. They can be placed on the market with profit when only six to twelve months old. The young litter brought forth in the spring is counted the most valuable, as the small pigs can then accompany the sow to pasture, the young vegetable growth being highly valuable in addition to milk and cereal food.

Many breeds of hogs are reared in Canada and the United States. Those reared the most extensively include the Poland-China, Chester White, Berkshire, Jersey, Yorkshire, Neapolitan, and Essex. The Poland-China, which is a representative breed, is either black or black with whitish spots, while other breeds are reddish or pure white. Iowa is the greatest hog-producing State in the Union. Others taking high rank are Illinois, Missouri, Ohio, Indiana, Kansas, Nebraska, and Kentucky. The total number of hogs produced annually in the United States aggregates 175,500,000 head, representing a value of \$2,150,500,000. Ontario is the leading hog-producing Province of Canada. Hogs are shipped alive to the market, where they are sold to packing houses and butchered, and the meat is prepared to be suitable for consumption. Among the leading packing-house centers of North America are Chicago, Kansas City, South Omaha, Sioux City, Cincinnati, Toronto, and Montreal. American pork is transported to practically all countries of the world, especially to Germany, France, and England, where the production is not sufficient to supply the demand. See **Meat Packing**.

SWISS GUARD, the famous regiment maintained in France and composed exclusively of Swiss. It was first organized by a royal decree in 1616. During the Revolution of 1789 the members of this regiment remained loyal to the government, but on Aug. 10, 1792, while defending the Tuileries against a mob, they were overwhelmed and many were massacred. About 800 of their number fell that day, and their memory is commemorated in Thorwaldsen's "Lion of Lucerne," cut in a cliff at Lucerne, Switzerland. In 1815 an effort was made by Louis XVIII. to revive the Swiss Guard, but the body was disorganized in the Revolution of 1830.

SWITZERLAND (swit'zēr-land), in Ger-

man, *Schweiz*, a republic of Central Europe, located between 45° 50' and 47° 50' north latitude and 5° 48' and 10° 28' east longitude. It is bounded on the north by Germany, east by Austria-Hungary, south by Italy and France, and west by France. The length from east to west is 208 miles and the width is 128 miles. The Jura Mountains form the natural boundary between Switzerland and France, and the southern boundary is mainly by the crest of the Alps, but the other borders do not conform to natural features. The total area is 15,976 square miles.

DESCRIPTION. The surface is diversified by lofty ranges, beautiful lakes, extensive glaciers, and fertile valleys. Both the Alps and the Jura Mountains traverse various sections, the former largely in the south and the latter along the western boundary. The Alps separate the country from Italy, where they reach their highest altitudes in Mont Blanc, Mont Rosa, and Mont Jungfrau, which lie at or near the border. The general elevation of the Alps in Switzerland ranges from 6,000 to 9,000 feet, reaching their culminating peak in Mont Rosa, height 15,217 feet. Peaks of considerable altitude occur in the Jura Mountains, this chain being linked to the Alps by a range called the Jorat, but they do not exceed 5,505 feet, which is the elevation of Mont Dôle, the highest of this range in Switzerland. The snow line is about 9,250 feet above sea level, hence Switzerland has a large area of perpetual snow. These collectively exercise a prolific modifying influence upon the climate. Much of the central part of the country is a plain, with an elevation of 1,300 feet above the sea.

The rivers are not large, but they are important as sources of water power. They are well supplied with water the entire year, since the melting snow of the Alps feeds them during the period when rainfall is not abundant. Many of the important rivers of Europe have their source in Switzerland, including the Po, the Rhine, and the Rhone. However, the Rhine and its tributaries furnish the greater part of the drainage, but the swiftness of the streams makes them almost useless for navigation. The Aar, a tributary of the Rhine, is navigable by vessels of considerable size and carries a larger volume of water to their junction than the Rhine itself. Lake Geneva is entered by the Rhone, which carries the overflow across the border into France. The Ticino, a head stream of the Po, crosses the border into Italy. Considerable drainage is carried by the Inn to the Danube, which it enters at Passau, where it discharges a larger volume of water than the Danube itself. Lake Constance, in the northeastern part, is partly in Germany. The largest body of water

within the country is Lake Geneva, on the south-western border. Other lakes include Zürich, Thun, Lucerne, Neuchâtel, Brienz, Biemme, and Maggiore. The interior lakes belong to the Rhine basin, while Lake Geneva is drained by the Rhone, and Lake Maggiore, partly in Italy, has its outlet through the Po.

The climate is necessarily varied according to altitude and proximity to the snow-capped mountains, but all sections are healthful and agreeable. A temperate climate prevails on the central plain and in the valleys, where the mean annual temperature is about 50°. With every thousand feet of ascent the temperature diminishes three degrees, hence the elevated valleys have a severely cold atmosphere in winter. Clouds hover over the higher Alps most of the time, and here the rainfall ranges from 70 to 90 inches. In the central plain the rainfall is 30 inches. A warm wind from the south, called the *Föhn*, frequently causes a rapid melting of the snow and consequently inundations and avalanches.

MINING. The mining industry does not produce sufficient to supply the demand of the more important minerals. Anthracite coal is mined near Bern, in Fribourg, but large quantities are imported from Germany and Austria. Salt rock is found in several of the cantons and the yield is sufficient to permit exportation. Val des Travers has valuable deposits of asphalt, slate is found in Glarus, and marble quarries are worked in Ticino and Schwyz. The Jura Mountains contain deposits of iron ore, though the output of this mineral is not sufficient to supply the demand. Granite, marble, and limestone are found in large quantities suitable for building purposes, and clays for brick and pottery are abundant. Other minerals include slate, manganese, and rock crystals of great beauty. Mineral waters are abundant in the mountain springs.

AGRICULTURE. Two-thirds of the inhabitants engage in farming. Fully 72 per cent. of the area is productive, and the lands are owned largely by peasant proprietors. Thirty-six per cent. of the surface is hay and pasture land, which is considered the most valuable, and farming is conducted with the greatest of care and most watchful attention. Wheat yields profitably up to elevations that range 2,500 feet above sea level, but the amount grown is not sufficient to supply the demand. Rye, oats, potatoes, and barley are the chief crops, and large interests are vested in the cultivation of vegetables and fruits. The grape industry is well developed in all the cantons, but the best wine is obtained from Geneva and Neuchâtel. Almonds, chestnuts, olives, and lemons are grown in

the warmer cantons of the south, where the hillsides are dotted with fine orchards. Gardening and flower-growing receive marked attention. Considerable progress has been made in the industry of cultivating the mulberry tree and silkworms. Cattle raising is carried on generally in the country, owing to the extensive grazing lands that are too hilly for cultivation. Dairying is highly developed and Swiss cheese is exported to all parts of the world. Other domestic animals include horses, sheep, goats, swine, and poultry. Switzerland is visited annually by a great influx of tourists, making it necessary to import large quantities of meat. However, the lakes and rivers abound in fish, and pisciculture is promoted by a large number of establishments. Lands that are used for grazing are partly timbered, but fine forests too dense to produce grasses are found in some sections. The forest trees include the beech, walnut, maple, oak, and pine.

MANUFACTURES. Switzerland has extensive interests in manufacturing, although it has no seaports and does not produce sufficient coal and iron. The government has given encouragement through the maintenance of industrial and technical schools for the dissemination of knowledge in mining, dairying, agriculture, and architecture. Ample water power is furnished by the streams. The manufacturing centers are near the markets of adjoining countries where raw materials can be obtained and the finished products may be sold. The people are skillful and persevering, and it is characteristic of them to utilize their resources to the best possible advantage. Textiles and metal products are of first importance, and in the quality of lace and embroidery the country is unexcelled. Basel is the center of the silk industry, especially in the manufacture of silk ribbons, and large quantities of dress goods are woven at Zürich. The manufacture of clocks and watches is the leading metal industry and the chief centers of this enterprise are at Locle and Geneva. Other manufactures include musical instruments, pottery, tobacco products, sugar, jewelry, leather, and machinery. Canned milk and fruits, wine, and cheese hold a high place in the list of manufactures.

COMMERCE AND TRANSPORTATION. Switzerland occupies a singular position commercially, since it has a large foreign trade in spite of the fact that it produces insufficient quantities of nearly all of the raw material to supply the demand. It exports large quantities of cotton and silk textiles, lace and embroidery, wine, cheese, jewelry, and watches. The imports consist principally of coal, raw cotton, grain, iron, and petro-

leum. Trade is principally with Germany, France, Italy, Great Britain, Austria-Hungary, and the United States. While the American imports are not extensive, large quantities of manufactured products are exported to American ports.

The country has excellent highways and extensive canal facilities, besides railroads aggregating 3,125 miles. About half of the railways are owned and operated by the government. The telegraph lines aggregate a total of 15,500 miles under government control and 10,500 miles under private ownership. Connection by railway is made with Italy through the Saint Gotthard tunnel. The lakes are important for navigation. A harbor of considerable extent is maintained at Basel, whence shipments are made via the Rhine to Strassburg and other points in Germany. The highways are in an excellent condition in all parts of the country.

GOVERNMENT. The government of Switzerland is a constitutional republic, the chief executive functions being vested in a national council of seven members chosen by the assembly. The president of the confederation is the highest executive officer and is elected by the federal assembly. The legislative authority is vested in the federal assembly, which consists of two divisions, the state council and the national assembly. Nineteen cantons and six half-cantons constitute the confederation. The government is administered under a constitution dating from 1874. The state council is constituted of 44 members, two from each canton, and the national assembly is formed of members chosen by direct vote of the adult population at the rate of one representative for every 20,000 inhabitants. Federal elections are held every three years, but the president and vice president are chosen by the federal assembly for a term of one year, and may not be reelected until after having been out of the office at least one year. The national judiciary, called the federal tribunal, consists of nine members elected by the federal assembly for six years and has appellate jurisdiction of both civil and criminal cases. Switzerland has no standing army in the usual sense of the term, but the army is made up of all citizens of military age. The organized military force is classed into the three divisions called the *Auszug*, the *Landwehr*, and the *Landsturm*. The first includes all men between 20 and 22; the second, those from 32 to 44; and the third, those of 17 to 50 years not included for any reason in the other two divisions. Children of eight years and over are given military instruction, which is promoted and encouraged by means of annual exercises and reviews. The war footing is given at 528,250 men.

EDUCATION. A free system of public schools is maintained, to which attendance is free and obligatory. The requirement to attend school is rigidly enforced in the Protestant cantons, but it is neglected in a number of the others. Illiteracy has been reduced to 1 per cent. Besides the common schools, there are ample provisions for higher education. The celebrated institutions of higher education include the universities of Bern, Geneva, Zürich, Basel, and Fribourg, to which students are attracted from all parts of Europe. Academies with extensive courses are maintained at Geneva and Lausanne. Zürich has a federal polytechnic school. Freedom of worship is extended to all the sects, but the Jesuits are not permitted to maintain organizations. A large majority of the people belong to the Evangelical Reformed Church, a branch of the Lutheran Church. About one-fifth of the inhabitants are Roman Catholics.

INHABITANTS. The inhabitants of Switzerland were known as the Helvetians to the Romans. These people were of Celtic origin and were later influenced by the Rhaetians and the Teutons, the latter taking precedence. German is the prevailing language and is spoken by 2,350,000 of the inhabitants, while the remainder use the French, Italian, and Romansch languages, the last mentioned being a form of the Latin, frequently called *Rhaetian*. According to the latest estimates, there are 725,500 French, 220,500 Italian, and 38,500 Romansch in the country. Bern, on the Aar, is the capital. Other cities include Zürich, Basel, Geneva, Lausanne, Saint Gallen, Chaux-de-Fonds, and Lucerne. Population, 1907, 3,525,256.

LITERATURE. No country takes higher rank from the standpoint of literacy and refinement, and among the great writers and statesmen of Switzerland are names that add luster to its nationality. The literature belongs almost exclusively with that of the Germans, but includes the products of a number of eminent writers classed with the French and Americans. Among the most eminent literary men may be named Pestalozzi, Breitinger, Sulzer, Johann von Müller, Bodmer, Haller, J. J. Rousseau, Hottinger, Hirzel, Gesner, Bonnet, and Agassiz.

HISTORY. The region now included in Switzerland was populated at the beginning of the historical period of Western Europe by the Helvetians in the north and the Rhaetians in the south, and both became subject to the Romans about 58 B. C., under whom they remained until about 215 A. D. Incursions were made by the Alemanni, who joined Switzerland to the German Confederation, and later settlements were formed by the Burgundians and Goths. Subse-

quently the Franks under Clovis made a number of settlements, and the whole region came under Frankish control in 534. Christianity was introduced among the Burgundians in the 5th century, but the Helvetians retained their pagan worship until the 7th century. It formed a part of the Frankish empire under Charlemagne, but his successors annexed a part to France and a portion to Germany, and in the early part of the Middle Ages the entire region was united to the German Empire. Feudalism was introduced soon after and the counts were only in part dependent upon the German emperors. However, a series of civil wars were instrumental in securing the freedom of several cantons and special charters for many of the towns. The counts of Hapsburg secured possession of Unterwalden, Uri, and Schwyz, three of the forest cantons, in the early part of the 13th century, and assumed the right to govern as sovereign rulers. The claim to sovereignty was denied by the cantons and the citizens organized to expel the Austrian counts. This, according to tradition, was effected by solemn compact made on Nov. 7, 1307.

We learn from traditional accounts that 31 representatives met at night in a solitary spot near Lake Lucerne, where the compact was subscribed to and those interested were bound by oath to its observance. The leaders chosen were Stauffacher of Schwyz, Arnold of Unterwalden, and Furst of Uri, with his son-in-law, William Tell. These leaders aroused the peasants to the duty of maintaining their freedom and independence and on Jan. 1, 1308, successfully deposed and expelled the Austrians. An invasion under the Austrian counts soon followed, but the Swiss defeated them with great loss at Morgarten in 1315, thus securing the independence of the three cantons. They annexed the city of Lucerne in 1332, Zürich in 1351, the cantons of Glarus and Zug in 1352, and Bern in 1353. However, Austria claimed jurisdiction of the cantons of Glarus and Zug and the city of Lucerne, and accordingly invaded Switzerland, but the Austrian army was defeated by the Swiss under Arnold of Winkelried at the Battle of Sempach in 1386.

The Swiss became aggressive in 1415 and invaded Aargau and Thurgau, territory belonging to Austria, and in the war resulting from this move they were again successful. They secured the cession of these regions by a treaty in 1460. Freiburg and Solothurn were admitted into the confederation in 1481, as the result of a successful war against Charles of Burgundy. Emperor Maximilian I. of Austria made a final attempt to bring the Swiss into subjection by invading their territory in 1498, but met with defeat in six

desperate battles, and the Peace of Basel of 1499 gave Switzerland practical independence, though international sanction was not secured until 1648. The three cantons of Basel, Schaffhausen, and Appenzell were long sympathetic and active allies to the confederation, and the two former were annexed in 1501 and the latter in 1513, thus bringing the number of cantons up to thirteen.

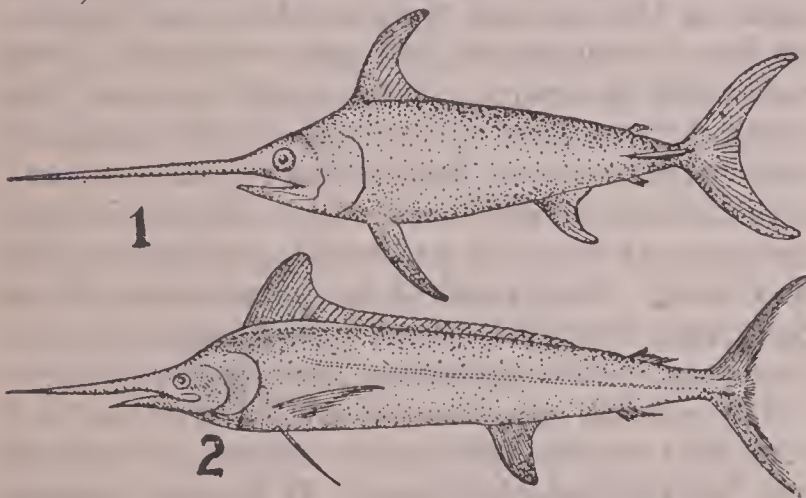
Zwingli began to preach the Reformation at Zürich in 1518, and his religious tenets were adopted by that canton in 1523, while Bern and the other cantons in the north soon followed, though the forest cantons remained attached to Catholicism. In 1531 war broke out between the two factions and Zwingli was slain at the Battle of Kappel. The work of the Reformation was soon taken up by Calvin at Geneva, but severe struggles and internal dissensions prevailed for several centuries. The aristocracy gained considerable influence in the larger cantons, but the Protestants secured a final victory, in 1712, at the Battle of Wilmergen. Public thought began to turn toward internal development soon after, resulting in the construction of canals, the building of cities and schools, and the development of a national spirit, law, and literature. The French seized Switzerland in 1798, when a number of cantons were added, but the peace of 1815 again restored independence and brought the number of cantons up to 22. This treaty was made at Vienna and declared the perpetual neutrality of Switzerland and parts of North Savoy under the guarantee of the great powers, who pledged themselves to maintain Swiss independence. The order of Jesuits was expelled in 1847, and the following year a number of disturbances occurred as a result of the Revolution of 1848 in France. This resulted in the adoption of the constitution of 1848, which forbade many monastic practices in Neuchâtel and other cantons.

The present constitution of Switzerland is a revision made in 1874 and was formally adopted on April 19 of that year. It accords greater power to the federal authorities, guarantees a larger scope of political rights to the citizens, and extends the suffrage. The 600th anniversary of the Swiss republic was celebrated in 1891, thus giving it the proud distinction of being the oldest of existing governments based directly upon democracy and the common rights of all. Switzerland has made material progress in its commercial and industrial life since the latter part of the 18th century, and the government is continually exercising its offices to extend its commercial and material importance. Although the history of the country has been comparatively uneventful the past century, it has been marked by a steady intellectual and national

growth. In 1908 the federal council prohibited the manufacture and sale of absinthe. Reforms in labor laws and insurance for the working classes were adopted about the same time.

SWORD, a weapon of offense or defense, used either as a dagger or like a large knife. It is made of a long steel blade fitted with a handle large enough to grasp with one hand, and, in some cases, with both hands. The blade is larger than that of the dagger or poniard, but it is not mounted on a long handle or staff. In the English language the name sword is applied to both the straight and the curved weapon, but in German the former is known as *Degen* and the latter *Säbel*, while the general name is *Schwert*. The length of the blade varies from 30 to 35 inches, which is about the length of a *saber*, a weapon used extensively in the cavalry of the United States for cutting and thrusting. However, some military organizations carry a saber with a curved blade intended only for cutting. Formerly the sword was used extensively, but it went rapidly out of use after the invention of modern weapons of war. Swords made of bronze and later of iron were used in ancient Greece. Tempered steel was used in making the straight swords employed in Rome at the beginning of the Christian era.

SWORDFISH, a family of spiny-rayed fishes, allied to the mackerels. They attain a



1, Swordfish; 2, Spearfish.

length of fifteen feet and have the bones of the upper jaw consolidated to form a long, sword-like process. Swordfish are widely distributed in the open seas of tropical and subtropical climes, and, being quite strong and swift, the larger species are rarely captured. The ventral fins are absent and the dorsal fin is high, without distinct spines. Only a few species are known. Most of those caught have a bluish-black color above and silvery-white beneath. They pursue schools of mackerel and other fishes, and feed on them with great greed. The swordlike projection forms about three-tenths of their length and is used as a weapon with which

to attack other fishes. They have been known to pierce the timbers of ships with these projections and to kill large-sized whales. Young swordfish are considered good food, both fresh and salted, but when older the flesh becomes less palatable. These fishes are abundant off the Atlantic shore of North America and in the Mediterranean, and in the latter are harpooned by fishermen of Sicily and Naples. Those native to the Mediterranean are generally spoken of as the *common swordfishes*. They attain a length of ten to twenty feet.

SYBARIS (sīb'är-īs), a city of the ancient Greeks in Lucania, in the southern part of Italy. It was situated on the west shore of the Gulf of Tarantum, between the Crati and the Coscile rivers, a short distance from the sea. The Achaeans founded it about 720 B. C., but other nationalities were permitted to take part in its government. According to Strabo, the city reached its height of prosperity about the year 500 B. C., when it ruled over 25 subject cities and sent an army of 300,000 men into the field. It carried a large trade with centers in Europe and Asia Minor, but finally fell into the hands of Telys, a tyrant supported by the popular party. The Crotonians destroyed the city while it was in the height of its prosperity and turned the bed of the Crathis (now Crati) over the site. In 1879 extensive excavations were made to determine the exact location of several large buildings, but little of value was brought to light.

SYCAMORE (sīk'ā-mōr), the name applied to a species of maple trees. It occurs in abun-



SYCAMORE MAPLE.

Flower and Seed.

dance in the west central part of North America, especially in Ohio and Indiana, where it is fre-

quently called the *plane tree*, or *buttonwood*. The leaves are broad and the bark is white. *Sycamore* is properly the name of a large tree native to Syria and Egypt, which is allied to the common fig. This tree yields a small fruit which is used extensively in Egypt for food, and the wood, though light and soft, is very durable, having been used for the coffins of mummies. The fruit is top-shaped, well flavored, and somewhat aromatic. Trees of this species are widespread, the top often occupying a space forty yards in diameter. They are planted near villages and along highways for shade and ornamental purposes.

SYDNEY (sīd'nī), a seaport city of Australia, capital of New South Wales, the oldest city in that continent. It occupies a convenient site on Jackson Bay, an inlet from the Pacific Ocean, on which it has a large and well-improved harbor. An extensive system of railroads furnishes communication with the regions lying inland, thus giving the city important domestic and foreign trade advantages. The streets are regularly platted, intersecting each other at right angles. It has stone and macadam pavements, waterworks, sewerage, and adequate means for rapid transit. Among the notable buildings are the post office, the government house, the parliament building, the customhouse, the Cathedral of Saint Andrew (Anglican), the Cathedral of Saint Mary (Roman Catholic), the National Art School, and the public library. It is the seat of the University of Sydney, several hospitals, and a number of industrial institutes. Hyde Park is one of several fine public grounds.

Sydney is important as an industrial center. It has large flouring mills, lumber yards, grain elevators, and railway shops. The manufactures include machinery, glue, leather, cured meat, vehicles, boots and shoes, sugar, paper, furniture, hardware, glass, pottery, steam engines, and clothing. It has a large export trade in coal, preserved meat, wool, wheat, copper, hides, tallow, and tin. The imports include coffee, tea, cotton, wearing apparel, and colonial goods. The place was founded in 1788. It was named in honor of Viscount Sydney, then colonial secretary. Its prosperity dates from 1851, when gold was discovered in the region lying inland, but it has been largely augmented by railroad building and the establishment of manufactures. Population, 1908, including several suburbs, 538,895.

SYDNEY, a city of Nova Scotia, county seat of Cape Breton County, 200 miles northeast of Halifax. It is situated on Cape Breton Island and the Intercolonial Railway, and in the vicinity are extensive coal mines. The harbor is safe and commodious. It is the terminus of lines of

steamers with Halifax and other cities. The industries include meat packing, machine shops, shipbuilding, and steel and iron works. Among the noteworthy buildings are the public library, the county courthouse, the high school, the Sydney and the Grand hotels, and a number of fine churches. Electric lighting, waterworks, and sewerage are among the public utilities. Population, 1906; 9,988.

SYLLOGISM (sī'lō-jiz'm), in logic, the principal method of deductive inference, that is, an inference from the general to the particular: It contains three terms, the *subject* and the *predicate* of the conclusion, and a term called the *middle term*, which occurs in both premises. The syllogism has three propositions, namely, two premises and a conclusion. The premise containing the major term is called the major premise; the major term is the predicate of the conclusion. On the other hand, the premise containing the minor term is called the minor premise; the minor term is the subject of the conclusion. The following arrangement is in the regular form of deductive reasoning:

All men are mortal.

John is a man.

Hence, John is mortal.

It will be seen that the first two propositions, called the premises of the reasoning, or syllogism, make the proof of the third, while the third proposition, called the *conclusion*, is the point to be proved. The arrangement may be expressed in the formula: "M is P, S is M, therefore S is P." Premises may be negative as well as affirmative, that is, S is not P, as well as S is P, and they may include either all or a part of the subject, as some S is P, or some S is not P. From these we have the four cardinal propositions:

Universal affirmative: All S is P.

Universal negative: No S is P.

Particular affirmative: Some S is P.

Particular negative: Some S is not P.

The four cardinal propositions, as a matter of convenience, are designated by the four first vowels: namely, A, universal affirmative; E, universal negative; I, particular affirmative; O, particular negative. In combining these four propositions in all the possible ways of three in a set, we obtain 64 sets, which are called *moods*. However, only eleven of these moods give valid conclusions, namely, AAA, AAI, AEE, AEO, AII, AOO, EAE, EAO, EIO, IAI, and OAO. Every mood of the syllogism has four figures. In the first figure, the middle term is the subject of the major premise and the predicate of the minor; in the second, the middle term is the predicate of both premises; in the third, it is the subject of

both premises; and in the fourth, it is the predicate of the major premise and the subject of the minor. Since each of the eleven moods has four figures, it follows that there are 44 syllogisms, but of these only nineteen are found by examination to be distinct and valid.

When one of the premises is understood but is not expressed in the statement, the syllogism is called an *enthymeme*. When several premises are employed for the same conclusion, several syllogisms are in fact abridged into one formula, which is called a *societas*. When one premise is assumed as hypothetically true and the conclusion is stated as depending upon the truth of the other alone, we have what is called a *conditional judgment*. On the other hand, if the conclusion is stated as depending upon the falsity of the other, we have a *disjunctive judgment*. Besides the fulfillment of all the conditions of the formulas in syllogisms, it is necessary to observe certain conditions and laws in regard to the use of words, this being necessary to the validity of the reasoning. A violation of these laws gives rise to fallacies.

SYMBOL (sĭm'bŏl), a sign or representation of an idea, used to suggest a quality, operation, or name. Symbols are used in mathematics to represent a quantity or an operation, or to express relationship between two or more quantities. In chemistry, symbols are abbreviations standing for the name of an element, and consist of the initial letter of the Latin name, or sometimes of the initial letter of the name of an element. Astronomical symbols are used to indicate the signs of the zodiac and the phases of the moon. For instance, ☾ indicates new moon; ☽, the first quarter; ☽, full moon; and ☾, the last quarter. See **Arithmetical Signs; Chemistry; Zodiac**.

SYNAGOGUE (sĭn'ă-gŏg), a place of meeting for Jewish worship and religious instruction, which corresponds to a church used by Christians for a like purpose. Jewish worship of the highest type was limited by the Mosaic law to the divinely chosen Jerusalem, but gatherings were held in various localities, even in the early period of the monarchy. When the Israelites were exiled in captivity to Babylonia, they constructed synagogues in different places, but always so they had their faces turned toward Jerusalem when entering at the door and when praying. Buildings of a similar character were constructed after the return from captivity and soon dotted all the inhabited parts of Palestine. Many synagogues were maintained in the time of Christ. It is mentioned specially in the Bible that Jesus taught, preached, and wrought miracles in the synagogue of Capernaum. The apos-

ties found synagogues in various places not located in Palestine, including those in the cities of Damascus, Iconium, Thessalonica, Athens, Corinth, and Ephesus.

The synagogues were formerly built with a partition five to six feet high, on one side of which sat the men and on the other side the women. Special seats were provided for the scribes and Pharisees at the eastern end, and the buildings were constructed so the congregation faced the east. A platform was provided for the speaker or preacher, and near it was an ark containing Hebrew copies of the Books of Moses. Though regular rabbis, or preachers, were appointed, others present could be called to address the congregation, and this privilege was extended even to strangers. Synagogues of modern construction are built quite similarly in eastern countries, but in most European and American countries they resemble more nearly the Christian churches. Ezra founded a Jewish council after the Babylonian captivity, known as the *Great Synagogue*. It consisted of 120 members. The purpose was to remodel the religious life and collect the sacred writings of the Jews. See **Sanhedrim**.

SYNCHRONOGRAPH (sĭn'krŏ-nŏ-grăf), an apparatus used in telegraphy for the rapid transmission of signals. A metallic disc is mounted on an axis, either the same or another axis than that on which the generator is mounted, and an alternating electric current is supplied to the disc through a brush. A tape that passes between the disc and the brush opens and closes the current. This instrument is used in connection with machine telegraphy, and the number of words transmitted per minute is very high, ranging from 2,000 to 3,500.

SYNOD (sĭn'ŭd), an ecclesiastical council or assembly for mutual deliberation on matters of general interest, affecting the churches within its jurisdiction and designed for their guidance. The term is used by the Lutheran Church in the United States to describe a supreme council, known as the *general synod*, and a more limited one known as the *district synod*. It is similarly used by the Dutch and German Reformed churches, but the Presbyterians apply it to a council immediately between presbyteries and general assemblies. In this sense the term applies to a body composed of presbyteries or delegates from them. In the Presbyterian Church an appeal may be taken from the presbytery to the synod and from the synod to the general assembly.

SYNTAX (sĭn'tăks), the division of grammar which treats of the construction of sentences. The rules which govern in syntax differ

according to the established usage and the languages to which they apply. In the English, which has few inflections, a large diversity of arrangement is not possible, the principle of juxtaposition being applicable to a large extent. In such languages as the Latin and German, which have a large number of inflected words, the relation of the principal elements of sentences can be indicated by changes in the forms of certain words, and the form of construction can be variegated. The correct placing of elements is called *arrangement*, which may be either in the natural or the inverted order. The *natural order* of arrangement is that which is most customary, while the *inverted order* is any departure from the natural order of arrangement. However, the construction of sentences or parts of sentences is governed by the logical relations of the thoughts which are expressed. The construction of sentences from words is known as *synthesis*.

SYNTHESIS (sīn'thê-sīs). See **Analysis**.

SYRA (sē'rä), or **Syros**, an island of the Cyclades, situated in the Aegean Sea, 20 miles northwest from Paros. The area is 31 square miles. Formerly it had forests of considerable value; but they have been largely cut and the island has been denuded of its fertility. Hills and narrow valleys characterize the surface. It is the site of Hermopolis, the capital of the monarchy which includes the Cyclades, and is an important seaport of Greece. This city is located at the head of a bay on the eastern coast, near the site of the ancient city, and has a large and convenient harbor. The island has a population of 27,350.

SYRACUSE (sīr'ä-kūs), a city of New York, county seat of Onondaga County, 148 miles west of Albany, on Lake Onondaga, 35 miles south of the east end of Lake Ontario. Direct communication is provided with Albany and Buffalo by the Erie Canal and with Lake Ontario by the Oswego Canal. It has transportation facilities by the New York Central, the West Shore, and the Lackawanna railways. The city is regularly platted, having broad streets that cross each other at right angles, and the location is on a gently rolling site. Fine avenues of trees shade the chief residential streets, and these are beautified by parkings and pavements. Many small parks are located in different parts of the city. On the eastern border is Lincoln Park, a wooded tract of 20 acres, and Burnet Park, including about 100 acres, is located on a hillside in the west. Syracuse is the seat of the State Fair, which is under the management of the State Agricultural Society.

The architecture is substantial, chiefly of brick

and stone. Among the important buildings are the county courthouse, the city hall, the Carnegie Library, the post office, the high school, and the buildings of the Syracuse University. It has a number of hospitals and charitable institutions, including the County Orphan Home, the Old Ladies' Home, and the State Asylum for Feeble-Minded Children. Besides the public library of 65,500, it has a fine library in the public schools and a law library belonging to the State. Intercommunication is by an extensive system of electric railways, with which are connected lines that extend to other cities and various points within the State. The waterworks are owned by the municipality. Other utilities include electric and gas lighting, sewerage, and storm water drainage. Many of the streets are paved with stone and asphalt, the latter being used chiefly in the residential section.

Syracuse ranks as the fourth city of the State and is noted as a commercial and manufacturing center. Springs on the border of Lake Onondaga yield large quantities of salt by evaporation, and large quantities are manufactured for exportation. It has establishments for the manufacture of clothing, typewriters, flour and grist, boots and shoes, iron and steel, and agricultural implements. Other manufactures include soda ash, carbolic acid, tar, ammonia, jewelry, and glassware. It has a large wholesale and export trade and is important as a market for live stock and farm produce.

The Onondaga Indians formerly occupied the region in the vicinity of Syracuse. Isaac Jogues, a Jesuit missionary, visited the locality in 1642. An Indian trading post was established in 1798 and it was soon afterward named Salt Point, from the large salt deposits in its vicinity. The completion of the Erie Canal caused it to grow rapidly, and it was incorporated as a village in 1825. Several villages were united in one corporation in 1847 and named Syracuse. Since then its commercial and educational growth has been constant. Population, 1910, 137,249.

SYRACUSE, an ancient city of Sicily. It was once the most noted commercial center of Southern Europe, but now is greatly reduced in size and importance. The ancient city occupied a large and imposing site on the east coast of the island, measuring fully 22 miles in circumference, when it probably contained fully 750,000 people. The city was founded by Corinthian colonists in 734 B. C., and the Greek Thucydides speaks of it as having been greater than any Grecian city, not excepting Athens. It rose to commercial importance with great rapidity and, after being strongly fortified by four walls, became a stronghold of strategic importance. Col-

onists were sent from Syracuse to various countries bordering on the Mediterranean. Among its famous rulers were the Elder and the Younger Dionysius, Hiero I., and Hiero II. It successfully repulsed the besieging Athenians in 413 B. C., but the Romans conquered it after a three years' siege in 212 B. C., and subsequently it remained identified with Rome until the decline of the empire. The Saracens captured and pillaged it in 878 A. D., carrying away its treasures, and it soon fell into complete decay. Among the famous buildings of ancient Syracuse were the Agora temple of Zeus Olympius, the Prytaneum, and a theater with a capacity for 24,000 people. In the Prytaneum was a splendid statue of Sappho. The city contained elaborate monuments built to Dionysius the Elder and Timoleum. The ancient harbor was the scene of great naval activity, and traces of its vast extent and improvements still remain.

The modern city of Syracuse is partly on the main island of Sicily and partly on a small island near the shore. The latter is known as Ortygia and is about one mile long and half a mile wide. Most of the streets are narrow and in an unwholesome condition, but it has several fine buildings, including a cathedral, a museum of classical antiquities, and numerous churches, monasteries, and nunneries. The city has a public library and several secondary schools. Among the manufactures are earthenware, drugs, chemicals, wine, and textiles. It has considerable trade in salt fish, wine, salt, oil, and silk textiles. A railroad line extends from it along the eastern shore of Sicily, and other lines furnish communication with the interior. Population, 1906, 32,894.

SYRACUSE UNIVERSITY, a coeducational institution at Syracuse, N. Y., founded under the auspices of the Methodist Episcopal Church in 1870. It is the successor of Genesee College, which was conducted at Lima, N. Y., from 1849 until 1871. The five colleges of the university include those of liberal arts, fine arts, medicine, law, and applied science. The master's and doctor's degrees are conferred in the graduate department. Besides the regular departmental work, the university maintains a summer session of six weeks and conducts a line of work at the marine biological laboratory at Wood's Hole, Mass. Lectures on meteorology and climatology are given in connection with the observing station of the United States Weather Bureau. The faculty includes about 190 professors and instructors, and the attendance is 3,200 students. The university has a library of 90,000 volumes and property valued at \$3,500,000.

SYR-DARYA (sīr dār'ī-ä), or **Sir-Daria**, a

river in the western part of Asia, chiefly in Russian Turkestan. It rises in the Tian Shan Mountains of Chinese Turkestan and flows toward the northwest into the Aral Sea. The total length is 1,500 miles. In the upper part it is known as the Narin, where it has many rapids and forms a mountain torrent. The lower course is through an arid region, where a large part of its waters are evaporated during the dry season. Anciently this river was called Jaxartes.

SYRIA (sīr'ī-ä), a political division of Turkey in Asia, forming the coast region along the eastern shore of the Mediterranean. It is bounded on the north by the Taurus Mountains, east by the Euphrates, the Syrian Desert, and Arabia, south by Arabia and Egypt, and west by the Mediterranean. The area is estimated at 108,625 square miles. Population, 1906, 3,318,950.

DESCRIPTION. The region along the shore is mostly sandy, with shallow coastal indentations, but the coast plain narrows toward the north, where Mount Carmel and the Lebanon Mountains occupy the region near the shore. Between the Lebanon and the Anti-Lebanon is the extensive valley of Coele-Syria, through which flows the Orontes River. It receives several confluent rivers and discharges into the Mediterranean at Seleucia. Ranges of mountains traverse the interior in lines almost parallel to the coast. They reach the greatest height in the Lebanon Mountains, which tower from 8,000 to nearly 11,000 feet above sea level. A portion of the Coele-Syria valley is drained by the Leontes River, which flows into the Mediterranean, but the southeastern part lies in the Jordan basin, which has a general inclination toward the south and drains into the Dead Sea. Syria contains considerable tracts of grazing lands, but large parts of it are highly fertile, especially the valleys of Lebanon and the plains of Gaza, Sharon, and Esdraelon. Minerals are not particularly abundant, but there are paying deposits of coal, iron, salt, bitumen, quicksilver, and limestone.

INDUSTRIES. Tourists notice a peculiar absence of skill in cultivating the soil, an art anciently of great renown in that region. However, within recent years the agricultural art has been showing evidences of improvement, owing largely to the building of several railroads and the return of many Jews to Jerusalem. The principal soil products include hemp, cotton, wheat, barley, rice, tobacco, indigo, and fruits. The chief fruits grown are olives, grapes, and apples. Sheep and cattle raising are important industries in the grazing and mountain regions, while the mixed farming in

the fertile districts includes the rearing of horses, camels, and poultry. Silk culture is making considerable advancement and is keeping pace with the development of mulberry groves. The cedar of Lebanon, so famous in history, is still secured, and the country has several species of pine and deciduous trees. The climatic conditions vary greatly in different sections, ranging from cool and pleasant summers in the Lebanon region to the arid and hot seasons in the Jordan valley. From April to October a dry season with scarcely any rain occurs. Syria has been divided by the Turks into several governments and industrial activity is fostered by them to a limited extent. It has few good highways. The manufactures embrace soap, earthenware, silk goods, cotton and woolen textiles, jewelry, glass, and clothing.

LANGUAGE, RELIGION, AND LITERATURE. The Syriac dialect is a branch of the Aramaic tongue and belongs to the Semitic family of languages, but the official and general language spoken is Arabic. About four-fifths of the people are Mohammedans, and the remainder are Christians and Jews. The Christians comprise Protestants and Greek and Roman Catholics. Protestant missionaries are actively at work through American and European assistance and a college is maintained by them at Beyrout. Protestant and Catholic schools and churches are supported in Jerusalem and many other cities. Syriac is practically a dead language, but it is used as the sacred language among the Christian churches of Syria and Asia Minor, especially in the Greek and several allied churches.

The literature written in the Syriac is classed with the Christian writings and had its rise in the 1st century of our era. Many of the early writings are translations and commentaries on the Bible, and they contain many sacred hymns, liturgies, and prayers. The first complete translation of the Bible into Syriac, called the *Peshito version*, is of great value to scholars. Works in philosophy, history, grammar, natural sciences, law, and medicine date from the 4th century A. D., but many of these writings are not extant, though it is known that they exercised an important influence in bringing classical learning to the Arabs. Among the Syriac writers of note is Saint Ephraem of the 4th century. The later writers include Jacob of Edessa, Bar-Habraeus, and Bar-Ali.

HISTORY. The history of Syria dates from remote antiquity. Damascus was a city of importance in the time of Abraham, about 2000 B. C., but about 740 B. C. the Assyrians conquered

it and made Syria tributary. The coast region west of the Lebanon Mountains was occupied by the Phoenicians, who founded and defended the powerful commercial cities of Sidon and Tyre, but they, too, became at least partially tributary to Assyria. Other peoples of note include the Moabites, Canaanites, Ammonites, and Anakims, who occupied the region along the Jordan. The Israelites under Joshua invaded Palestine about 1500 B. C. and held the country with varying success until about the time of Christ, when it became a part of the domain of the Romans. In the meantime the Israelites were carried into Assyrian captivity, in 721 B. C., and later into Babylonia.

Syria was conquered by the Persians and subsequently by the Greeks under Alexander the Great. After the division of Rome it was a part of the Byzantine Empire, but in 636 A. D. the Arabs conquered it. The Seljuk Turks occupied it in 1078 and later it was held by the Crusaders, who maintained their kingdom at Jerusalem until 1187. The Mamelukes joined it to Egypt, but it finally became a territory of the Ottoman Turks in 1517. Mehemet Ali conquered it in 1833, but the great powers of Europe restored it to the Turks in 1840. The Druses and Maronites began a factional war in 1860, which the Turks were unable to quash, but peace was restored under European sanction by a French military force. The region is now divided into three governments. One has its capital at Beyrout and one is governed from Damascus. The region of Lebanon is governed by a Christian mutessarrif from Beit-ed-din.

SYRIAN CHRISTIANS, a branch of the Christian Church, officially called the Church of the Syrian Rite. It is most strongly represented in Syria, but controversies in the 4th century caused it to be divided into numerous denominations. The leading branches include the Jacobites in Mesopotamia, the Maronites in Lebanon, the Nestorians in Kurdistan, and the Christians of Saint Thomas in India. In the 4th century this church had several million members and was a united body, and the total membership at present does not exceed that number.

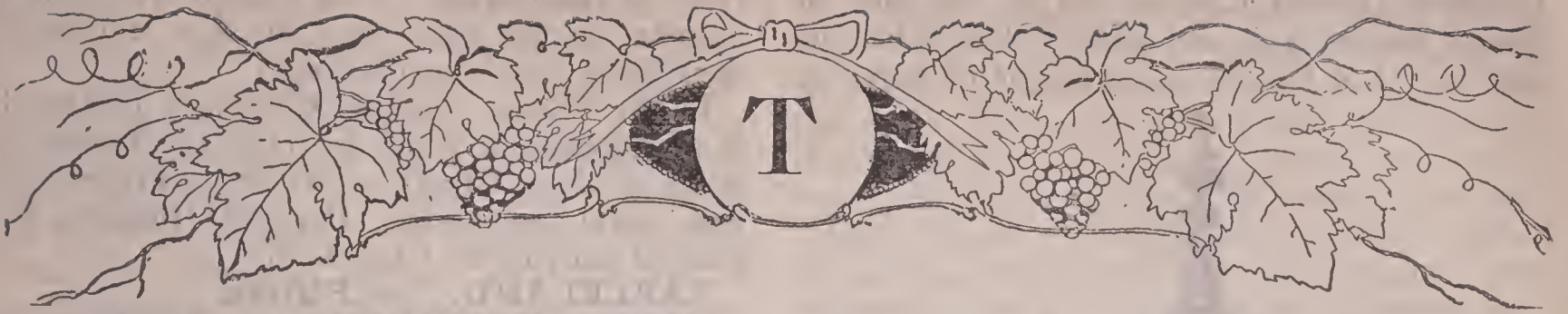
SZEGEDIN (sĕg'ĕd-ĕn), a city of Hungary, at the confluence of the Maros and Theiss rivers, 105 miles southeast of Budapest. It is an important railroad junction. The surrounding country is fertile, producing large quantities of corn, tobacco, and fruits. It has manufactures of soap, matches, leather, tobacco products, salt, soda, cotton and woolen goods, machinery, and lumber products. The principal buildings in-

clude the government offices, the superior law court, numerous public and secondary schools, and several convents and churches. Szegedin has a large railroad and river commerce, the articles of trade being manufactures, live stock, cereals, and lumber. The city stands in a marshy plain and is defended by a fortress

built by the Turks in the 16th century. An overflow of the Theiss River caused much damage in 1879, but since then vast embankments and wharf improvements have been made to protect against high water. The inhabitants consist almost entirely of Magyars and Slavs. Population, 1906, 106,643.

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T

TABERNACLE

T, the twentieth letter and the sixteenth consonant of the English alphabet. It is a sharp mute and is closely associated with *d*, the two being frequently interchanged in some languages. In German it is quite similar to *z*, as in Pestalozzi. It is made by placing the tip of the tongue closely against the front part of the palate and then giving a quick and strong emission of the breath. In some words, as in nation, action, and portion; it has the sound of *sh*. It is silent in some words, as in *castle*, *listen*, and *christen*.

TAAL (tä'äl), a town of the Philippines, in Luzón, on the Transpit River, near the Gulf of Balayán. It is connected by a bridge with Lemerí, on the opposite side of the river, and is about fifty miles south of Manila. Formerly the town was located on the bank of Taal Lake, in which the volcano Taal is situated, but numerous eruptions caused it to be removed farther south. It has a large trade in cotton, sugar, coffee, and fish. Population, 1908, 33,550.

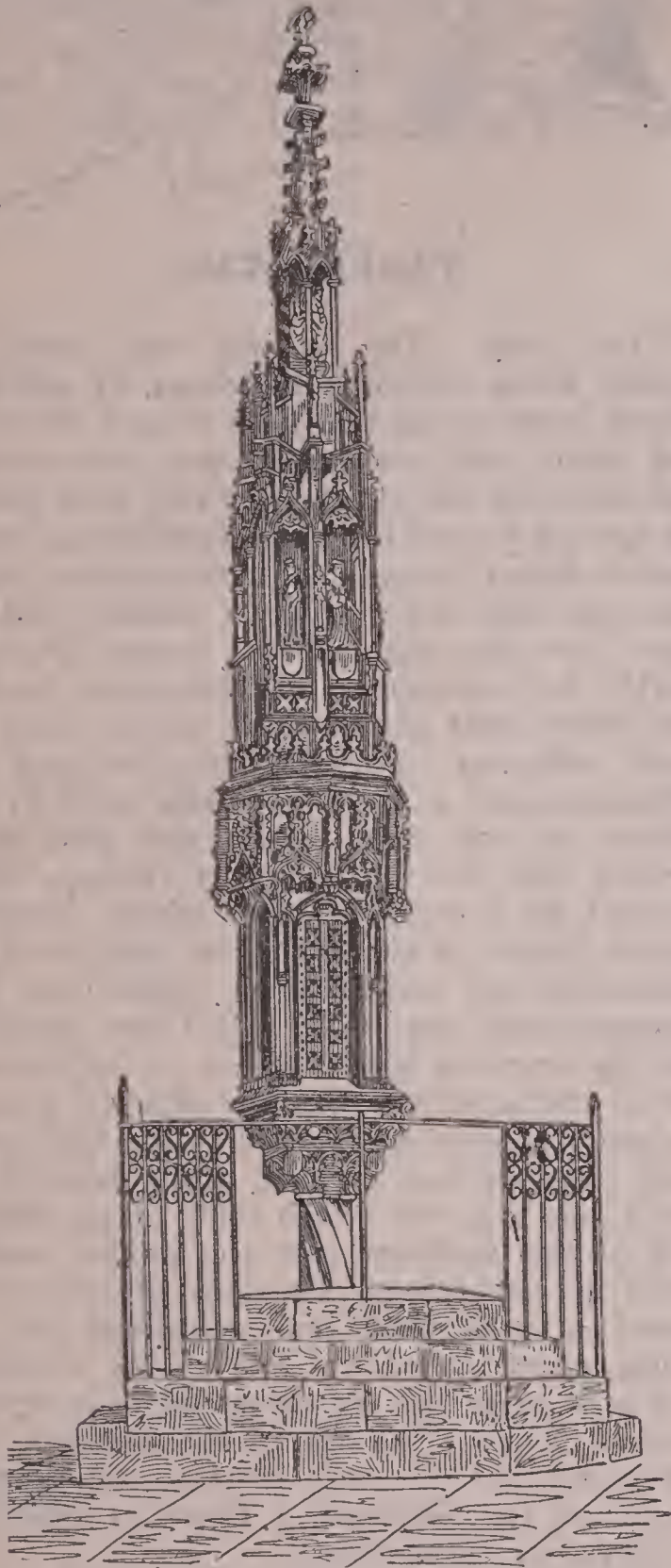
TABARD (täb'ärd), a kind of tunic or mantle worn as a protection from the weather during the Middle Ages. Usually it was worn over the armor, when it was decorated with the arms of the wearer. The name *Tabard* was applied to an inn of London, England, in the 14th century. It was located on High Street, Southwark, and was the starting place for the pilgrims mentioned by Chaucer, when they went upon their journey to the shrine of Thomas à Becket. The sign of the inn was a tabard, or sleeveless jacket.

TABERNACLE (täb'är-nä-k'l), a tent or sanctuary constructed under the direction of Moses in compliance with divine authority. The tabernacle was used while the Israelites were in the desert as a sign that God dwelt among his people. Freewill offerings were solicited to obtain materials for its construction, and in response the Jews brought precious stones, gold, silver, skins, cloth, spices, and other material. It was built in the form of a parallelogram, 45 feet long, 15 feet wide, and

15 feet high. The material was acacia or shittim wood, including 48 boards, of which 20 boards were on the two sides toward the north and south, while six boards were on the west end, and only two on the east end, thus leaving an opening toward the east. Golden rings were used to fasten the upright boards together, while the ends were set into silver sockets, and the upper covering was made of carpet. A court 75x150 feet surrounded the tabernacle, and in the eastern half of the court was an altar for burnt offerings. Between the altar and the tabernacle was a laver or basin used by the priests to wash their hands and feet before passing into the sanctuary, its entrance being covered by a costly curtain which contained woven figures of cherubs. The interior of the tabernacle was divided by a curtain into two compartments, the outer called the *sanctuary* and the inner the *holy of holies*. Near the center of the sanctuary was the altar of incense, on which incense was burned by the high priest each morning and evening, while toward the north side was the gilded table of showbread, and in the southern part the golden candlesticks or candelabra. The holy of holies contained a gold-plated and gold-lined box of acacia wood, called the *ark of the covenant*, and in it were the ten commandments written on two tables. The ark of the covenant was surmounted by the two cherubs and between them was the Shekinah, a figure to symbolize the presence of Jehovah.

The people gathered in the east end of the court to worship, while only the priests entered the sanctuary, and this but twice daily, in the morning to extinguish the lights and in the evening to light them. The holy of holies was entered by no one but the high priest, who went into it but once a year, on the great day of atonement. When the Israelites moved from place to place, the Levites took charge of the tabernacle. Moses first set it up on the first day of the second year after the exodus from Egypt. It was located at Shiloh soon after the

Israelites reached Canaan, but in the time of Saul it was at Nod, and when Solomon became king it was at Gibeon. The temple of Solomon



TABERNACLE AT BARTFELD, HUNGARY.

superseded it, but that king provided a place for it in the temple, thus making Jerusalem the central place of Jewish worship. The feast of the tabernacle was one of the three leading Jewish festivals, and its celebration required the presence of all the males at Jerusalem. It was held to commemorate tent life in the wilderness, and on this occasion the people dwelt on their housetops or in temporary dwellings. In the later period the feast partook of thanksgiving for the completion of the harvest and the vintage. In the latter sense it was called the

feast of ingathering. This festival was held in autumn, lasting eight days, the first and eighth days being holy convocations.

In the Roman Catholic Church, a tabernacle is a receptacle in which to retain the Eucharist. Some of these structures are finely ornamented with metal and marble. Bartfeld, Hungary, has a noted tabernacle of this kind.

TABLELAND. See **Plateau**.

TABLE MOUNTAIN, or **Tabelberg**, a mountain of South Africa, in Cape Colony, situated near Cape Town. It has an elevation of 3,560 feet. The summit furnishes a fine outlook across the city and Table Bay. It is so named on account of its peculiar shape and level top. White clouds, termed *tablecloth*, frequently envelop the summit.

TABOO (tā-bōō'), the name applied by the natives of the Polynesian Islands to any object which is consecrated for a special religious purpose. In some instances they extend the name to certain political prohibitions exercised by the chiefs. All things reserved for their idols are taboo and no one but the priests is permitted to touch them. The prohibition is especially incumbent upon women and such men as are regarded profane. Formerly the chiefs were accustomed to taboo certain articles of food and clothing, especially those they desired to reserve for their own use, and this practice occasioned distress by depriving the common people of what belonged to them. The word is now used to signify a total prohibition of intercourse with or approach to the thing tabooed.

TABOR (tā'bēr), **Mount**, a famous mountain in northern Palestine, rising abruptly in the plain of Esdraelon to a height of 1,900 feet. It furnishes a magnificent view of the Holy Land. From its summit the tourist may catch a gleam of the Sea of Galilee fully fifteen miles distant, while the adjacent plains and a large part of the Jordan basin may be viewed. Fine forests of oak and pistacias grow on its slopes and summit, in which wolves, lynxes, and reptiles find a haunt or retreat. Tabor was long thought to be the scene of Christ's transfiguration, but it is now reasonably clear that that event occurred farther north and that a fortified city occupied the region in its vicinity for centuries. The Crusaders built many fine churches and monasteries on Mount Tabor and traces of them still remain. Napoleon I. gained a victory over the Turks on its slopes.

TABRIZ (tā-brēz'), or **Tabreez**, a city of Persia, capital of the province of Azerbaijan, on the Aji River, 38 miles east of Lake Urumiah. It occupies a fine site 4,000 feet above sea level, is fortified by a brick wall with an outer

ditch, and may be entered through seven gates. Lofty hills surround three sides of the city, while the other side is in the form of a fertile and extensive plain. The city is well platted and cleaner than most cities of the East, but many of the buildings are poorly constructed and lighted, and little provision has been made for sanitary comforts. Among the manufactures are jewelry, carpets, silk and cotton goods, leather, furniture, earthenware, and utensils. The leading exports include shawls, spices, dried fruits, carpets, and raw silk, and there are imports of sugar, wines, and fabrics. It has a large interior and foreign trade and is the gathering center of many caravans. Among the principal buildings are numerous mosques and bazaars, an arsenal, several baths, and a number of government houses.

Tabriz is the Tauris of ancient times and is one of the oldest cities of the East. Tiridates III. made it the capital of Armenia in 297 A. D., when it was considered an old city. The site was enlarged and beautified by parks and gardens under the direction of Zobeidah, wife of Harun-al-Raschid, in 791. In 1293 Marco Polo made a visit to Tabriz. Timour sacked the city in 1392 and soon after it became a possession of the Turkomans, but fell to the Persians in 1500. Earthquakes are of frequent occurrence, which accounts for most of the buildings being low. A large per cent. of the inhabitants are of Turkish descent. Population, 1906, 180,500.

TACOMA (tă-kō'mă), a city of Washington, county seat of Pierce County, 28 miles west of south of Seattle. It is situated on Commencement Bay, an inlet from Puget Sound, near the mouth of the Puyallup River. The city has transportation facilities by the Northern Pacific, the Great Northern, the Canadian Pacific, the Chicago, Milwaukee and Saint Paul, and other railroads. It has a secure and spacious harbor, from which many steamship lines sail to carry coastwise and trans-Pacific trade. The site rises gradually from Commencement Bay, which is about a mile wide and five miles long, and the streets traverse an undulating tract. The surrounding country has deposits of coal and extensive interests in lumbering. It produces grain, hops, fruits, and vegetables. Southeast of the city is Mount Rainier, locally called Mount Tacoma, one of the Olympic Mountains. It has an elevation of 14,526 feet and presents a picturesque sight, having forest-covered slopes and a snow-capped summit.

The city is finely platted, having wide and straight streets, many of which are substantially paved with stone, brick, and asphalt. The parks include about 700 acres, of which Point

Defiance is the most noteworthy, being the largest and beautifully ornamented with natural scenery of great beauty. Among the principal buildings are the county courthouse, the city hall, the Chamber of Commerce, the Northern Pacific offices, the Tacoma Theater, the public high school, the Union Club House, and the Tacoma Hotel. It is the seat of Puget Sound University, the Annie Wright Seminary, the Washington College, the Pacific Lutheran University, the Whitworth College, Vashon College, and the Tacoma Academy. The Carnegie public library contains about 38,000 volumes, and the Ferry Museum of Art contains a choice collection. Among the institutions are the city and county hospitals, the State insane asylum, and the Saint Joseph's Hospital. The municipality owns and operates the waterworks and the electric light plant. Intercommunication is provided by an extensive system of street railways, which is connected with lines that reach Seattle and other points within the State.

Tacoma has a large wholesale and jobbing trade and is one of the leading business centers of the Pacific coast. An abundance of timber and coal is obtained for manufacturing purposes in the vicinity. It has large smelting and shipbuilding interests. The general manufactures include furniture, flour and grist, lumber products, hardware, engines, mattresses, earthenware, and machinery. It has a large trade in coal, packed meat, lumber, grain, flour, fish, and fruits. Salmon fishing is carried on extensively on Puget Sound and much of the output is canned for the market. The wharf facilities, grain elevators, and packing establishments are among the largest in the West. The locality was settled in 1868, when Old Tacoma was founded, and New Tacoma was platted the following year. In 1873 the Northern Pacific was completed, and the city of Tacoma was organized in 1874. It became the county seat in 1880. Few cities of America have had a more rapid and substantial growth in wealth and commercial importance. Population, 1900, 37,714; in 1910, 83,743.

TACONIC MOUNTAINS (tă-kōn'ik), a range of highlands in the eastern part of New York, extending a short distance across the border into Vermont and Massachusetts. These mountains trend from the Hudson toward the northeast, assuming their greatest height after they cross the border, and in Vermont merge into the Green Mountains. Mount Equinox, in Vermont, has a height of 3,816 feet, and Greylock, in Massachusetts, is elevated 3,535 feet above sea level. These highlands give rise to the name Taconic System, which includes a

series of rocks of a metamorphosed character that predominate in the region.

TACTICS (tāk'tīks), the art of disposing military and naval forces in order for battle, or conducting and arranging troops for action on the scene of war. The term *elementary tactics* is applied to the instruction in military art, while *grand tactics* has reference to the maneuvers on the field of battle. Since armies are divided into infantry, cavalry, and artillery, each class has a form of tactics peculiar to itself.

Artillery has a large field of action and is a powerful instrument in modern warfare. The chief duty is to protect the infantry of its own country and destroy that of the enemy. This is possible from the fact that it has a great range and may mass itself to support the action of the other arms. Although it must cease firing when flanking or changing its position, modern implements permit it to do so with considerable speed and accuracy. Usually a high point is selected with the view of reaching the position of the enemy and at the same time covering effectively the retreat of its own army. Usually the position is concealed on the sheltered side of a hill and the firing is indirect upon the enemy. Officers stationed at convenient points are able to determine the direction and range of the shots, and by signals indicate the same to those who have charge of the gun. Artillerymen are carefully trained and thoroughly familiar with the theory of projectiles, and from extensive practice are able to locate their batteries and direct the fire with great precision. A field army usually has both light and heavy artillery, the former comprising field and horse batteries and the latter guns of position. Mortar and Howitzer batteries are classed as field artillery and are used for curved and for high-angle fire. Guns of position are of long range. Usually the artillery moves in columns of platoons, but when within the range of firearms it appears only in columns of sections, thus lessening the danger of excessive losses.

Cavalry has the advantage of being able to move rapidly. This branch of the army is employed chiefly to protect the infantry and to obtain information. When the enemy is to be pursued or the infantry is required to retreat, the cavalry is able to be of great service. Though important as a division of the army, its use in the battlefield is limited. On an open plain it is able to advance upon the enemy, but this cannot be safely done if there is danger of exposure to artillery fire. Since lances and swords are the principal arms, the

cavalry is effective only at short range, and the purpose is to make a sudden and vigorous attack. Where two forces of cavalry meet in combat, the conflict sometimes results in a hand-to-hand conflict, but the encounter is usually of short duration. Cavalry attacks are sometimes made upon the artillery, but only where the strength of the enemy is quite well known, and it is the aim to pass to the rear so as to make the attack at the unprotected side of the batteries. Cavalry attacks upon infantry must necessarily be sudden, else the fire of the enemy causes losses and demoralization before the attack can be made effective. In some instances cavalymen alight to fight on foot, but this method is confined to points where the enemy is not strong or passage must be effected through defiles and woods.

Infantry is usually effective in firing at a distance of 900 yards, but the fire is more decisive at 500 yards. This division of the army can act independently and is able to act more speedily than any other. Usually the movement is in columns to the firing zone, where the line is single or open, this being essential to avoid the destructive effect of a volley. Defenses are hastily built of earth in long lines, usually parallel to each other at varying intervals, and the men lie upon the ground as they fire upon the enemy. Advances are made rapidly from one embankment to another, and the firing is either in volleys or each soldier fires at will a definite number of rounds. While each division is previously assigned and the plan of battle is carefully mapped out, each man has certain independence in thinking and in acting. A careful outlook is kept for the exposed and weakened positions of the enemy until the climax of battle is reached, which is frequently at a distance of 500 yards. Frequently it occurs that the encounter is at very close range, when the bayonet becomes an important weapon of attack and defense. Although warfare has been greatly influenced by the invention of powerful explosives and rapid-firing guns, the tide frequently turns upon efficiency at close range. According to Meckel, the noted German tactician, "The laurel of victory still hangs on the point of the bayonet."

Naval tactics are concerned with the proper groupings and movements of ships and other naval weapons. It is the purpose of a commander to hold the enemy at every point, and with this end in view he endeavors to break the line of battle formed by the antagonist. Naval tactics are usually classed in two divisions, including *torpedo tactics* and the handling of ships and weapons, the latter being

termed *gunnery*. Torpedoes and submarine navigation play an important part in modern naval contests and close quarters are usually avoided to escape the effect of torpedoes. If an attack is made upon a fleet or coast defenses, the ships sail in an ellipse. A fleet of twelve ships may be divided into three squadrons of four ships each, or the entire fleet may advance abreast, when the arrangement is termed a *line*.

The navies are subdivided differently into fleets and each fleet, into squadrons. Usually a squadron consists of from six to twelve ships, and half a squadron is called a *division*. Two ships of a squadron comprise a *section*. When the advance is in single file it is said to be in *column*, and when the movements are diagonal to the line of the ships they are said to be in *echelon*. The ships must continue in motion in order to keep them under control and they cannot be turned suddenly. It is impossible to stop a heavy ship moving at high speed in less than a distance several times her length. These facts have made it necessary to formulate plans of movements during battle. The requirements are that the movement be as simple as possible, that changes in speed be avoided, that ships should be grouped according to their characteristics, and that the fleet be concentrated until the attack is made, when it should be in a position to form quickly as directed by the superior officer.

TAGANROG (tä-gän-rôk'), a seaport city of Russia, in the government of Ekaterinoslav, on the north shore of the Sea of Azov. The harbor is too shallow for large ships to land, but they anchor and unload by means of barges within half a mile of the quay. The surrounding country is highly fertile and is penetrated by several railroad lines, thus giving the city a large export trade in corn, wheat, live stock, wool, leather, and dairy products. Among the manufactures are machinery, clothing, cotton and woolen goods, hardware, and earthenware. The fisheries are an important industry, and both fresh and salt fish are transported to the northern markets. Most of the buildings are wooden structures, but there are a number of massive and substantial buildings, including an imperial palace, a Greek monastery, several hospitals, many schools, a cathedral, and a number of other churches. The city was founded by Peter the Great in 1696. It contains a fine monument to Alexander I. Considerable damage was done in 1855 as a result of the Crimean War. Population, 1906, 61,786.

TAGUS (tä'güs), the largest river in the Spanish peninsula, which rises near the bound-

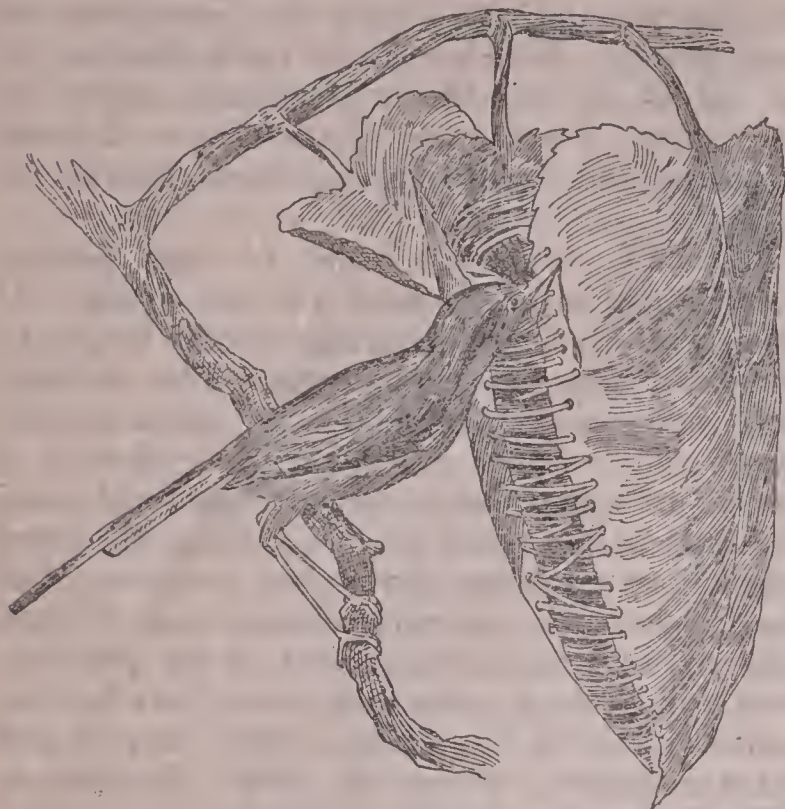
ary of Aragon and New Castile and, after a general course of 542 miles toward the southwest, flows into the Bay of Lisbon, an inlet from the Atlantic. Much of its basin is dry and barren and its banks are precipitous in many places. It is navigable for a distance of 115 miles. Among the principal tributaries are the Jarama, Zezere, and Zatas rivers. Lisbon, Santarem, and Toledo are the chief cities on its banks.

TAHITI (tä'hê-tê), one of the Society Islands, the largest island of the group. It consists of two parts, having a total length of 32 miles, these being connected by an isthmus three miles wide. The area is given at 412 square miles. The surface is diversified by a number of ridges, but it has a considerable area of fertile valley coast lands. Among the chief productions are sugar, arrowroot, cocoanut, dye-woods, domestic animals, cotton, and cereals. Papeete, or Papéiti, the capital, is the principal town and trading center and has a safe harbor. France established a protectorate over Tahiti and the Society Islands in 1844. Population, 1906, 10,834. See **Society Islands**.

TAHLEQUAH (tä-lê-kwä'), a city of Oklahoma, in the Cherokee Nation, 80 miles northwest of Fort Smith, Ark. It occupies a fine site in the valley of the Illinois River, on the Saint Louis and San Francisco Railroad, and is surrounded by a productive farming and stock-growing country. The principal buildings include the Tahlequah Institute, the courthouse, the high school, and the Cherokee National Library. It has manufactures of earthenware, utensils, and wearing apparel. Several newspapers are published in the town, both in the English and Cherokee languages. The place was settled in 1836 and incorporated in 1889. It was the capital of Indian Territory until that region was united with Oklahoma to form a State. Population, 1900, 1,482.

TAILOR BIRD, a genus of birds of the warbler family, so named from their habit of sewing leaves of cotton or other substances to form a receptacle for the nest. The nest proper is made of cotton, wool, loose hairs, and twigs, and four eggs are usually laid. These birds include a number of species, most of which are native to the East Indies and Southeastern Asia. The common tailor bird measures about six inches exclusive of the tail, which is about as long as the body. The upper part is greenish and the lower part is whitish. It is the most ingenious species in sewing together the leaves, usually taking two leaves at the extremity of a twig and stitching them by passing vegetable fibers through holes made by the bill.

TAI-PINGS (tī'pings'), the followers of Hung-Sew-Tseuen, a professed Christian who was at the head of a rebellion in China from 1850 to 1864. The leader of the rebellion was



TAILOR BIRD.

popularly called Teen Wang, or Heavenly King. He endeavored to expel the reigning Tartar dynasty and in its stead establish a Chinese dynasty, to be called Tai-ping, or Great Peace. Peking had been captured by the allied French and English army in 1860, and the treaty exacted made it of commercial interest to these governments and to the United States to restore and preserve order. Gen. F. T. Ward, an American, was given command of the allied forces, under whom the rebels were defeated at Shanghai in 1860. On the death of General Ward, in 1862, C. G. Gordon, commonly called Chinese Gordon, was placed in command and the insurrection was finally crushed in 1867. The protracted war damaged many of the commercial cities and wrought much injury in several of the best provinces.

TAJ MAHAL (täzh mä-häl'), a beautiful tomb and monument near the city of Agra, India, which was constructed by Emperor Shah Jehan as a mausoleum for himself and his favorite wife, Noor Mahal. It occupies a fine situation just outside the wall of the city, about a mile east of the fort. The structure is of white marble. The main features include the mausoleum in the center, above which a beautiful dome rises, and at each corner is a smaller dome or minaret. Both the exterior and interior are elaborately decorated, and on the inner walls are many passages from the Koran written in solid stones. The general design,

elaborate perfection, and complexity of grace are alike remarkable. It is estimated that 20,000 workmen were employed in its construction for 22 years and that it cost \$4,200,000.

TAKU (tä-kōō'), a town of China, in the province of Chi-li, thirty miles east of Tientsin. It is finely located near the mouth of the Pei-ho River and is strongly fortified. The forts of Taku were captured by the British and French fleets in 1859. At the time of the Boxer rising, in 1900, they were attacked and captured by the allied troops.

TALC (tälk), a granular mineral with a shining luster, quite greasy to the touch, and inclined like mica to separate into sheets. It consists quite largely of magnesia and silica, usually in the proportion of 33 parts of the former to 62 of the latter, and nearly 5 per cent. of water. The color ranges from white to blackish-green. It is either transparent or translucent when in thin sheets. Different varieties are called potstone, soapstone, and steatite, or French chalk. Talc is used for hearthstones, paint, and wall plaster. In a powdered state it is useful as a lubricant. The Chinese employ it to some extent instead of glass in windows. Steatite is used to some extent instead of chalk. The richest talc mines occur in North Carolina, where the mineral is found in large strata, and the product scales much like slate. It is found in New Hampshire, Vermont, Maryland, Massachusetts, Virginia, and New Brunswick. In 1908 the production of the United States was 54,800 tons, besides which a small quantity was imported. The larger importations are from Canada.

TALCA (tä'l'kä), a city of Chile, capital of the province of Talca, 135 miles south of Santiago. It is situated on the Calaro River, about 45 miles from the coast, and is on the Santiago-Concepción Railway. The manufactures include woolen blankets, clothing, cigars, and machinery. It has a large trade in wheat, fruits, and live stock. Population, 1906, 41,878.

TALENT (tä'l'ent), a unit of weight and money in ancient Greece. The talent as a unit of weight was the highest denomination in the system of Greece, equal to about 82 pounds avoirdupois. A talent of different denomination was used by the Hebrews and Babylonians. The Greek talent as a monetary unit was valued at about \$1,000, and the Sicilian talent, sometimes called the *little talent*, was of gold and weighed about three-fourths of an ounce avoirdupois. As a monetary unit the Greek talent was divided into 60 *minus* and 6,000 *drachmas*.

TALISMAN (tä'l'iz-man), a figure cast in metal or engraved upon stone, supposed to con-

fer on its possessor supernatural powers. The talisman was made at a particular hour and under the influence of certain planets, and it was supposed to have a favorable influence in averting disease and calamity. It differs from the amulet in that the powers of the latter are passive and only preservative from harm and injury, while the talisman, prepared under a favorable conjunction of planetary influences, could subject to him the elements and enable him to pass through the air or over the seas. It was thought effective in winning the affection of a beloved object and to strike an adversary with a deadly blow with entire safety of the possessor. Advancement in educational art has caused the talisman to be discredited in civilized countries, but some lingering traces of the same superstition are still left in the charms which are supposed to bring good luck. Images of saints and rosaries were employed in the Middle Ages as talismans. The medicine bag of the North American Indian and the fetich of the African are forms of talismans.

TALLADEGA (täl-lä-dē'gä), a city of Alabama, county seat of Talladega County, sixty miles east of Birmingham, on the Southern and the Louisville and Nashville railways. It is surrounded by a fertile farming and fruit-growing country. Large quantities of coal, iron, and marble are obtained in the vicinity. It has the Presbyterian Orphans' Home, the Talladega College, and the State schools for the deaf, dumb, and blind. The chief buildings include those of the county and several fine schools and churches. It has manufactures of hosiery, cotton goods, leather, flour and grist, fertilizers, and machinery. The public utilities include waterworks, sewerage, and electric lighting. General Jackson defeated a force of Creek Indians on the site of Talladega in 1813, when about 300 Indians were slain, while the Americans lost about 100 men. Population, 1910, 5,854.

TALLAHASSEE (täl-lä-häs'së), the capital of Florida, county seat of Leon County, 25 miles north of the Gulf of Mexico and 163 miles west of Jacksonville. Communication is furnished by the Seaboard Air Line, the Carrabelle, Tallahassee and Georgia, and the Georgia, Florida and Alabama railroads. It is surrounded by a fertile farming and fruit-growing region, which yields large quantities of cotton, tobacco, and tropical fruits. The principal buildings include the State capitol, the county courthouse, the Leon County Academy, the Florida State College, the Walker Library, and the Florida State Normal College. Bloxham Park is a fine public resort. Among the manufactures are tobacco, wine, woodenware, and utensils. The

place has systems of waterworks, electric lighting, and sanitary sewerage. It became the territorial capital in 1822, but was not platted until 1824, and the capitol building was begun in 1826. Near the city is the old Spanish fort of San Louis. Population, 1905, 3,311; 1910, 5,018.

TALLOW (täl'lô), the product obtained from rendering the fat of certain animals, especially that of cattle, goats, and sheep. It is a mixture of olein, palmitin, and stearin and is derived by submitting the fat to heat in kettles. The best grade of tallow is obtained from the fat found near the kidneys of cattle and grades of less value come from other parts, especially the caul, which covers more or less of the intestines. Pure tallow is somewhat whiter than lard, is almost tasteless, and has a peculiar odor. It is soluble in boiling alcohol and has a specific gravity of about .935. It is an important article of commerce and is used in making soap, candles, and lubricants. The better grade is employed in making oleomargarine. A vegetable tallow is obtained by boiling the berries of various plants, such as the tallow tree.

TALLOW TREE, a class of trees yielding vegetable tallow, a product of value in candle making. A number of widely different species have been described. They are distributed more or less in regions having a temperate climate. Most of them have large leaves and fragrant flowers and the stem measures from 25 to 50 feet in height. The vegetable tallow is secured by making incisions in the stem and by boiling the seeds, but the capsules and seeds of other species are the only parts that yield this product. These are boiled and crushed and the fatty substances are afterward secured by pressure. The *Chinese tallow tree* belongs to the spurge family and is cultivated extensively in China, India, and the warmer parts of America, especially in Georgia and the Carolinas. The *West African*, or *Sierre Leone, tallow tree* is of the gamboge family and both its seed and trunk yield a yellow, greasy juice. Copal is the product of the trunk and is used in making soap and varnishes.

TALMUD (täl'müd), the name sometimes used to designate all the teaching of the Jewish law. In this sense the term comprises the Mishna, the Gemara, and the writings commonly called the Old Testament, but it is employed more frequently to describe the body of Jewish civil and canonical law not comprised in the Pentateuch, commonly including the Mishna and the Gemara, but sometimes limited to the latter. The Mishna is properly the first part of the Talmud and consists of a collection of traditions and decisions made by Rabbi Juda, which

he compiled about the year 192 A. D. to sum up all previous rabbinical labors. On the other hand, the Gemara is the second part of the Talmud and embraces an exposition of the first part. The Mishna was written in Hebrew and the Gemara in Aramaic. The greater part of these works is devoted to religion and ethics, but they contain more or less of writings that may be classed as history, philosophy, and sciences. Jews generally hold the Talmud of greater importance than the Old Testament, but it is looked upon by Christians as being a fund of information regarding later developments in Judaism and as containing numerous exaggerations. The Talmud was first preserved in traditional forms and fragmentary writings, which were afterward collected into written volumes. Two collections are extant, known as the *Jerusalem Talmud* and the *Babylonian Talmud*. The former embodies the discussions on the Mishna of the Palestine doctors from the 2d to the middle of the 5th century and the latter, those of the Jewish doctors in Babylonia from about 190 to the 7th century. These works are written with the subject-matter in the center of the page and around the margins are notes and comments.

TAMAQUA (tä-mä'kwä), a borough of Pennsylvania, in Schuylkill County, 37 miles north of Reading, on the Little Schuylkill River. It is on the Philadelphia and Reading and the Central of New Jersey railroads. In the vicinity are extensive coal mines. It has a public library and a number of fine schools. The manufactures include hardware, flour, boots and shoes, knit goods, and clothing. It has electric lighting, waterworks, and sewerage. The vicinity was settled in 1799 and Tamaqua was chartered as a borough in 1852. Population, 1910, 9,462.

TAMARIND (tä'm'ä-rind), a tropical tree of the bean family, which was originally native to the East Indies, but is now extensively naturalized and cultivated in other warm regions. About forty species have been described, ranging from shrubs to large trees, but the common tamarind usually ranges in height from thirty to forty feet. The leaves are alternate and pinnate, the flowers are reddish-yellow, and the fruit consists of a brown-shelled pod from three to six inches long, containing three to ten seeds. The seeds are used in mak-



COMMON TAMARIND.

ing a beverage, in cookery, for preserving fish, and for various purposes in medicine. Pressed in syrup or sugar, the pods form the preserved tamarind of commerce. The wood, bark, leaves, and flowers have economic value, and the tree forms a fine ornamental plant. Species native to the East Indies frequently reach a height of eighty feet, and their pods contain more seeds than those raised in the West Indies. Other species are met with in the deserts of Asia and Africa, but these are invariably smaller plants.

TAMARISK (tä'm'ä-risk), the name of several shrubs and herbs native to Europe, found chiefly in the region of the Mediterranean. The *common tamarisk* cultivated in gardens grows wild in Southern Europe. It is a fine shrub from twelve to fifteen feet high and has light green leaves and beautiful flowers. When in full blossom, it is one of the most beautiful shrubs, presenting a profusion of small red flowers. Another species, the *German tamarisk*, grows to a height of eight feet. The branches are upright and the bark is smooth, but the flowers are very beautiful. These plants are popular for ornaments in gardens and parks. Some species of tamarisk attain a height of thirty feet and are used as fuel, such as are common to the deserts of Arabia and Africa.

TAMBOURINE (tä'm-böör-ën'), an ancient musical instrument of the drum class, consisting of a wooden hoop, one side of which is open and the other is covered with a vellum head. Around the hoop are metal plates, which jingle when the instrument is played. The player strikes the head with the fingers, hand, or elbow, thereby producing a rolling sound, and intensifies the musical effect by drawing the fingers or thumb over the skin. Tambourines are popular among the Italians, Gypsies, and Basques and are used extensively in various parts of America and Europe. A form of these instruments is employed with good effect by the Salvation Army, usually in connection with a drum and cornet.

TAMIL (tä'mil), a race of people native to Ceylon and southern India. They are classed with the Dravidian peoples of India. It is supposed that they inhabited the country before it was invaded from the north by the Aryans, whose culture they adopted. Their language is spoken in the northern part of Ceylon and a large part of India. They have an important and extensive literature and many of the writings are in verse.

TAMMANY SOCIETY, a political organization of the Democratic party in New York City, which has long wielded marked influence in the municipal and State elections. The first

organization, founded in 1789 by William Mooney, was known as the Columbian Club, but in 1805 the society incorporated under its present name, which was derived from an Indian chief of the Delaware tribe. Aaron Burr in 1800 placed the society on such a thoroughly organized footing that it controlled New York City politics and gave him the Vice Presidency. The first building was erected by the society in 1811, and in 1822 the power of the organization was merged into its general committee. Consecutive growth increased the committee to 1,400, and the chairman finally developed into a boss of the hall. William M. Tweed was the most noted of the bosses, but his corruption was finally exposed and he was imprisoned in 1871, dying in jail with a suit pending against him which the city had brought for the recovery of \$6,000,000. Though crippled for some time, it soon reorganized and is now the most potent influence in the city politics of Greater New York. The society supported Garfield for President in 1880 and thereby defeated Hancock, but its opposition to Cleveland in 1884 did not secure the vote of New York to Blaine. More or less friction between the society and Democrats of New York outside the city has weakened the party to some extent in the State. In 1896 the Tammany Society opposed the candidacy of Bryan, but it supported him in 1900 and in 1908. Richard Croker, Frederick Smythe, John Kelly, and Thomas L. Leitner are among its most recent leaders. At present the membership is 11,250.

TAMPA (tām'pā), a city in Florida, county seat of Hillsboro County, on Tampa Bay, at the mouth of the Hillsboro River. It is on the Seaboard Air Line and the Atlantic Coast Line railroads. The place has a fine harbor and has steamboat connections with Havana, New York, Charleston, and other American ports. Among the noteworthy buildings are the county courthouse, the public library, the Convent of the Holy Names, the Tampa Bay Hotel, and many fine churches. It is noted both as a summer and a winter resort.

Tampa has large interests in the manufacture of tobacco, cigars, clothing, earthenware, machinery, and canned goods. Other important industries include fishing and wholesaling. It has a considerable export and import trade. The city has electric lighting, street railways, waterworks, sewerage, paved streets, and several public grounds, including De Soto Park. It was settled in 1848 and incorporated in 1886. Population, 1905, 22,823; in 1910, 37,782.

TAMPA BAY, an extensive inlet from the Gulf of Mexico, on the west coast of Florida. It is 38 miles long and from six to fifteen miles

wide. The northern part is divided into Old Tampa Bay and Hillsboro Bay. Within the bay are numerous small islands, and at its entrance, on Egmont Key, is a lighthouse. Marketable fish and turtles abound in the bay, and it is important as a spacious and safe harbor. Tampa, on its northern shore, is the chief port.

TAMPICO (tām-pē'kō), a seaport city of Mexico, in the state of Tamaulipas, about 225 miles northeast of the city of Mexico. It is situated near the mouth of the Panuco River, about five miles from the Gulf of Mexico, and has convenient railroad connections with the interior. The harbor is made unsafe by sand bars, but jetties enable vessels drawing 24 feet of water to enter. It has two hospitals, a customhouse, and several schools and churches. The city has broad and regular streets, but is rather unhealthful on account of its site being low and swampy. Sewerage, telephones, and electric lighting are among the facilities. It has exports of tallow, hides, salted meat, and fish. Population, 1908, 17,168.

TANA (tä'nä), a river of British East Africa, which rises in the southwestern slope of Mount Kenia and discharges into the Indian Ocean. In the upper course it has many falls and cataracts, but the lower part passes through alluvial plains. A bar obstructs it at the entrance, but it is navigated about 350 miles during the rainy season. The entire length is 500 miles.

TANAGER (tän'ä-jēr), a family of passerine birds belonging to the finch family. They are native to the warmer regions of America. The species number fully 300, most of which are noted for their brilliant plumage and fine colors. The hues include mainly beautiful shades of orange, scarlet, and black. A large number of the species are birds of fine song, particularly the *organist tanager*, a bird found largely in Central America. Some of the species visit the warmer parts of the United States, frequenting places as far north as Massachusetts. They are quite shy and cautious, and their nests are built in places safely isolated from dwellings. A species known as the *summer redbird* is about seven inches long and has an alar extent of twelve inches. The *festive tanager* has a parrot-green plumage.

TANANARIVO. See **Antananarivo.**

TANGANYIKA (tän-gän-yē'kä), one of the great lakes of tropical Africa, situated between German East Africa and the Congo Free State. It stretches in a direction from southeast to northwest, has a length of 415 miles and an average width of 30 miles, and its surface is 2,700 feet above sea level. The basin is a deep depression between hills and mountains, though

the western coast is somewhat the higher, and the eastern portion is partly in the Great Rift Valley. Numerous rivers flow into it, but they are not large streams. The outlet is by the Lukuga River into the Congo. Speke and Burton discovered this lake, in 1858, and extensive explorations were made soon after in its vicinity. In ordinarily dry seasons the evaporation equals the inflow, when the Lukuga ceases to discharge, but in the wet period there is a considerable outflow. Vast and valuable forests abound in the vicinity of the lake, and on its eastern shore is the town of Ujiji, the most important in that region. Other towns include Albertville and Bismarckburg.

TANGIER (tân-jēr'), or **Tangiers**, a sea-port city of Morocco, near the western entrance of the Strait of Gibraltar, about 10 miles east of Cape Spartel. It occupies a fine site on the Bay of Tangier, overlooking the strait, and is defended by walls and several forts. The noteworthy buildings include the Great Mosque, the Roman Catholic church, the provincial government houses, and the buildings occupied by the foreign ministers and consuls to the Morocco court, all of whom have their residence at Tangier. The streets are in a poor condition, mostly narrow and dirty, but there is a considerable foreign and interior trade, particularly in live stock, minerals, clothing, utensils, and raw materials. Tangier is the ancient Tangis and was founded by the Carthaginians, but later became a Roman possession. Charles II. of England received it as the dowry of the Infanta of Portugal in 1662, but the expense of maintaining the government caused its abandonment in 1684. It was besieged and bombarded by the French in 1844. The inhabitants consist mostly of Mohammedans, but include 6,000 Christians and 7,000 Jews. Population, 1907, 32,650.

TANJORE (tân-jör'), an inland city of India, capital of a government of the same name, 175 miles southwest of Madras. It is located in the midst of an extensive plain, about 45 miles west of the Bay of Bengal, and has considerable railroad and trade advantages. Among the notable buildings are the great pagoda, a beautiful Hindu temple, and the palace of the rajah. It is the seat of a number of mosques, churches, public offices, and educational institutions. The manufactures include earthenware, silk textiles, cotton and woolen goods, and machinery. It has a considerable trade in cereals, live stock, and fruits. In 1773 the British laid siege to the town and soon after annexed it to their colonial possessions. Electric and gas lighting, telephones, pavements, and waterworks are among the improvements. Population, 1906, 58,780.

TANNIN (tân'nin), or **Tannic Acid**, the name applied to certain astringent substances occurring in the bark and other parts of plants. They are widely distributed in various forms throughout the vegetable kingdom. These substances possess the property of coagulating albumen and gelatin and forming dark-colored precipitates with salts of iron. They occur in large quantities in oak bark and to a lesser extent in that of hemlock, willow, elm, pine, and chestnut. Tannin is derived from the bark of the plum, pear, and other fruit trees. Forms of tannin occur in the bark of the sumac and the whortleberry. It is found in the leaves of the ash-tree and several allied plants. Coffee, tea, and other substances contain a certain per cent. of tannin. It has many important uses in the arts and trades, particularly for tanning or converting the skins of animals into leather. This operation depends on the formation in the skin of an insoluble compound of tannin and the albuminoid matter of the skin. The tannin employed mostly is derived from oak and cinchona bark, which is ground to a coarse powder and piled in alternate layers with the skins in deep vats. The vats are then filled with water and the skins are allowed to soak for a few weeks or months, until they have become penetrated by the tannin.

TANNING. See **Leather**.

TANSY (tân'zÿ), a coarse perennial plant of the composite family. It is native to Europe and Asia, but has been naturalized in North America, where it grows as a common weed along the roadside. It attains a height of two to three-feet, bearing finely dissected leaves and rayless heads of yellow flowers. All parts of the plants are strongly aromatic and bitter, which circumstance has led to their medicinal and culinary use.



TANSY.

The *oil of tansy* is highly poisonous. Under medical advice it may be taken as a remedy in dropsy and as a worm-destroying agent.

TANREC (tân'rĕk), or **Tenrec**, the name of

a genus of mammals found in Madagascar. They are insect-eating animals and somewhat resemble the hedgehogs. The hairs are spiny, and the young have actual spines, but these are shed when the permanent teeth develop, to be replaced with spiny bristles about an inch long. These animals are nocturnal, coming out at night to search for food. Although they appear to prefer insects, they feed partly on worms and the tender roots of plants. Some species are molelike and do damage by burrowing in the rice fields.

TANTRA (tăn'tră), the name of a Sanskrit book that treats of a religious ceremony, relating chiefly to the worship of Siva, or of Sakti, the female principle. Several works of this class of literature are extant. As a whole they deal with the creation and the destruction of the world, lay down a ceremonial form for the worship of the gods, and contain prayers and rituals. One of the leading Hindoo commentators mentions not less than 65 Tantras. Collectively they are considered as a fifth Veda, though they are much more recent, all dating subsequent to the Christian era. The followers of the Tantras, called the *Tantrikas*, worship by means of mystical rites.

TAOISM (tā'ō-iz'm), a form of religious worship in China, based upon the teachings of Lao-tse, a scholar of the 6th century B. C. The religion probably existed from prehistoric times, but no authentic information regarding it can be traced further back than the time of Lao-tse, an official who appears to have given it definite form and made it popular. He published a small work under the title "Classic of the Way and of Virtue," which teaches a form of religion something similar to naturalism or rationalism. Gentleness, humility, economy, and the return of goodness for evil are among the principal requirements. The priests of Taoism practice a form of mysticism, determine lucky and unlucky days, and regulate popular feasts. They admonish their followers to cultivate the simplicity and innocence of former days and practice divination by the use of a system of broken and unbroken lines, which they determine with the so-called *Shih* sticks. Formerly Taoism was a mere system of superstitions and fanciful notions, but it developed into a religion through the adoption of certain peculiarities common to the Buddhist faith. Many monasteries and temples devoted to Taoism are found in China and a few are met with in other countries of Asia, especially in Anam and Japan.

TAPAJOS (tä-pä-zhōsh'), a river in Brazil, which rises by two branches near the boundary of Bolivia, and, after a course of 1,100 miles

toward the northeast, joins the Amazon near Santarem. It is formed by the junction of the Arinos and Juruena rivers, and a short distance below the junction are a number of important falls, some of them twenty to thirty feet. The greater part of the main channel is navigable, and in its lower course is a lakelike expansion, which in some places widens to twelve miles. The Arinos River has its source only eighteen miles from the Paraguay, both rivers rising in a diamond-producing district. The valley is highly fertile and contains fine forests.

TAPESTRY (täp'ēs-trÿ), a kind of ornamental figured cloth of wool or silk. Usually the figures are raised above the surface and enriched with gold and silver, the designs representing men, animals, historical subjects, or landscapes. The term was originally applied to ornamental hangings, which were adjusted in dwellings to hide the walls, or to form screens or curtains. The term tapestry is employed at present not only to describe hangings, but also coverings of furniture of churches and apartments of public offices. Hand tapestry is embroidered by the needle, woolen or silk threads being worked into the meshes of a fabric. The different colored designs are made by working short lengths of thread at the proper places and fastening them at the back of the textile.

In many European countries beautiful tapestry was made for adornments in monasteries and churches by noble ladies, who engaged in the art largely for the sake of occupation and benevolence. The loom began to be introduced for making tapestry in the 9th century, after which much of the work was done by machinery, although the rare and beautiful designs are still hand-made. Tapestry of Flemish manufacture in the 14th and 15th centuries took very high rank, which gave rise to the large enterprises devoted to its production at Bruges, Antwerp, Brussels, and other cities. The art was not introduced in England until in the reign of Henry VIII., but there were manufactures of considerable importance in France, Germany, and other continental countries long before. France was celebrated for the productions of tapestry in the time of Louis XIV., when the celebrated Gobelin factory flourished in Paris. A variety of woven fabrics having a multiplicity of colors in their design are commonly called tapestry, but they do not properly belong to that class of woven fabrics. Tapestry carpet belongs to this class. See **Bayeaux Tapestry**.

TAPEWORM, the common name of a class of parasitic worms infesting the alimentary canal of vertebrates. They have no mouth or alimen-

tary canal, but live by absorbing the juices of the animals they infest. The length varies from five to fifteen yards, and the typical species are ribbonlike, varying in breadth from two lines at the narrowest part to five at the broader end. At the narrow end is the head, which is supplied with suckers or hooks for adhesion, and a row of segments constricted off from it increase progressively in size toward the posterior. The larger tapeworms have several hundred segments, each budded off from the head, the oldest being farthest from it. Each segment matures male and female organs, and, when it is developed, breaks off and is expelled from the bowels. To develop a new tapeworm, it is necessary that the matured segment be swallowed by some warm-blooded vertebrate. This may occur by drinking water or eating flesh of the swine or other animals.

When the buds are swallowed, the fertilized ova develop into hooked embryos, which bore through the alimentary canal into the tissues, or into the blood vessels, and pass from the latter with the blood to the brain, liver, or other organs of the body, where they surround themselves with cysts containing a fluid and become bladder worms. The head is developed from the bladder worm, but is not capable of further development until it is swallowed by the proper host. Different species of tapeworms are found in the muscles of the ox, in the brain of sheep, and in the muscles of hogs. The *broad* or *Swiss tapeworm* inhabits certain fish, as the pike and turbot. In some cases persons infested by a tapeworm experience no inconvenience, but usually there is pain in the stomach, continual craving for food, faintness, and restlessness, and itching in various parts of the body.

TAPIOCA (tăp-ĭ-ō'kă), a nutritious, starchy food derived from the large, tuberous roots of the cassava or manioc plant. The juice is obtained by pressing the roots and allowing the starch to deposit at the bottom of a vessel. *Cassava starch* being thus separated from the fibrous constituents, it is spread upon iron plates

while in a moist condition and, under the application of the heat, the starch granules become partly ruptured and agglomerate into irregular pellets. In this condition the starch forms the tapioca of commerce and is employed largely in making puddings and as light, nutritious food for invalids. The portion of the root remaining after the starch has been extracted is ground to a pulp and used in warm countries to make manioc or cassava bread, which is eaten largely by natives and the poorer whites. Tapioca is manufactured in large quantities in the West Indies, Brazil, and the East Indies, where different species of the cassava plant are grown. Some species yield tubers weighing twenty to thirty pounds.

TAPIR (tă'pēr), a class of hoofed quadrupeds, which have a bulky body and moderately long legs. In appearance they somewhat resemble the hog, but the legs are longer and the nose is not fitted for digging in the soil. The snout is prolonged into a proboscis. The skin is thick and covered with short but close hairs, the tail is short, the ears are small, and the neck is clothed with a short, stiff mane. Tapirs have



AMERICAN TAPIR.

four toes on the fore feet and three on the hind ones. They are found in large numbers in South America, ranging from the Isthmus of Darien to the Strait of Magellan. The color of the South American tapir is brown, and the size is about that of a small ass. The flesh is eaten by natives, the meat being considered quite nutritious. When pursued by the jaguar, it rushes to the water and finds safety in diving. The

tapirs of Malaysia and Sumatra are larger than those of South America, the body being seven to nine feet long. They are easily tamed and domesticated, when they become quite gentle. Living representatives are not found in Europe, but fossil remains are very abundant, some of them approximating the elephant in size.

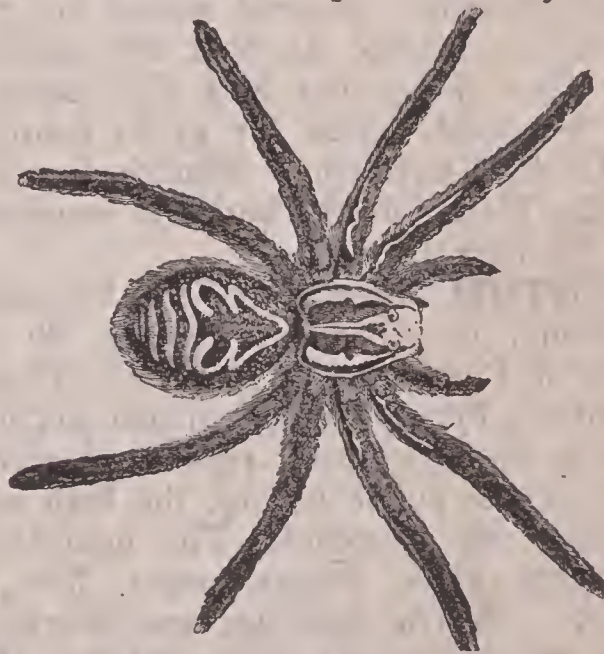
TAR, an oily liquid secured by the destructive distillation of organic substances, such as coal, wood, shale, and peat. The two principal classes sold in the market are *wood tar* and *coal tar*. The former is the product of the special distillation of several varieties of wood, and the latter is a primary by-product of the distillation of coal for the manufacture of illuminating gas. Large quantities of tar are made in the forests of North Carolina, and to a greater or less extent in a number of other states. The usual plan is to excavate a shallow hole near the upper side of an embankment of a hill, into which the wood is piled in conical heaps, after being cut into sticks about three or four feet long and several inches thick. It is then covered with damp soil and fired, the tar being melted out of the wood while it burns slowly, and is collected in a large cast-iron can below, from which it is conducted through spouts into barrels. It requires two or three weeks to complete the burning of a large kiln, and 15 to 18 per cent. of the wood is converted into tar. Pitch pine and fir trees are used extensively in tar making, but the better trees are used in manufacturing turpentine, while the older and inferior classes are picked for tar making. Sweden produces large quantities of wood tar, in which country the trees are partly stripped of their bark several years before they are cut down, this serving to increase the quantity of resinous matter.

The chemical constituents of tar include acid, alkaline, and neutral substances. It is used chiefly for coating the planks and cordage of ships, in making tar paper, in constructing tar pavements and tar roofs, for protecting iron work from the weather, and for making valuable disinfecting compounds, such as creosol and carbolic acid. Coal or mineral tar was first manufactured in the latter part of the 18th century, though only to a limited extent, but when coal gas came largely into use it became greatly cheapened and entered more extensively as a merchantable product into the market. The tar resulting in the manufacture of gas was first produced in such large quantities that it could not be disposed of successfully, but since then it has entered largely into the industries as a fuel and for producing hydrocarbon oils, pitch, and analine colors.

TARANTO (tä'rän-tō), a city in the south-

ern part of Italy, at the northern end of the Gulf of Taranto, 45 miles southwest of Brindisi. It is situated on an island, which was formerly a peninsula, and is separated from the Gulf of Taranto by the Little Sea. The harbor is one of the best in Italy and admits the largest vessels. It has railway facilities, well-paved streets, electric lighting, and electric street railways. The principal buildings include the Cathedral of Saint Cataldo, an episcopal palace, the castle, and the public library. Among the chief manufactures are cotton and linen goods, macaroni, canned and cured fish and oysters, and olive oil. The city was founded by the Greeks about 707 B. C. and was anciently known as Tarentum. It became the leading Greek city in Italy and remained independent until 272 B. C., when it was captured by the Romans. Hannibal took possession of it in the Second Punic War, but it was later retaken by the Romans. Few relics from ancient times are extant. Those remaining are principally traces of several temples and an amphitheater. Population, 1906, 61,327.

TARANTULA (tä-rän'tū-lá), or **Tarentula**, a species of spider native to Southern Europe, especially to the warmer parts of Italy. It is so



TARANTULA.

named from Taranto, Italy, where tarantulas occur in considerable numbers. The body is elongated, being a little more than an inch in length, and the color is brownish. This spider belongs to the hunting class and displays remarkable ingenuity in running down its prey. The bite was formerly thought to produce the disease called *tarantism*, but it is now known to be no more dangerous than that of a common wasp. A class of hairy spiders, known as tarantulas, are native to Texas and other Southern States. The body is large and the bite is quite poisonous. A species known as *digger wasp* is an allied form and is peculiar for making deep holes in the ground, which it lines with silk and

covers with webs. The females are peculiar for carrying their young on the back.

TARAPACÁ (tä-rä-pä-kä'), a province in northern Chile, which is of vast importance because of its extensive deposits of saltpeter. The area is 19,306 square miles. Iquique is the capital and principal seaport. A railroad line extends from the capital to the saltpeter deposits twenty miles inland. Vast reducing works are maintained at various points, largely by foreign capitalists, and the annual export of this commodity is valued at \$27,500,000. The soil of Tarapacá is dry and barren and a mountain range trends nearly parallel to the coast, in which rich deposits of silver are worked. Nearly all the inhabitants are dependent upon the saltpeter and silver mining industries. Formerly the region belonged to Peru, but it was ceded to Chile in 1884. Population, 1906, 92,985.

TARE, the name of several species of plants native to the Northern Hemisphere. They belong to the pea family and are known as *vetch* in some localities. The root is annual, the leaves are oblong, and the climbing stem grows to a height of three feet. The flowers are usually in pairs, either red or purplish, and the seeds are nutritious. Several species are grown extensively in Europe as feed for cattle and horses. They thrive best in a rich sandy soil, but are frequently sown for green manure in tracts that need fertilizing. Mention is made of the tare in Matt. xiii, 36, but it is supposed to refer to the darnel.

TARENTUM (tä-rěn'tüm), a borough of Pennsylvania, in Allegheny County, 20 miles northeast of Pittsburg. It is on the Allegheny River and the Pennsylvania Railroad and is surrounded by an agricultural region. Among the features are the public library, the high school, and several fine churches. The manufactures include plate glass, bottles, paper, flour, and machinery. Electric lighting, waterworks, and sewerage are among the public utilities. Population, 1900, 5,472; in 1910, 7,414.

TARGET (tä-r'gět), a mark or butt set up to be shot at, as to test the accuracy of a firearm or the force of a projectile. It is usually made of steel in a circular form and in the center is the bull's eye, around which are two or more wide rings. In target practice it is customary to cover all portions of the target, except the bull's eye, with a white or light blue paint. This enables the marksman to distinguish in taking aim at the bull's eye, which, when struck, causes a figure to spring up at the top. If the center is missed, the ball or other projectile causes a mark in the newly applied paint, hence the best marksmanship can be determined easily. Target

practice is usually at distances of from 100 to 300 yards, but a sharpshooter usually practices at 500 yards. All kinds of small arms are used in practicing, but army practice is chiefly with the carbine, rifle, or revolver.

TARGUM (tä-r'güm), the name applied to one of several Chaldee versions of the Old Testament. These translations became necessary when the Hebrew language was superseded by the Chaldee, or Aramaic, tongue, in the general vocabulary of Palestine. Although they are not of great value for the criticism of the text, these writings are helpful in that they furnish means to study the life and custom of the people at the time they were written. Among the Targums extant are those of the Prophets, Job, Ruth, Esther, Lamentations, Song of Songs, Ecclesiastes, Proverbs, and Psalms. There are in fact three Targums to Esther and three to the Pentateuch.

TARIFA (tä-rē'fä), a seaport city of Spain, in the province of Cadiz, on the Strait of Gibraltar. It occupies an imposing site 25 miles southeast of Cape Trafalgar, where it was founded in 710 A. D. by an Arab chief named Tarif ibn Malek. The Moors required all vessels passing through the Strait of Gibraltar to pay duties at Tarifa, and the duties were called *tarifas*, whence came the English word *tariffs*. A force of Spaniards from Castile captured Tarifa in 1292, and the French took possession of it in 1823. Population, 1907, 13,168.

TARIFF (tä-r'íf), a list or schedule of duties to be paid to the government for the importation or exportation of articles of merchandise. The list is usually in alphabetical order and the rates are subject to frequent changes, owing to the circumstance that duties depend on the supply and demand of goods and on the interest and wants of the community. Tariffs may be *prohibitory* or *retaliatory*, and may be charged *specifically* or *ad valorem*. The tariff rates may be settled by government authority or by agreement between different nations. In the United States tariffs are levied only on imports for revenue and protection, but many articles are on the free list. Both export and import duties were charged in the colony of New Netherlands as early as 1629, and the Massachusetts Bay colony levied import taxes in 1668. An unsuccessful effort was made by the Continental Congress to unite the colonies on a general tariff tax law.

CANADA, The present tariff law of Canada was enacted in 1907, when the former Customs Act of 1897 was repealed. It provides for three rates of duties, known as the general tariff, the intermediate tariff, and the British preferential tariff. In addition to these it provides a surtax

and a special, or dumping, duty. The *general tariff* applies to all articles which are not admissible under either the intermediate or the British preferential tariffs. The *intermediate tariff* applies to all goods that the Governor General may by Order in Council designate. However, no country is at present entitled to this class of rates. The *British preferential tariff* applies to all goods that are produced or manufactured in the United Kingdom and certain British countries that may be admitted to the benefits of the same. A *surtax* is levied upon the imports from countries that do not treat imports from Canada as favorably as those from other countries. The *special, or dumping, duty* is levied on goods which are sold to consumers in Canada at a lower price than the fair market value.

UNITED STATES. President Washington signed the first tariff act passed by the United States on July 4, 1789. It was prepared by Alexander Hamilton and provided duties ranging from 5 to 15 per cent., though only 47 articles were specially enumerated. The purpose of this tariff was to provide revenue for the general government, both for its support and to discharge the national debt. It provided duties averaging 8 per cent. ad valorem, but the duties were raised to 11 per cent. in 1790 and to 13 per cent. in 1792. Refined sugar and tobacco were placed on the tariff list in 1794, and another extension of the list was made in 1797. Hamilton and the Federalists advocated, largely for political reasons, the adjustment of the tariff so as to give protection to American industries. This theory went into effect in the form of the Lowndes-Calhoun bill of 1816, which imposed duties of about 25 per cent. on leading manufactures, but the agricultural South and commercial New England protested against it. In 1824 a new tariff bill was passed, which provided an average rate of 37 per cent. and increased the duties on metals and agricultural products. This measure was championed by Henry Clay, who made himself the leader of the so-called *American system*, which aimed to combine a high protective tariff with Federal expenditures for internal improvement.

The so-called *tariff of abominations*, imposing duties on raw materials, was passed in 1828, and provided a rate of 41 per cent. Calhoun and South Carolina remonstrated against this measure, owing to the fact that some of the duties were prohibitive, and they were supported and aided in the protest by Alabama, Georgia, and North Carolina. It was claimed by the opponents of the measure that Congress had no right to levy tariff duties for protection, urging not only the injustice of a high tariff from which

exporting states received no benefit, but also its general unconstitutionality. In 1832 the tariff laws were modeled after those of 1824, but they still retained the principle of protection, and South Carolina immediately proceeded to nullify the act. Jackson met nullification with marked decision, but Henry Clay introduced the Compromise Bill of 1833, which provided for a gradual reduction of tariffs to a uniform rate to be reached in 1842. The Polk-Walker tariff of 1842, so called from Robert J. Walker, Secretary of the Treasury under President Polk, changed all existing rates but was a protective measure. In 1846 a new tariff was enacted, which provided a so-called *tariff for revenue only*, though it retained protective features. The tariff of 1857 made a further reduction of duties and remained in force until 1861.

The Morrill tariff went into effect on April 1, 1861, and practically doubled existing duties. Immediately after the Civil War enlarged the necessary expenditures of the government, which were met by several successive bills raising the tariff. A modification of rates was made in 1870, when tea, coffee, and several other articles were added to the free list. Quinine was added to the free list in 1879 and shortly after a reduction was made in the duty on pig iron, wool, steel rails, paper, and glass. The McKinley tariff of 1890 enlarged the free list, but increased the duties on many commodities and provided a bounty of two cents per pound on sugar in lieu of duty. Some articles were taxed so high that importation was practically prohibited. The Wilson tariff of 1894 reduced the duties about 38 per cent. and enlarged the free list considerably. It carried with it a tax of 2 per cent. on the excess above \$4,000 per annum of all incomes, but the Supreme Court declared this feature unconstitutional. The Wilson tariff was repealed in 1897, when the Dingley tariff took its place. In 1909 the Dingley tariff was succeeded by the Payne-Aldrich tariff, which is so named from Sereno E. Payne, a member of Congress from New York, and Nelson W. Aldrich, a Senator from Rhode Island, these being the chairmen of the ways and means committees of the House and the Senate respectively. This tariff measure made a slight reduction, about 2 per cent., in the average of the tariff.

TARN (tärn), a river of France, one of the chief tributaries of the Garonne. It rises in the Cévennes Mountains, receives the Agout and the Aveyron, and has a length of 215 miles. The valley is rich in the vine, coal, and cereals.

TARNOPOL (tär-nô'pöl-y'), a city of Austria, in Galicia, on the Sereth River, 75 miles east of Lemberg. It has railroad facilities and

is noted as a horse market. The manufactures include machinery, clothing, and furniture. A large part of the inhabitants are Poles and Jews. Population, 1906, 33,182.

TARPEIAN ROCK (tär-pē'yän), the name of a precipitous rock forming a portion of the Capitoline Hill in Rome, so named from Tarpeia, daughter of Spurius Tarpeius, governor of the citadel on the Capitoline of Rome. It is related that the Sabines bargained with the Roman maid to open the gate of the fortress to them, and as a reward promised her the golden ornaments worn on their arms. As they passed through the gates, they threw on her their shields, saying, "These are the ornaments we bear on our arms." She was crushed to death and buried on Tarpeian Hill. Ever after traitors were put to death by being hurled headlong from the hilltop.

TARPON (tär'pön), a large fish which is closely related to the herring. It is found in the West Indies and the waters off the southeastern coast of the United States. The eyes are large, the mouth is placed obliquely, and the dorsal fin is high. It grows to a length of four to six feet and has great power in leaping and swimming. While the flesh is not valued highly, the tarpon is valuable for its silvery cycloid scales, which are used in making ornamental work. This fish affords much sport in angling. Tarpon fishing is popular along the southern coast of Florida and Texas.

TARRYTOWN (tär'rī-toun), a village of New York, in Westchester County, 25 miles north of New York City. It is situated on the east side of Tappan Bay, an extension of the Hudson River, and is on the line of the New York Central Railway. The location is on ground rising gradually from the river, furnishing a fine view of the bay, and it is popular as a residential center. Among the institutions are the Irving Institute, the Institution of Mercy, and the Tarrytown Lyceum, which contains a library of 5,000 volumes. A short distance north of the village is the graveyard of the Dutch Church, in which the remains of Irving are buried. The older buildings include the Dutch Church, erected in 1699, and the Philipse Manor House, dating from 1683. The village has public waterworks, electric lighting, and manufactures of machinery and automobiles. *Sunnyside*, the home of Washington Irving, is at Irvington, about two miles south of the village. Major André was captured at Tarrytown in 1780. Population, 1905, 5,370; in 1910, 5,600.

TARSHISH (tär'shish), the name of an ancient commercial emporium mentioned in the Old Testament. It is first spoken of in Gen. x, 4.

However, in this instance reference is probably made to Crete and Rhodes. Later references are believed to refer to settlements by the Phoenicians in Spain at the mouth of the Guadalquivir. The latter locality is supposed to be referred to from the fact that its products are identical to those connected with the region of Tarshish.

TARSUS (tär'süs), an ancient city in Asia Minor, in the Turkish province of Adana, 10 miles from the Mediterranean. It is located on the Cydnus River, in a fertile region, and has a considerable trade in cotton, wheat, barley, gallnuts, and various manufactures. Tarsus has a number of fine mosques and public baths, and near it are ancient ruins of extensive walls, theaters, and public buildings. The city was founded by Sardanapalus. It was captured by Alexander the Great, but afterward fell into the possession of the Romans, under whom it became a city of great importance. It was long a powerful commercial rival of Antioch, Alexandria, and Athens. Cleopatra and Antony ascended the Cydnus as far as Tarsus. The apostle Saint Paul and several Greek scholars were born at Tarsus. Population, 12,500.

TARTAR (tär'tēr). See **Cream of Tartar**.

TARTAR EMETIC, the name applied to a double tartrate of potassium and basic antimony. It is made by preparing a paste of acid potassium tartrate and antimonious oxide, which are mixed with water and allowed to stand for several hours, when the compound is boiled and allowed to crystallize. The taste is sweetish, but it leaves an unpleasant sensation in the mouth. Though soluble in water, it cannot be dissolved in alcohol. Tartar emetic is a powerful irritant. It is used in reducing fever and sometimes to produce vomiting, but physicians do not prescribe it as much as formerly, for the reason that it has a depressing effect upon the heart and nervous system.

TARTARIC ACID (tär-tär'ik), the acid found in grapes, pineapples, tamarinds, and other fruits. It is prepared commercially from *argol*, an impure potassium acid tartrate deposited from wine by converting it into a calcium salt, decomposing with sulphuric acid, and allowing the solution to crystallize in a warm place. Tartaric acid is deposited in the casks in which wine is kept. This form of the acid may be purified by crystallization from boiling water and converted into cream of tartar. Tartaric acid crystallizes in large prismatic crystals and is soluble in about half its weight of water. By the action of heat it is converted into several other acids, whose composition depends on the temperature at which the tartaric acid was decomposed. It is very

sour to the taste, but is inodorous, and has a marked action on several metals, such as iron and zinc. Tartaric acid is useful in making lemonade, in calico printing and dyeing, as a medicine, and for making baking and soda-water powders.

TARTARS (tär'tērz), the name usually applied to a class of people inhabiting parts of Asiatic Russia, principally the steppes of Central Asia. It has reference chiefly to Moslems of Turkish origin. Tribes of Tartars, different from the Turks, comprised the Mongolians, who migrated from the northern part of China and Central Asia toward the west in the period extending from the 4th to the 10th century, and of whom descendants still occupy parts of southern Russia. In the 12th century large numbers of true Tartars joined Genghis Khan and marched under his leadership from Chinese Tartary to Europe. Chinese Tartary is a region in northern China, whence the true Tartars moved westward. Little Tartary, a term frequently applied to southern Russia, comprises the governments of Astrakhan, Orenburg, Ekaterinoslav, the Crimea, and the Cossack provinces. The Tartaric language belongs to the Turanian tongues, of which the Turkish is the most typical, but there are many dialects.

TARTARY (tär'tā-rī), the name formerly applied to a vast region extending from the seas of Japan and Okhotsk to the Caspian Sea, including southern Asiatic Russia, Turkestan, Mongolia, and Manchuria. Little Tartary included the southeastern part of European Russia, and Independent Tartary was the name applied to the region now included in Turkestan, the latter being still called Tartary by some writers. The name originated from the great hordes of Tartars that moved westward from northern China in the 13th century and formed settlements in the central and western parts of Asia, extending westward as far as the Volga, in Europe.

TASHKEND (tāsh-kēnt'), or **Tashkent**, a city of Asiatic Russia, in the government of Turkestan, of which it is the capital. It is located on the Tchirtchik River, a tributary of the Syr-Darya, about 400 miles southeast of the Aral Sea, and is surrounded by a fertile region. A lofty wall of brick and stone, about twelve miles in circuit, surrounds the city, which may be entered by twelve gates. The chief buildings include a fortified castle, many mosques and temples, numerous bazaars, and several schools and colleges. Among the manufactures are silk textiles, woolen and cotton goods, ironware, furniture, gunpowder, and utensils. The trade is very extensive, largely for the reason that it is

of easy access by caravans, and Russian enterprise is rapidly developing highways and railroads. The streets are narrow and tortuous in the older parts of the city, but in the newer portions improvements have been made by paving, drainage, and the culture of avenues of trees. It has electric lighting, telephones, and street railways. Russia annexed the city and tributary territory in 1866. Population, 1906, 158,497.

TASMANIA (tāz-mā'nī-ā), a state of the Commonwealth of Australia, which includes the island of Tasmania and a number of adjacent islands. The island of Tasmania is situated in the South Pacific, 140 miles south of Australia, from which it is separated by Bass Strait. Its western shore is washed by the Indian Ocean. The form is that of a triangle, measuring 195 miles from north to south and 245 miles from east to west. The area, including the adjacent islands and the island of Macquarie, is 26,385 square miles. Macquarie is situated about 1,000 miles southeast and for administrative purposes belongs to the State of Tasmania.

DESCRIPTION. The coasts are quite abrupt and bold and are indented by numerous bays and harbors. Among the chief inlets are Oyster Bay in the east, Storm Bay in the southeast, and Macquarie harbor in the west. The surface is diversified with chains of mountains which range from 3,000 to about 5,000 feet above the sea. They reach the highest elevation in the northwest, in Cradle Mountain, which has an altitude of 5,069 feet. An extensive plateau region is located in the west central portion, but it is more or less diversified by ridges and isolated peaks. Through the central part extends a valleylike depression, through which numerous spurs of mountains trend in various directions. This central plain has a direction through the island from the southeastern part, from the mouth of the Derwent River, almost due north, to the mouth of the Tamar River. Within the plain are a number of mountain lakes of considerable size, such as Great Lake and Sorell Lake. The Derwent is the largest river, flowing almost due southeast into Storm Bay. It receives the inflow from numerous mountain streams and is the largest river of the island. The Huon is in the south, the Gordon and the Arthur in the west, the Tamar and the Forth in the north, and the Swan in the east.

The climate is more equable and temperate than that of Australia, being greatly influenced by the ocean, and it is warmer in the northern than in the southern part. The temperature ranges from 28° in winter to 100° in summer, and the mean temperature at Hobart is 46° during the colder and 63° during the warmer part

of the year. Rainfall is greatest in the western part, where it ranges from 40 to 100 inches, and in the eastern section it is from 22 to 30 inches. The forests consist of Huon pine, beech, blue gum, acacia, eucalyptus, blackwood, and other native trees. Many species of birds common to semitropical countries abound, but the mammals common to the island are not numerous. The latter include the kangaroo, wombat, opossum, and wallaby.

INDUSTRIES. Agriculture and the raising of live stock are the main occupations. Wheat is grown on a larger acreage than any other cereal, but it is exceeded in the areas used in the cultivation of hay and green fodder. Corn, oats, barley, and potatoes are grown extensively. All fruits common to the Temperate Zone thrive, especially cherries, grapes, plums, quinces, almonds, apricots, and peaches. Silk culture and the mulberry tree have been introduced successfully. Sheep are the principal domestic animals, but there are extensive interests in rearing horses, cattle, swine, and poultry. The cultivation of hops is a profitable enterprise.

Mining is carried on with considerable success and copper is the principal mineral. The output of copper has an annual value of about \$4,850,000. Material development has been made in the output of gold the last decade. Silver is the third mineral in rank. Other minerals include tin, coal, and iron. Large deposits of sandstone, limestone, and granite abound, and these minerals are quarried extensively for construction purposes. More tin is produced in Tasmania than in any other Australian State, and the mines are chiefly in Mount Bischoff.

The manufacturing enterprises are favored by extensive water power available in the streams and by the fact that Tasmania has an abundance of raw material. Large quantities of butter and cheese are made for export. Mutton and beef are preserved extensively both by curing and freezing, and some interests are vested in canning fruit and fish. Other manufactures include woolen goods, furniture, hardware, earthenware, boots and shoes, and machinery. The leading exports are wool, wheat, sheep, dairy products, lumber, and minerals. A majority of the trade is with Great Britain and ports in Australia, chiefly in Victoria and New South Wales.

Railroad building has received considerable attention. A line extends across the island from Devonport, on Bass Strait, to Hobart, at the mouth of the Derwent River. Another line crosses the northern part of the island from east to west, and these trunk lines have numerous branches to inland points. The total lines aggregate 850 miles, most of which are owned by the

government. Considerable coastwise trade is carried in small vessels, and the highways near the larger towns are in a good state of improvement. Hobart, Launceston, and Strahan are the leading ports for foreign trade.

GOVERNMENT. The chief executive power is vested in the Governor, who is appointed by the British crown. He is assisted by a cabinet of six responsible members. Legislative power is vested in the Parliament, which consists of a legislative council of eighteen members elected for six years and a house of assembly of 35 members elected for three years. Those voting for members of the legislative council are limited to a property franchise, while all citizens are eligible to vote for members of the lower house. The right to vote has been extended to both sexes. Educational interests have been liberally stimulated in the establishment of common and secondary schools and by the maintenance of several public and private colleges. The compulsory school attendance extends from the age of seven to thirteen years, and children who reside a long distance from school are carried by a State-owned railroad. The University of Tasmania, in which the educational work culminates, is located at Hobart, and with it is affiliated an institution at Launceston.

INHABITANTS. Formerly the island was inhabited by a native race similar to the races of Australia. They were low in stature, had broad faces, and the skin and hair were dark. These people declined rapidly after the island was colonized by Europeans. It is said that a woman named Tinganina, who died in 1876, was the last native Tasmanian. At present the inhabitants are chiefly British or of British descent. About two-thirds of the people belong to the Church of England and the remainder are Methodists, Roman Catholics, Presbyterians, Lutherans, Baptists, and Jews. Hobart, in the southern part, on the estuary of the Derwent River, is the capital and largest city. Launceston, on the Tamar River, near the northern shore, has a large trade. The emigration and immigration were about equal during the last decade. Population, 1907, 181,624.

HISTORY. Abel J. Tasman (1602-1659), a celebrated Dutch navigator, discovered Tasmania in 1642, and it was named Van Diemen's Land in honor of the Governor of the Dutch East Indies. Cook visited the island in 1769 and in 1803 a British expedition sailed from Sydney with the view of claiming the island for England. They founded a settlement on the present site of Hobart in the same year, and in 1806 located the city of Launceston. Convicts were transported for some time from Sydney to Tasmania, but a

considerable immigration began in 1817, and since then the island has made rapid advancement in population and the development of material industries. It was declared independent of New South Wales in 1825. About 3,000 natives were in the island at the time of the discovery. Convict transportation to Tasmania was abolished in 1853. Many laboring men and settlers left Tasmania on the discovery of gold in Australia in 1851, but most of them returned to make the island their permanent home. Tasmania became a member of the Commonwealth of Australia in 1901.

TASMANIAN WOLF, an animal native to Tasmania, the largest representative of the carnivorous marsupials. It is about four feet long and has a doglike muzzle and a tapering tail. The general color is grayish marked with yellow, and it has a series of stripes on the hind part of the back. In habits it is nocturnal, coming out at night to search for food. It was formerly abundant, but has been nearly exterminated, since it proved destructive to sheep and poultry.

TASTE (tāst), the particular sensation excited when a soluble substance comes into contact with certain parts of the mouth, particularly with the tongue. The tongue contains the chief end organs of the nerves of taste, including parts of the fifth and ninth pairs of nerves, but the sense of taste extends to the soft palate and the arches of the palate. These nerves end in the papillae, which absorb the substances tasted and convey them to the nerves. The intensity of the sensation depends upon the surface coming in contact with the matters tasted, increasing with the surface exposed to a soluble substance. A temperature of 72° Fahr. is most favorable for producing the sensation. Temperatures much above or below this lessen the ability of the nerves of taste to receive impressions.

Salt and bitter substances have the greatest effect at the back of the tongue, and, this part being reached by the gustatory nerve, a branch of the fifth nerve distributed to the anterior two-thirds of the tongue, which is in sympathy with the stomach, such flavors by sympathy often produce vomiting. Sweet and sour substances affect most notably the edges of the tongue, where branches of the fifth pair of nerves permeate. Since these nerves are connected with the face, an acid by sympathy distorts the countenance. Tastes may be classified by bitter, sweet, acid, and saline. The senses of taste and smell are intimately connected and much of the compound sensation produced by drinking or eating an aromatic substance, such

as coffee, is due to smell rather than simply taste. Taste was originally the guide to select food, but it has become so depraved by the force of habit and condiments that it is difficult to discover the natural tastes in man. It is a more reliable guide in the choice of food among the lower animals than in man, since their taste is not influenced so greatly by habit.

TATTERSALL'S, the name of a market in Grosvenor Place, London, famous as a place for selling, riding, and driving horses. It was established by Richard Tattersall, in 1780, and has continued to remain the headquarters of the turf. This place contains an apartment in which the business of horse racing and betting throughout the country receives attention.

TATTOO (tāt-tōō'), a mark in the skin produced by indelible pigments. The practice of tattooing prevails to a considerable extent with the brown and yellow races, especially among the North and South American Indians, South Sea Islanders, Burmese, Bedouin Arabs, Dyaks, and Mongolians. Tattoos are made by marking the skin with punctures or incisions and introducing into the wounds colored liquids, gunpowder, or other substances, so as to produce indelible figures or designs on the body. The custom is practiced differently in various regions, some peoples placing the tattoos only on the arms or other concealed portions of the body, while in some sections variously designed figures are made in the skin of the face and over practically all parts of the body. It is quite painful to undergo the operation, but barbarians bear it with considerable fortitude, since in most cases the figures indicate degree of rank or are made as a mark of distinction or remembrance. Instruments of steel with small teeth are commonly employed in tattooing, but primitive peoples use bone or stone for that purpose. In many cases the figures are very elaborate and variously colored, often representing animals, landscapes, and historical scenes. The practice is very old, dating from the early history of mankind, and it has been favored by people high in the scale of civilization. Lev. xix., 28, prohibits its use among the Jews in these words: "Ye shall not make any cuttings in your flesh for the dead, nor print any marks upon you." Tattooing is a favorite adornment among the female Bedouins even at the present time. It was practiced in ancient times by the Thracians and Scythians and among the Britons and Irish.

TAUNTON (tän'tün), a port city in Massachusetts, one of the county seats of Bristol County, on the Taunton River, 35 miles south of Boston. Communication is by the

New York, New Haven and Hartford Railroad and a number of electric railways. It has an abundance of water power derived from the Taunton River. The streets are regularly platted and improved by pavements, waterworks, sewerage, gas and electric lighting, and avenues of ornamental trees. Among the noteworthy buildings are the public library, the county courthouse, the post office, the city hall, the Morton Hospital, the Bristol Academy, and the State insane asylum. Taunton Green and Woodward Spring Park are fine public grounds.

Taunton has a large jobbing trade and is noted as an industrial center. The manufactures include ironware, brick, locomotives, boots and shoes, soap, cotton and woolen textiles, hardware, furnaces, paper, agricultural implements, silver-plated ware, carriages, stoves, and farming implements. Herring fishing is a productive enterprise. The first settlement was made at Taunton in 1638. It was so named from Taunton, England, whence the first settlers came. The place was incorporated as a city in 1865. Population, 1910, 34,259.

TAURUS (ta'rus). See **Zodiac**.

TAURUS, a mountain range in Asiatic Turkey, forming the watershed between the Black and Mediterranean seas and stretching from the upper Euphrates to the Aegean Sea. The slopes toward the Mediterranean are steep and leave a narrow coast plain, but toward the north it merges gradually into the high plain of Asia Minor. Two divisions are included in the Taurus proper, known as Ala Dagh in the east and Bulghar Dagh in the west. The Anti-Taurus range connects it with the Caucasus, Elburz, and Ararat. The highest peak of the Anti-Taurus is Arjish Dagh, height 13,112 feet, and of the Taurus proper, Bulghar Dagh, 11,415 feet. Between Syria and Asia Minor is the valley of the Cydnus, forming a pass known in ancient times as the Cilician Gates.

TAX, an assessment levied upon persons, property, or business for the support of the government or other public service. It may be said that no system of taxation has yet been devised that rests with equal fairness upon all individuals in the state, and possibly the consummation and application of such a system can scarcely be reached, even in the most democratic form of government. The four principles of taxation laid down by Adam Smith, which have been generally accepted by writers on political economy, may be briefly stated as follows: each individual in a state should contribute to the support of the government in exact proportion to the relative ability of all; the system of taxation should provide a certain

and not arbitrary tax upon each individual; each individual should be taxed to pay at the time and in the manner most convenient to himself; and the general system of taxation should be so adjusted that the people may not be pressed to pay more than is actually needed to support the state and supply adequate funds for the public treasury.

Taxes are divided into direct and indirect. *Direct taxation* is the term applied when the tax is paid directly to the municipality or state by the person upon whom it is levied, such as taxes upon real estate, domestic animals, machinery, dogs, an income tax, and a poll tax. On the other hand, in the scheme of *indirect taxation* the tax is levied on one person but really paid by another. Indirect taxes are assessed on commodities and the amount of the tax is added to the price of the commodity, thus requiring the consumer to pay it. This is illustrated by the internal revenue system, in which the stamp tax and excise taxes on tobacco and liquors are added to the commodities taxed. This may be illustrated quite similarly by the tariff system. For instance, if there be a duty of ten cents per pound on coffee, though nominally paid by the importer, it is added to the price of the article and the consumer pays that much more per pound.

The ancient governments levied taxes upon unfriendly nations, and the booty of war obtained by sacking cities was a considerable source of income in supporting the army and building up home enterprises. In many instances private property of subjects was confiscated for use by the state, tribute was exacted for special privileges in consideration of trade and social advantages, and crimes were made punishable by the payment of heavy fines, payable either immediately or in installments. It was customary among the Jews to support the state by contributing the first born of their flocks and the first fruits of their lands, though the rates were increased under different sovereigns. The Roman Empire collected tolls, exacted payments for conferring the privileges of citizenship on individuals, carried away the treasures of conquered nations, and levied tribute upon various articles of trade. Feudalism was a system of land ownership by the sovereigns and nobles, under whom the common laborers were reduced to serfdom and belonged to the soil, while the fruits of the land flowed into the coffers of the rich and powerful to support them in luxury and the nation in authority. The systems of ancient and medieval peoples are still perpetuated in some of the countries of Europe and Asia, but advancement

in civilization and educational arts is fast leading to the view held by the American colonists, "No taxation without representation."

Taxation now partakes of various forms and includes taxes levied by the school district, township, municipality, county, state, and nation. The national taxes consist of duties on imports and excise taxes, mostly on liquors and tobacco, with other forms added at different periods, such as stamp taxes and taxes on incomes. All other taxes are direct taxes and are assessments on real and personal properties, according to their estimated value. The assessment of railroad property is made in most instances by a state commissioner or an executive council. The value of property owned by individuals is ascertained by the assessor, whose estimates are subject to revision by a board of equalization, and the taxes are usually payable to the county treasurer, who later distributes the money to the different corporations and individuals entitled to receive the same. This form of direct taxation is with some exceptions the most equitable of any save that of the income tax.

In an *income tax* each individual pays according to the amount of profit per annum, while a *property tax* requires each to pay in proportion to the amount of property owned, but one's revenues are not always proportional to one's property. Besides, property is liable to double taxation in the case of mortgages, and in the form of money and valuable paper it is quite frequently withheld from enlistment by the assessor. *Poll taxes* are direct taxes, usually levied on those subject to military duty, who are required to pay from fifty cents to three dollars per year or work to the extent of that amount on the public highway. In case the tax levied on property is not paid, any personal or real property owned by the person taxed is subject to sale for nonpayment. Tax sales are quite common and usually take place about the first of December, the property tax being due usually the first of January, thus giving the payer about eleven months' time to make payment before the sale. Persons owning property sold for taxes are given two to three years in most states to make redemption, which is done by paying the taxes together with the cost and interest. Public property, such as courthouses and school buildings, is exempt from taxation in most countries. The houses of worship and the property of clergymen are exempt quite generally. See **Single Tax**.

TAXIDERMY (tăks'ĩ-děr-mŷ), the art of preparing and preserving the skins of animals and of mounting them in a lifelike manner.

The art is of considerable antiquity, but it reached a high state of development only about three centuries ago. Now vast collections of practically all kinds of animals may be seen in mounted condition in national educational institutions, colleges, and municipal museums of nearly all civilized countries, and their careful preservation has been the means of greatly stimulating research by naturalists and students. The process varies with the class of animals to be treated. It may be said that the general plan is to remove the skin, to which the feet, tail, hairs, and part of the head are left attached. All these parts are treated with an arsenic preparation, or with a powder containing arsenic, camphor, burnt alum, oak bark, and other substances, after which the skin is stuffed in such a manner that the form and size of the animal are carefully restored. The product is then perfumed with an aromatic substance, glass eyes are adjusted, and it is mounted to represent the living form. Reptiles, mammals, fishes, birds, and animals of all classes may be treated and preserved in this manner.

TAY (tā), the longest river of Scotland, which rises in the southern Grampians and, after a course of 120 miles toward the east, flows into the North Sea. It has an estuary of about three miles, but the tide flows a mile above Perth, to which city it is navigable for vessels drawing ten feet. The principal tributaries include the Dochart, Lyon, Garry, Tummel, Arn, and Almond. The cities on its banks are Dunkeld, Aberfeldy, Perth, and Dundee, the last mentioned being its chief port. The Tay valley is fertile. An area of 2,400 square miles is included in the basin. Valuable salmon and other fisheries occur in the Tay and its estuary.

TAYLOR (tā'lěr), a city of Texas, in Williamson County, 35 miles northeast of Austin, on the International and Great Northern and the Missouri, Kansas and Texas railways. The surrounding region is a fertile farming country. It has electric lighting, waterworks, and a large trade in wool, cotton, and live stock. The manufactures include flour, machinery, and cotton-seed oil. The shops of the International and Great Northern Railway are located here. Population, 1900, 4,221; in 1910, 5,314.

TAYLORVILLE, a city of Illinois, county seat of Christian County, 25 miles southeast of Springfield. It is pleasantly situated on the Wabash and the Baltimore and Ohio Southwestern railroads. The chief buildings include the high school, the Carnegie Library, and the county courthouse. Coal mines are worked near the city. It has manufactures of brick, tile,

chemicals, and farming implements. The municipality has public waterworks and a system of sanitary sewerage. It was settled about 1839 and incorporated in 1882. Population, 1900, 4,248; in 1910, 5,446.

TCHAD. See **Tsad.**

TEA, a genus of shrubs and trees allied to the camellia. They include species that vary in height from four to thirty feet. The most im-



LEAVES AND FLOWERS OF TEA.

portant species is the *tea shrub*, or *Chinese tea*, which in a native state grows to a height of twenty to thirty feet, but its development is limited to five or six feet when cultivated for its leaves, the important product that yields the tea of commerce. This plant has lanceolate leaves two to six inches long, produces large white flowers of fine fragrance, and is a hardy, evergreen species. It is propagated from the seed, but the young plants are not ready for picking the leaves until three years old. They yield best when eight to ten years old, and

later diminish in the production of leaves, until finally new plants must be set out in their stead. The cultivated species of tea possess a wide adaptability to climate, being excelled in this characteristic among food plants only by wheat. The range of cultivation extends from 39° north latitude in Japan, to regions south of the Equator, including Java, Australia, South Africa, and southern Brazil. It can be grown successfully in the portion of North America lying south of a line drawn from California to South Carolina, but the greater cost of labor in the United States as compared to that of Asia has made it impossible to successfully compete with the vast productions of China and Japan. A number of tea farms have proven quite successful under Japanese management in California, and in many sections of the southern states the tea plant is grown with profit.

Vast tea plantations are maintained in China and Japan, where the industry of growing tea for the market has been established for many centuries. The leaves are picked by hand, an enterprise engaged in by the whole family, and the first crop is gathered in the spring, usually in April, the particular month of the year depending upon climatic conditions. A second crop is harvested about a month later, this being the most valuable of the season, and two succeeding crops are produced afterward. Native names are applied to the different grades of tea, *hyson* meaning spring crop, *pouchong* signifying wrapped tea, and *souchong* meaning small kind. Both green and black teas are procured from the same plant, this depending upon the process of curing the leaves. *Green tea* is made by drying the leaves quickly in pans soon after being gathered. They are then rubbed lightly between the palms of the hands or taken out and rolled on a table, after which they are placed in the pans and dried a second time. *Black tea* is secured by drying the leaves in shallow baskets in the sun and air, during which a saccharine fermentation is supposed to take place in conjunction with a volatile oil. During the chemical changes that occur while fermenting and drying, the leaves change slightly in color, and they are afterward roasted in an iron vessel and dried over a charcoal fire. The black color results from manipulation and drying, and the flavor is greatly modified in the process. Professional tea tasters are employed to sample and classify the tea according to its flavor. Green tea includes hyson, young hyson, hyson skin, gunpowder, imperial, and caper. Among the species of black tea are the pekoe, flowery pekoe, orange pekoe, pekoe souchong, congou, bohea, and souchong. Adulterations in

tea are made by adding leaves of other plants and artificial coloring is frequently used, such as Prussian blue and a mixture of indigo and gypsum.

According to Chinese legend, Emperor Chin-nug discovered the virtues of tea in 2737 B. C., but it is quite probable that positive reliance cannot be placed upon the claim, since all knowledge of agriculture is traced to that sovereign by Chinese writers. Tea culture was carried from China to Japan in the 13th century, and these two countries were the only tea-producing regions until the early part of the 19th century. The Dutch established tea plantations in Java in 1825, whence tea culture spread rapidly throughout the East Indies. Soon after it was established in Ceylon, the West Indies, South America, Australia, and Southern Europe. The principal constituents of tea are a volatile oil, thein, tannin, and albuminous compounds. It has some soluble mineral matter, including phosphoric acid and potash. Thein is the active principle. Tea is imported principally from China and Japan.

TEACHERS' COLLEGE, an institution for the training of teachers, founded in New York City in 1880. Ten years later it was made a part of the educational system of Columbia University, in which it is represented by its dean and a member of the faculty, but it maintains a separate corporate organization. The courses consist of pedagogical work. They embrace the history and philosophy of education, educational psychology, school administration, ancient and modern languages, mathematics, domestic and fine arts, the sciences, music and voice culture, physical education, manual training, and kindergarten. The Speyer School and the Horace Mann School are observation and practice institutions affiliated with the college. It maintains a large number of university extension courses, and ranks as the most important school of this class in the United States. The value of its property is \$2,150,000. It is attended by about 3,000 students.

TEACHERS' INSTITUTE, an assemblage held under county or State supervision, designed as a normal or short training school for teachers and those who desire to engage in the teachers' profession. The first teachers' institute was held in 1839, when Henry Barnard, secretary of the Connecticut board of education, called the teachers of Hartford County for a month's session at Hartford, and, with several instructors, gave those in attendance instruction in the theory and art of school-teaching. Soon after teachers' institutes were organized in many of the states, being provided for in most cases

by statutory laws. The sessions are held annually, ranging from three days to four weeks, and the funds are supplied by the State or county, or are secured partly by a small admission fee of those in attendance. In most states the institutes are held under the direction of the county superintendent, who selects assistant instructors, subject to the approval of the State department of public instruction.

Many teachers' institutes partake of the nature of academic instruction and normal training, for which purpose a graded course of study covering three or four years is pursued systematically, the object being to induce consecutive study during the year. However, the principal object is to inculcate higher ideals of life and teaching, stimulate educational enthusiasm, and bring the teachers in contact with progressive methods and instructors of successful experience and recognized ability. In some instances a practice department or a round-table program is provided, at which those in attendance either alternate in giving model lessons or relate their methods of teaching and discipline.

TEAK (tĕk), a large tree of the vervain family, native to Java, Ceylon, and Southern Asia. It has large, ovate, opposite leaves, terminal panicles of white flowers, and round fruit about the size of cherries. The teak native to the East Indies attains a height of 200 feet, towering above other forest trees in the native woods. Its deciduous leaves are ten to twenty-four inches long and six to eighteen inches wide. It yields lumber resembling mahogany in appearance, which is not attacked by insects, and is used extensively in shipbuilding and for general construction purposes. The African teak is an allied species and is frequently called *African oak*. The great durability of teakwood is due to an aromatic oil, which gives it a peculiar smell when freshly cut. A red dye is made of the leaves, which is employed in dyeing cotton and silk textiles.

TEAL (tĕl), the common name of a class of small ducks. They are very abundant and highly esteemed for the table. The teal duck of North America is found in large numbers throughout the region from the Atlantic to the western highlands, and in the spring migrates to breed in the regions far north. The *blue-winged teal* and the *green-winged teal* are the two common species. Both are rapid flyers and swimmers and dive with considerable skill. The body is about 15 inches long, with an alar extent of 25 inches. The color is grayish with markings of blue and green, and the head is slightly crested. Several species of teal ducks

are native to Western Europe, among them the common teal. It migrates as far as northern Russia and Scandinavia in the spring, and in the fall returns to the Mediterranean and warmer regions of Europe and Africa. The male is brownish-red with various black and green markings, and the female is a dull-gray color. The Romans domesticated the teal duck for its flesh and eggs, and it is still reared on some of the smaller farms of Europe.

TECHNICAL EDUCATION, the training that has for its object improvement in the arts and trades. The term is commonly used to designate such instruction as is useful in pursuing the industrial arts or has for its object the special preparation for a vocation. Schools which make technical education a direct object are frequently divided into two general classes, those giving instruction in working trades, such as carpentry, watchmaking, tanning, decorating, engraving, and dyeing, and those which train for the commercial trades, which have to do with the retailing of glass, ceramic wares, etc. With the latter are included the trade schools that train craftsmen for practical work at any trade. Frequently a third class is considered as belonging to the schools that further technical education, embracing such as give particular attention to educate its students for superintendents and managers of industrial establishments, and for consulting and designing architects and engineers. Schools of this class are known by various designations, such as institutes of technology, engineering schools, polytechnical institutes, and schools of applied science.

Much instruction along the line of technical education is given in many colleges and universities that do not make training for the arts and trades a direct object, but the utility of preparing students especially along this line has become more generally accepted since trades are more closely organized and the branches of work in the industries have been diversified. It cannot be said that this training was ever fully excluded from the larger institutions of learning, but its importance was especially emphasized at the International Exposition in London, in 1851, which revealed the superiority in all that relates to the application of arts and beauty to manufactures produced by the European nations. It was particularly noticeable that the countries of Europe which had facilities for special instruction designed to advance science, especially France, Germany, and Switzerland, displayed products which were superior in design and workmanship to those of countries not advanced in the means to extend

education in the arts and sciences. The more recent expositions, including those at Buffalo, Saint Louis, Portland, and Seattle, have given emphasis to the importance of this training, and it has come to be an established fact that a theoretical knowledge of principles is necessary in addition to mere manual dexterity and empirical insight.

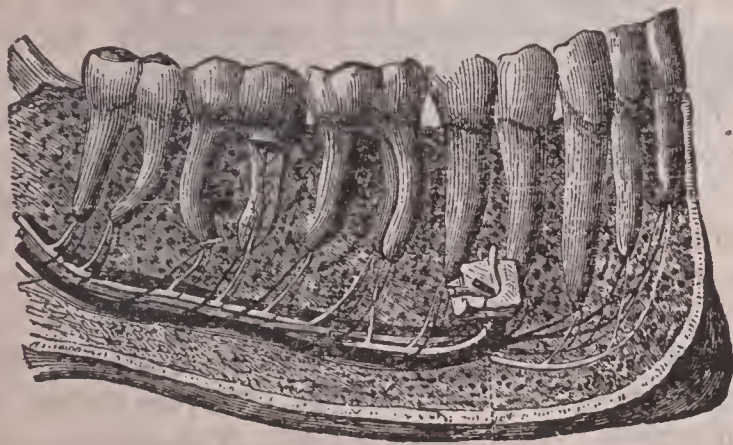
Technical education in the highest degree must begin in the primary school and be based on general literary culture. The branches of study recognized as essential are drawing, chemistry, and geometry. Typical examples of schools in the United States are those that teach dyeing and extend knowledge of textiles, such as located at Lowell and New Bedford, Mass., and the School of Industrial Art of the Pennsylvania Museum, at Philadelphia. At Krefeld, Germany, is a famous institution which has taken up for study the subject of government control of public utilities, such as waterworks, gas and electric light plants, and street railways. This institution provides thorough instruction in the mechanism and pattern designing involved in weaving and of the chemistry and technology of dyeing. Other noted institutions of this class are the School of Silk Weaving, Zurich, Switzerland; the Advanced School of Weaving, Lyons, France; and the textile department of the Manchester Technical School, England. Schools in which carpentry and the building trades are taught are quite numerous in Austria and Germany, including those located at Cologne, Chemnitz, Munich, and Nuremberg, and the School of the Technological Industrial Museum, Vienna. Schools for training foremen and superintendents in mechanical industries are maintained at Angers, Châlons, and Lille, France. The courses in these schools vary from three to five years, and in many distinct instruction is provided for boys and girls.

Until recently schools of applied art were not numerous in Canada and the United States, but there is a growing sentiment in favor of training for the handicrafts. Many states have made provision for manual training in the public schools, either in special classes or by systematic instruction through the grades from the primary department to the high school. The Cooper Union of New York City is one of the most prominent institutions affording instruction preparatory for commercial pursuits and the working trades. Others of a similar class include the Drexel Institute, Philadelphia; the School of Industrial Art of the Pennsylvania Museum; the Maryland Institute, Baltimore; the Lowell School of Design, Boston;

the Art Academy, Cincinnati; the Chicago Art Institute, Chicago; the New York Trade Schools, New York; and a number of colleges which teach the essentials of agriculture and mechanical arts. In quite a number of cities night schools are maintained at which provision is made for those who are occupied during the day. The learned societies of America also include many associations that are maintained especially to extend knowledge of industrial arts. These include the American Institute of Mining Engineers, the Society of Naval Architects and Marine Engineers, the Society for the Promotion of Agricultural Science, and the Society for the Promotion of Engineering Education.

TE DEUM. (tē dē'ūm), the first two words of the hymn beginning with the words, *Te Deum laudamus*, of which the English version is, "We praise thee, O God." The Latin hymn of this title is generally ascribed to Saint Ambrose and to Saint Augustine, but some authorities assign it to Hilary of Poitiers. It is used extensively on occasions of triumph and thanksgiving and has engaged the genius of many musical composers. In the Anglican Prayer Book it forms part of the morning prayer. It is recited in the Roman Catholic Church on all Sundays, except those of Advent and Lent, as well as on numerous festivals.

TEETH, the hard, bony structures situated in the mouth or near the entrance to the pharynx of vertebrates, which are partially exposed when developed and employed for seizing and chewing food. They are hard and dense



PERMANENT TEETH OF LOWER JAW.

and in most mammals, when developed, consist chiefly of dentine or ivory invested on its upper surface and crown with enamel and at its base with cement. The roots of the teeth, embedded in the gum, have a small opening leading into the pulp cavity, through which numerous blood vessels and nerves penetrate. The teeth of most mammals are classified as incisors, canines, and grinders, though there is a vast difference in the structure and size, which depend largely upon the food and habits that

characterize the animals. In the lion and other carnivorous mammals they are formed to serve in flesh eating, and in the ox and herbivorous animals they are designed more particularly for cutting off and grinding grasses. On the other hand, in some animals they are specially fitted to cut trees, as weapons of defense or means of anchorage, or to aid in constructing habitations.

Many species of fishes have compound teeth, and, whether simple or compound, they are shed and renewed at different stages of their lives. Birds have no teeth, but the name is applied to a notch in the bill in some species, which is large and conspicuous among the birds of prey. Toads, turtles, ant-eaters, and tortoises have no teeth, but instead have a mouth constructed with a view to facilitate compressing and swallowing the food. Serpents have a form of teeth on the palate, aside from those on the jaw, but the poison fangs of venomous species are the most conspicuous. Some edentates, as the ant-eaters and pagolins, have no teeth, though they belong to the mammals. The two tusks of the elephant are modifications of the incisors in the upper jaw, but besides these it has one, or two molars on each side of the two jaws. Naturalists have studied the teeth of extinct and living animals with such minuteness that they are able to determine the genus with much accuracy by examining the tooth structure and form. Teeth do not constitute a part of the skeleton, but, like the hairs, belong to the skin or exoskeletal part of the body.

HUMAN TEETH. Man and most mammals have 32 teeth when in the adult state. In man each half-jaw has eight teeth, those on corresponding sides being similarly shaped and arranged. There are *two incisors* in each half-jaw, situated nearest the middle of each jaw; the next one is called *canine*, or *eyetooth*; the next two, *bicuspid*s; and the next three, *grinders*, or *molars*. The incisors and eyeteeth have one fang or root, while the others have two or three fangs. Children are born toothless, but soon begin to develop a temporary set of teeth, called *milk teeth*. The first to appear are the incisors, which begin to cut through the gums at about the age of seven months. The first molars appear at nine months and the canines at eighteen months, while the last of the molars do not appear until the age of two or three years. There are twenty milk teeth in all, the number consisting of eight incisors, four canines, and eight molars.

The first set of teeth is usually still perfect at six years, but the jaws contain the crowns of all the second set, except the *wisdom teeth*.

At that age the crowns of the permanent set begin to press against the roots of the milk teeth, and the latter become slowly loosened and drop out. The last of the permanent set to appear are the wisdom teeth, which are sometimes delayed until the age of 20 to 23 years. A dense substance resembling bone, called *dentine*, constitutes the greater part of the interior of the teeth. The crown of the tooth, which is exposed to wear, is covered by a protective sheath of *enamel*, a hard, white substance. It is the hardest of all animal textures and contains about 97 per cent. of mineral matter. The fang of the tooth is covered by a *cement*, which is formed of a layer of true bone. Within the tooth is a pulp cavity filled with a soft and highly vascular substance called the *dental pulp*. The roots of the teeth are set in sockets of the jawbone, which is lined with a membrane that forms a soft cushion.

Decay of the teeth results from portions of food being lodged between them and from a sediment called *tartar* being deposited, both tending to injure the teeth and to make the breath offensive. Dentine once broken off is not restored. An injury of this kind is soon followed by the tooth beginning to decay, which ultimately results in inflammation of the part containing the blood vessels and nerves, thus causing toothache and rapid wasting of the tooth structure.

TEGUCIGALPA (tā-gōō-sē-gāl'pā), the capital of Honduras, on the Choluteca River, about forty miles northeast of the Gulf of Fonseca. It occupies a site 3,375 feet above sea level and is surrounded by a fertile region, which has deposits of gold and silver. Among the most important buildings are the cathedral, a national university, several public schools, the government buildings, and a ladies' seminary. It has manufactures of clothing, machinery, and ironware. The city has a brisk inland trade. It was founded by the Aztecs and had some importance in the early history of Central America. Population, 1908, 18,645.

TEHERAN (tē-h'rān'), or **Tehran**, the capital of Persia, in the province of Teheran, 68 miles south of the Caspian Sea. The city is located on the southwestern slope of the Elburz Mountains, in sight of Mount Demavend, height 18,600 feet. It was long an inactive and poorly built city, but within recent years material improvements have been effected. The facilities include gas and electric lighting, street pavements, rapid transit, and a railroad line. In the older parts the streets are still narrow and irregular, and many of the houses are low and plastered with mud. Among the principal

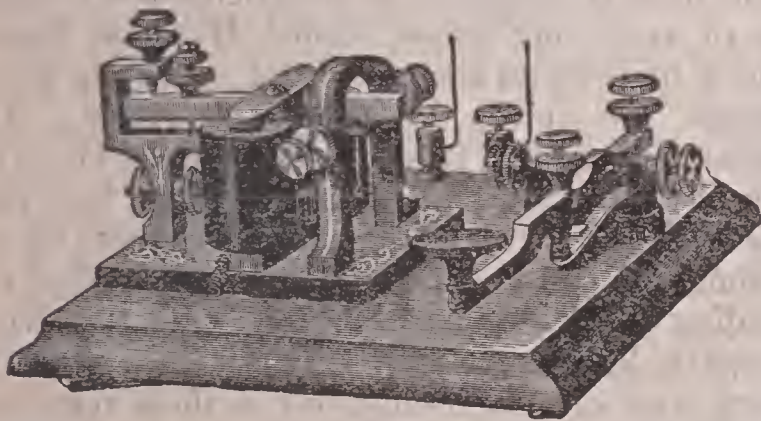
buildings are the citadel-palace of the Shah, the arsenal, numerous bazaars, and the residences of foreign legations. Many beautiful parks adorn the public places, particularly the royal residences and the castle occupied by the kajars. Other features include the Mosque of Masjid-i-Shah and many public baths. The manufactures include linen goods, hats, clothing, carpets, shoes, and machinery. It has a considerable trade in live stock, fruits, cereals, and merchandise. The climate is exceedingly hot in the summer time, causing fully a third of the inhabitants to occupy villas in the highlands toward the north. Near the city are ruins of the ancient Rei, known in the time of Alexander the Great as Ragae, which is regarded the birthplace of Harun-al-Raschid. Population, 1906, 218,608.

TEHUANTEPEC (tā-wān-tā-pēk'), a town in Mexico, in the state of Oaxaca, fourteen miles from the Gulf of Tehuantepec. It is situated on the Tehuantepec River, which supplies water power, and has railroad connections with the Pacific and the Gulf of Campeachy. The region lying between the Gulf of Campeachy and the Gulf of Tehuantepec, an inlet from the Pacific, is known as the Isthmus of Tehuantepec and forms the narrowest part of North America, lying north of the Isthmus of Panama. It is 130 miles at the narrowest place. Several plans to construct a canal have been projected, utilizing the Coatzacoalcos River a part of the distance, but the project has been abandoned and a railroad line is now operated in its stead, thus supplying valuable transportation facilities between the Atlantic and the Pacific. The town of Tehuantepec has manufactures of indigo, salt, cotton fabrics, and machinery. Off the coast are valuable fisheries, including those of pearl fishing. It has a growing trade in cereals, live stock, and manufactures. Cochineal, fruits, cereals, and grasses are produced in the vicinity. The place was occupied by the Zapotec Indians at the time of the Spanish Conquest, but was captured by Alvarado in 1522. Population, 1906, 12,865.

TELAUTOGRAPH (těl-ā'tō-gráf), an instrument for reproducing by an electric current at a distance sketches and handwriting. The principal part consists of a transmitter and a receiver at each station, and the mechanism is so arranged that electrical current sent over the connecting wires puts the receiving pen in synchronous movement with the transmitting pencil. Two lines of wire connect the transmitters and receivers of other stations, and power equal to that used in two ordinary incandescent lamps is taken from the electric circuit at each

end. An ordinary lead pencil is used in the writing or drawing, but two silk threads are attached near its point to make the connection with the transmitter. The impulse is carried by means of the electric current to the receiving station, where the writing or drawing is reproduced in exact agreement with the copy made at the transmitting station. This instrument was invented by Elisha Gray. It is used for the conveyance of messages, in the coast defense service, on warships of the navy, for train dispatching, and in communicating between the news and press rooms of newspaper offices. It may be employed to good advantage in commercial work, since both the sender and the person addressed will have a record. No current is consumed when the transmitter is switched off. It is not necessary for an operator to be at a receiving station, since the writing is done true to the copy when the receiving pencil or pen is in place.

TELEGRAPH (těl'ê-gráf), an instrument to send messages by means of electricity, either at short or long distances. An instrument of this kind is frequently called the electric telegraph. The name telegraph is from the Latin *tela* = far, and *graph* = to write, meaning *to write afar*. This term was first applied because the original receiving telegraphic instrument had an electro-magnetic register, which recorded on a



TELEGRAPHIC RECEIVER AND KEY.

band of paper, in the form of dots and dashes, the signals sent over the line of wire. It was soon found that the operator could receive the telegraphic message by sound, even more readily than by the recorded dots and dashes received on the moving band of paper. This led to the invention of a form of receiving instrument called the *telegraphic sounder*, which is now in almost universal use, though the instrument has been materially improved by successive inventors.

ELECTRO-MAGNETIC TELEGRAPH. Several essential and complicated parts enter into the electro-magnetic telegraph. These include the battery, or source of electric power, the insulated wire by which the electric current is carried to any distance, the key or communicator for signaling

between two places, and the sounder for receiving the messages at the station to which they are sent. A single wire is used to connect the two stations and is joined at each station to a key, a sounder, and a battery. It is necessary to have a complete circuit. This is secured by one pole of each battery being connected with the ground, and, when a current is sent along the wire, the circuit is completed through the earth. The circuit is said to be *broken*, or *open*, when the flow of electricity is cut off and *closed*, when it is allowed to go on again. In sending a dispatch the circuit is opened and closed successively by the operator who sends the message, by means of the key. The armature of the relay at the station where the message is received vibrates in unison with these movements, the sounder repeats them with greater force, and the second operator interprets their meaning.

In long telegraphic lines, when the current reaches the distant end of the line, it is too weak to produce an audible signal, or to form a satisfactory record. In such case an apparatus called a *telegraphic relay* is employed. This consists of an electro-magnet whose magnetizing coils contain many turns of fine wire. The armature of the relay magnet serves to open and close the circuit of a local battery, the current of which operates either the sounder or the recording apparatus. It is possible by means of the relay to send telegraphic dispatches across a continent or ocean. Multitudes of applications have been made of the electro-magnetic telegraph, including the *duplex telegraph*, by which it is possible to send several messages at the same time over a single wire. In this system different sets of instruments are attached to the wire, each set corresponding to currents of different strength and being in communication with special batteries. Messages can be transmitted in this way without interruption for the reason that the instruments respond only to the batteries to which they are attached.

Many improvements have been made in the construction of telegraphic instruments, and extensive systems of wire lines are maintained in practically all countries. The Edison-Smith system of *train telegraphy* is one of the newer devices. By means of it a train in motion may receive dispatches from offices along the line, this being effected by induction from the telegraph wires along the line of railway and the communication is received by an instrument located in one of the cars. William Marconi, Nikola Tesla, and a number of other inventors added largely to telegraphic advancement by constructing instruments to communicate mes-

sages without wires, this system being known as *wireless telegraphy*. Another system, known as the *Bonelli's telegraph*, employs five wires and the messages are set up in brass type. However, it is too expensive to make it practical in commercial telegraphy.

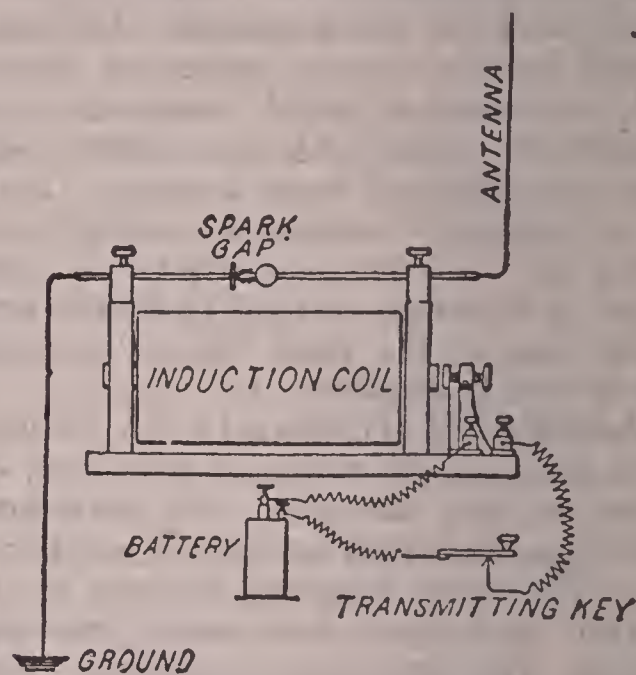
TELEGRAPH LINES. Telegraph wires are usually stretched upon high poles, but in some countries they are covered with a nonconductor, usually gutta-percha, and buried in the ground. A bracket is used to furnish ample facilities to attach the wires, but where from eight to twenty wires are employed in the same system two or more brackets are necessary. The attachment is made by means of glass knobs, since glass is a good nonconductor and prevents the escape of the current at the poles. Telegraph lines in Canada and the United States are owned by private corporations, who send messages for individuals at certain toll rates, but in most European countries the telegraph lines are operated by the government in connection with the postal system, thus giving the people a popular and efficient means of communication at low rates.

HISTORY. Practical efforts to send messages by the agency of electricity date from the early part of the 18th century, though the idea of using electric currents for that purpose is much older and was alluded to by writers of ancient times. The first practical results were obtained by stretching a series of wires and suspending from the ends a number of light balls marked with the letters of the alphabet, the electric current moving the particular ball against which it was directed. Such an instrument was perfected at Geneva, Switzerland, by Le Sage in 1774. Steinheil, of Munich, Germany, invented an electro-magnetic machine, in 1837, and Cook and Wheatstone, two Englishmen, in the same year secured a patent for a constant battery instrument. In the latter a keyboard was employed and needles were adjusted so as to point to the different letters under the proper impulse. Professor Morse is the inventor of the present commercial system of telegraphy. He constructed the first line over which a message was sent successfully at a long distance, the line being from Washington to Baltimore. The first message was, "What hath God wrought?" and was sent by him in 1843 to his assistant, Alfred Vail. The sum of \$30,000 was appropriated by the United States government to successfully develop and apply the instrument.

The United States has the largest mileage of telegraph poles in the world, a total of 246,540 miles. These are controlled principally by two companies, the Western Union and the Postal

Telegraph, the former having about 75 per cent. of the lines. Canada has an efficient telegraph service, a total of 48,775 miles, including several transcontinental lines. Russia has 105,800 miles; France, 93,600; Germany, 90,000; Australia, 50,000; Great Britain, 48,500; and Mexico, 36,000. See **Cables; Telautograph.**

TELEGRAPHY (tê-lêg'ra-fÿ), **Wireless**, the art of telegraphing by electricity without wires. In theory it is closely allied to heliography, or signaling with flashes of light. The



WIRELESS TRANSMITTER.

light used is produced by electricity and is made up of very long waves, called *Hertzian waves*, and is invisible to the naked eye, since the waves vibrate too slowly to affect the retina. The waves were named from the discoverer, Heinrich Hertz (1857-1894), a German physicist, who conducted experiments with spark discharges of the Ruhmkorff coil and Leyden jars in the period extending from 1886 to 1887. He found that when a spark leaped the gap between the terminals there were electric oscillations in these terminals sufficiently strong to produce magnetic waves in the surrounding space, which in turn caused similar oscillations in an adjacent conductor lying at an angle to them. The waves were detected by a device called a *resonator*, which consists of a circle of copper wire formed with a gap. The transmitter employed by Hertz was practically the same as is used at present, but the receiver has been greatly improved.

SYSTEMS. William Marconi, an Italian inventor, developed the pioneer system of wireless telegraphy by utilizing the discovery of Hertz. The first wireless message was sent across the English channel in 1899, a system having been established in England by Marconi, and the first daily newspaper published on mid-ocean was issued Nov. 15, 1899, on board the steamer

Saint Paul, containing news transmitted from shore by wireless telegraphy. Many systems are now in use, those employed chiefly in North America being the Marconi, Fessenden, and De Forest systems. The Popoff system is used most in Russia; the Slaby-Arco and Braun-Siemens-Halske, in Germany; the Fissot, Branley, and Rochefort, in France; and the Marconi, Lodge-Muirhead, and Orling-Armstrong, in England. In 1903 the government of Italy voted \$160,000 to establish a transatlantic system of wireless telegraphy. Wireless outfits are carried by all modern warships and by many steamships. The advantages of wireless communication were greatly emphasized in the naval operations during the Russo-Japanese War and at numerous times while the Revolution of 1905 was raging in Russia. Intelligible messages were sent as early as 1901 from Cornwall, England, to Newfoundland, a distance of 1,800 miles.

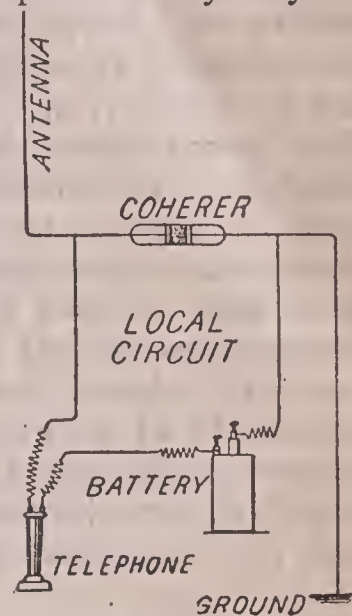
APPARATUS. The accompanying illustrations give a fairly clear idea of the mechanical construction of the instruments employed. In typical wireless telegraph stations, both transmitting and receiving, the vertical wire, called the *antenna*, is mounted on a tower about 100 feet high. Frequently a series of wires is used. In some instruments the receiver is supplied with a telephone, while others transmit the sound in the manner of an ordinary telegraph, or record the messages in telegraphic characters.

Messages are transmitted by operating a telegraph key according to the Morse code in the primary circuit of the induction coil (see transmitting key), which causes sparks to leap at corresponding intervals at the spark gap. (See illustration.) Signals induced in this way are transmitted by the Hertzian waves to the receiving station, where the telegraph receiver records them, or they may be perceived by holding the telephone to the ear (see illustration), though in most instruments the Morse alphabet, made by combinations of long and short signals, is utilized through the agency of a recorder or receiver. Much improvement was made by Marconi when he increased the sensitiveness of the coherer, but there are in use many types of wave detectors, though they are all based largely on the principle of the imperfect contact, the Marconi magnetic detector being an exception. Inventors are still at work in an effort to develop a system which will not allow interference between two or more equipments. Such a system is quite essential, since it would prevent unauthorized persons from reading and intercepting the messages. The purpose is to tune or syntonize the transmitting and receiving stations with the view of perfecting instruments that will

give and respond to oscillations of a certain periodicity only. Although many patents have been granted to inventors who claim to have made improvements so the desired result can be secured, complete success in syntonizing had not been obtained up to 1909.

In order to better understand the mechanical parts of equipment for wireless telegraphy, the following is given with the suggestion that it covers the essentials of most instruments: A vertical wire called the *antenna* is connected to one terminal of the coil, and the other terminal is connected with the earth, the purpose being to increase the electrical capacity of the terminal rods and produce larger waves. Instead of producing the oscillations by means of an induction coil, they are now ordinarily produced by a dynamo and a step-up transformer, except for telegraphing over short distances. But even with these changes we would not be able to telegraph over any appreciable distance if dependent upon the Hertz resonator for receiving a message, for, owing to the fact that the waves spread out in all directions from the transmitting antenna, the receiving antenna is acted upon by a very small proportion of the power expended by the transmitter, and this proportion decreases very rapidly as the distance between the transmitter and the receiver increases. In order, then, to detect the rays at long distances, a very sensitive instrument called the *coherer* has been invented.

The coherer in its usual form consists of a glass tube with two metal pistons fitted therein between which a quantity of nickel filings is placed. The latter form an imperfect electrical contact between the pistons, and take the place of the spark gap in the receiving antenna. When the oscillations are set up in the antenna by the Hertzian waves, due to their high pressure or voltage, they break through the imperfect contact of the coherer, causing the filings therein to cohere or string together and thus produce a much better electrical path through the coherer. The action is microscopic and cannot be detected with the naked eye. However, the coherer, aside from being a part of the antenna circuit, is also made a part of a local battery circuit, which contains a telegraph receiver, and, whenever the electric oscillations open a good path through the filings for the local circuit,



WIRELESS RECEIVER.

the telegraph instrument will be energized by the local battery only. In order to break this path after the oscillations have ceased, or, in other words, to cause the filings to decohere, they are constantly jarred apart by means of the tapper, which is in reality an electric bell with the gong removed, the clapper striking the coherer tube instead. Carbon granules may be substituted for metallic filings, and in this case no tapper is necessary, the coherer being self-restoring.

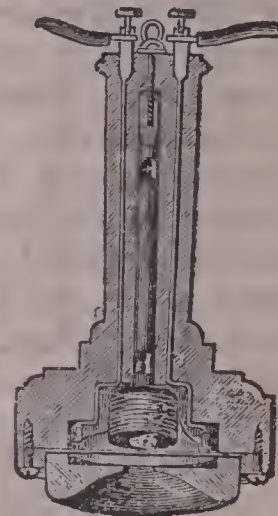
TELEPHONE (těl'ê-fōn), an instrument for reproducing sound at a distance by the transmission of impulses through the agency of electricity over a conducting wire or cord. The three essential parts of a telephone include the *transmitter*, by which sound waves generate or modify an electric current; the *line*, by which the current is transmitted to the distant station; and the *receiver*, through which the current produces sound waves. In the common form of the telephone a transmitting and a receiving instrument are employed at each end of the line. A strong bar magnet, provided with a coil of insulated wire wrapped around it near one end, is connected at one of its ends to a wire which passes to a distant station, where it is connected to one end of a similar cord wrapped around a magnet of the same kind. The other end of the insulated wire is connected with the ground, thus providing a complete circuit, called a *tele-*

against the plate or disc in the receiving telephone, produce corresponding vibrations. The reproduction is so true that the voice of the speaker can be readily recognized at a distance of many hundred miles. In the accompanying figure a sectional view of the telephone is shown.

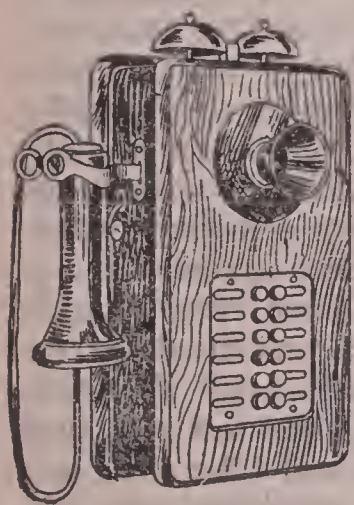
The ancients understood the laws on which the telephone is based, but the invention of practical instruments to successfully utilize them in long-distance communication dates from the 19th century. Philip Reis, of Friedrichsdorf, Germany, constructed a telephone in 1861 and was the first to apply the name by which it is known. This he did before the Physical Society of Frankfort. Elisha Gray, of Chicago, completed a short distance telephone in 1873. However, Alexander G. Bell, of Boston, Mass., was the first to invent a telephone that carried the human voice with perfection a long distance. He exhibited his instrument in 1876. Shortly after, Thomas A. Edison and others made notable improvements. The telephone came into general use with remarkable rapidity, not only in cities and towns, but it is in extensive use among the farmers in country districts. In many regions farmers and ranchmen successfully utilize the wires of fences to make telephone connections.

The systems of telephones now in use enable people in cities and many in rural districts to communicate with each other, thus greatly facilitating rapidity and convenience in social and business communication. Long-distance telephones are likewise numerous. The first line of material length was completed, in 1895, between New York and Chicago, which is about 950 miles. Long distance lines are

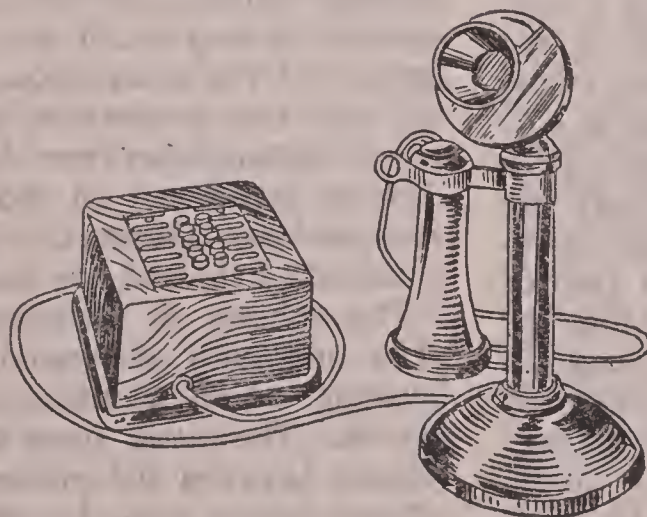
maintained between Paris and London, between Paris and Berlin, between Berlin and Vienna, and between many other capitals and cities of Europe. Michael I. Pupin, of Columbia University, in 1891 announced the invention of a device for overcoming the resistance long experienced in ocean telephoning. He placed at regular intervals along his cable an induction coil around the parent wire. The current, which can be very weak, starts from the remitter, and just as



SECTION VIEW OF TELEPHONE.



Wall Type.



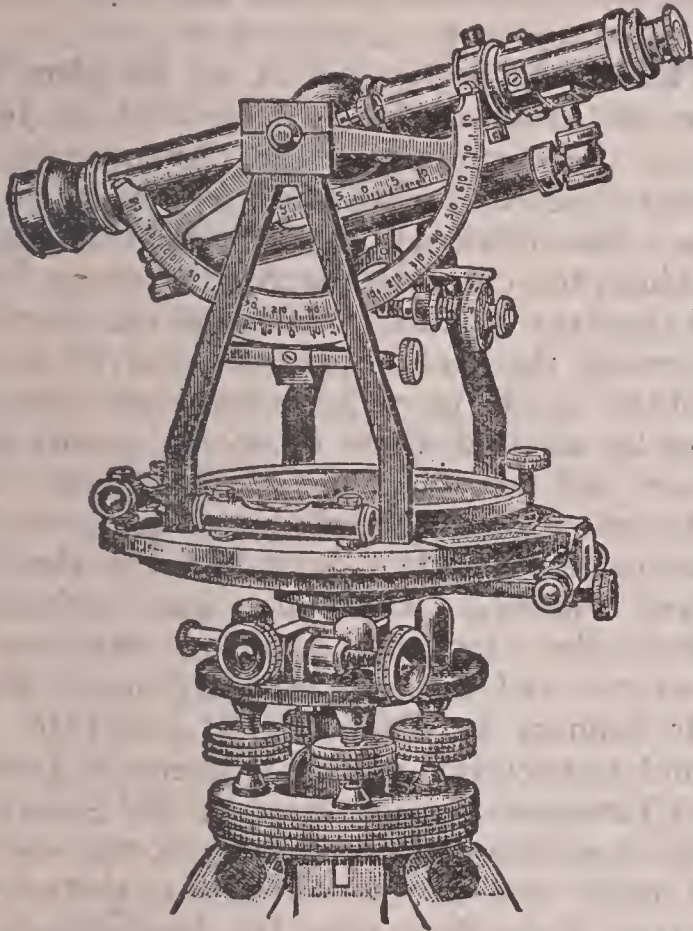
Desk Type.

TELEPHONES.

phone circuit. A thin disc of sheet iron is fixed in front of the extremity of the magnet. As the mouthpiece of the transmitting instrument collects and concentrates the sound, the sheet iron is caused to vibrate, and electric currents corresponding exactly to the original sounds are thereby excited. A person holding the receiver to the ear at the other end of the line is enabled to perceive a reproduction of the original sounds, for the reason that the electric currents, coming

it begins slightly to weaken strikes one of these induction coils, which strengthens the current and gives it renewed impetus, and, so pushed on its way, the current leaps from coil to coil according to well-known electrical laws. Relays serve the same purpose in long-distance telephoning and in telegraphing.

TELESCOPE (těl'ê-skōp), an optical instrument to magnify distant objects and bring them within the range of distinct, or more dis-



TELESCOPE MOUNTED FOR USE.

tinct, vision. It consists essentially of two parts, an object glass, or mirror, for forming an image of the object, and an ocular, or eyepiece, for receiving the image. The telescope assists the eye in two ways, by magnifying the image of the objects viewed, and by collecting and concentrating upon the eye a greater amount of light than would enter the organ if unassisted. It may be taken as a general rule, that the larger the object glass, the greater in both respects is its power. The object glass is convex, and the eyepiece is either convex or concave. In the former case the image appears inverted, and in the latter case it appears to the eye in its natural position. Eyeglasses are always concave in terrestrial telescopes, as opera glasses and spy glasses, but in astronomical telescopes they may be of either form, since the object to be viewed has a spherical shape. Telescopes are either refracting or reflecting. The former transmit the rays to a focus through a combination of lenses called the *object glass*, while the latter bring them to a focus by reflection from a concave

mirror. Thus, an observer looking through the eyeglass of a refracting telescope views the image itself, but one using a reflecting telescope views a reflection of the image made by the mirror.

The *reflecting telescopes* have very large object glasses, and to them are due the most important discoveries made in astronomical science. The largest reflecting telescope in the world is that of Lord Rosse at Parsonstown, Ireland, which has a speculum six feet in diameter. Other large instruments of this class include the William Herschel telescope and the one erected by Ainslie A. Common near London. Both of these are smaller than the Rosse instrument, but they are more perfect in their effect. The Lick Observatory in California has a refracting telescope with an object glass three feet in diameter. It was long the largest in the world, but it is surpassed in size by the Yerkes telescope at Lake Geneva, Wisconsin.

The Yerkes telescope belongs to the Chicago University, being a gift of Charles T. Yerkes, and is now the largest in use. Its object glass measures forty inches in diameter, is about three inches thick, and weighs 762 pounds. The sheet-steel tube is 63 feet long, the largest diameter being 53 inches, and the weight of its three sections is six tons. The estimated cost of the lens is \$100,000, and of the telescope and the observatory, \$500,000. Although the telescope has a power considerably greater than that of the Lick instrument, its location is less favorable on account of being on lower ground, thus giving it a more misty atmosphere. Other noted refracting telescopes include the one at the Washington Naval Observatory, 26 inches; at Vienna, 27 inches; at Yale University, 28 inches; and in Pultova, Russia, 30 inches. Among the men connected with the history and development of the telescope are Gerbert of Auvergne, Roger Bacon, Galileo, Kepler, Liebig, Newton, Herschel, and Peter Andreas Hansen (1795-1874).

TELLURIUM (těl-lū'rī-ŭm), a nonmetallic element belonging to the same class as sulphur and selenium. It occurs native in small quantities and is found in a number of minerals, especially in California, Virginia, and Hungary. This element is crystalline, white, and shining, and burns with a strong flame. The flame is blue with green edges, and while burning it gives off a thick white smoke. See **Chemistry**.

TEMPE, a narrow valley in northern Greece, through which flows the Peneus River. It is situated between Mount Olympus and Mount Ossa, in Thessaly. Both ancient and modern poets have praised its beautiful and romantic scenery, and tourists speak of it as a region of remarkable grandeur. In places the

valley narrows so as to leave passage only for the river and a carriage road, and in several localities are ruins of ancient castles and fortresses.

TEMPERANCE. See **Total Abstinence.**

TEMPERANCE (tēm'pēr-ans'), **Sons of**, an organization to promote temperance, founded in New York in 1842. Both men and women are eligible to membership, and a cadet branch is maintained for boys who are not under sixteen years of age, who are designated as Cadets of Temperance. Those who join are required to sign a pledge not to use alcoholic drinks or engage in the sale or manufacture of spirituous liquors. The order has branches in Australia, Canada, Great Britain, and the United States. About half of the members are in the last mentioned country, where a membership of 3,000,000 is reported. This organization has life insurance and sick and funeral benefits.

TEMPERATURE (tēm'pēr-à-tūr). See **Thermometer.**

TEMPERATURE, the condition of any body with regard to heat or cold. *Animal temperature* has reference to the state of the body of animals with regard to heat, though this applies only to warm-blooded species during life. The source of heat in animals is found in the potential energy of the food and the oxygen which is absorbed from the air during respiration. In the healthy human adult the temperature ranges from 97.5° to 99° Fahr., and the normal state is usually close to 98°. In early infancy as well as in old age, the temperature is slightly above the average, but it is influenced but slightly by race, though the people who reside in the tropical regions have a temperature averaging about one-half a degree higher than those of the Temperate zones. At the surface the body is slightly cooler than in the interior, and it is somewhat higher immediately after meals and during exercise. In fevers the temperature rises to 106°, and registrations below 93° and above 106° are usually fatal. When the body has a temperature of 100°, the pulse beats 80 times per minute. See **Climate.**

TEMPERING, the process of producing a determined degree of hardness in metals, especially iron and steel. Hardness is that property by which certain substances resist being worn or scratched by others. However, the terms *hard* and *soft* are used only in a relative sense, since a body may be hard as compared with one substance, but soft when compared with another. Thus, glass is considered hard when compared with marble, but it is soft as compared with the diamond, since it is scratched or cut by the diamond. Steel possesses the property of being easily hardened or tempered, and it is possible

to obtain almost any degree of hardness and brittleness in this metal. The process consists in plunging the steel, when raised to a red heat, into cold water or some other liquid, which will cause it to become hard. To temper it properly for the purpose desired, as in making knives and razors, it may be made excessively hard and then reduced by gradually reheating. Hardness in steel is indicated by its color. Razors and surgical instruments are made from steel heated to about 450° and then plunged into cold water or oil, when it assumes a pale straw color.

TEMPLARS (tēm'plērz), or **Knights Templar**, an order of knights founded at Jerusalem in the beginning of the 12th century, celebrated alike for its religious and military influence. Nine Christian knights were the founders, of whom the chief ones were Hugues de Payens and Geoffrey de Saint Omar, and the object was to protect the Holy Sepulcher and its visitors. Baldwin II., King of Jerusalem, accommodated them by allowing them to occupy a part of his palace, and the abbot and canons of the church and convent of the temple gave them a building wherein to keep their arms, whence they were called *Templars*. The order was confirmed in 1128 by Pope Honorius II. They were enjoined to wear a red cross on the left breast and on their banners by Eugenius III., in 1146. The Templars exercised a wide influence in Palestine until Jerusalem was captured by the Saracens in 1187, when they retired to Antioch, then to Acre, and finally transferred their seat to the island of Cyprus. Pope Alexander III. had already conferred extensive privileges upon the order in 1162, which included regulations that gradually increased their numbers, and they became very numerous in all the countries of Southern and Western Europe, establishing themselves in England about 1185.

The Templars gradually attained to great wealth and influence, including some of the leading families of Europe, and at one time had designs upon European thrones, with the view of establishing a nationality. Philip the Fair of France lured Jacques D. Molay, master of the temple, to Paris in 1306 with the view of suppressing the order in France, and the following year placed all the leaders under arrest. Pope Clement V. issued a bull calling upon Christian princes to aid in examining the Templars as to piety and morality, and a general council at Vienna, in 1311, abolished the order as heretical. Many of the leaders were prosecuted and put to death for alleged crimes, while their wealth was confiscated and their meetings were prohibited. In France the treatment accorded the Templars was highly unjust, and they were served no bet-

ter in England under Edward II. They received just and mild treatment in Germany, where they maintained themselves longest. Much of the property belonging to the Templars was bestowed on the order of the Knights of Saint John, which was joined by many of the members after the main organization had been abandoned.

TEMPLE, a building designed for religious worship. In some countries the term is used synonymously with church and even with mosque, but it has special reference to the chief sanctuary of the Jews, the Christian churches constructed by the Knights Templar, the Protestant places of worship in France, and the edifices erected in various pagan countries. Solomon, King of the Jews, built the most remarkable temple in the historic period of the world. It was located on Mount Moriah, in Jerusalem, and was constructed of stone and the cedar of Lebanon. The length was 60 cubits; the width, 20 cubits; and the height, 30 cubits. It was divided into two parts, the outer sanctuary or Holy Place, and the Holy of Holies; the former was 20 by 40 and the latter 20 by 20 cubits. Within the Holy Place were the showbread table, the altar of incense, the seven-branched candlesticks, and ten smaller tables and candlesticks. The Holy of Holies contained the Ark of Testimony, sheltered by the outspread wings of two cherubs. Nebuchadnezzar destroyed the temple in 586 B. C., but the Jews erected a new edifice on the same site after returning from the Babylonian captivity, in 516 B. C. It was rebuilt by Herod the Great in 18 B. C., and his structure was the one from which Christ expelled the merchants and money changers. It remained intact until 70 A. D., when it was completely destroyed by the Romans. In the time of Constantine the Jews sought to rebuild the temple on the same site, and another attempt was made by Julian, but both attempts proved futile. The ground is now occupied by a Moslem place of worship, known as the Mosque of Omar.

Temples were very common in Greece and Rome. They were dedicated to some particular deity and in them the priests officiated and burned incense. Indeed, these edifices were the principal architectural features of most ancient peoples. Many of the ruins in Egypt, Greece, Rome, and even China give evidence that these structures were of large size and contained the greatest treasures of ancient civilizations. Temples of considerable note are found in China and other countries of Asia, and in form they do not differ materially from the ancient style. See **Pagoda**.

TEMPLE, a city of Texas, in Bell County, about 112 miles south of Fort Worth, on the

Missouri, Kansas and Texas and the Gulf, Colorado and Santa Fé railroads. The surrounding country is fertile. The features include the public library, the high school, an academy, two hospitals, and extensive railroad shops. Among the manufactures are cotton textiles, earthenware, cigars, clothing, and machinery. It is a market for cereals, live stock, dairy products, and merchandise. Electric lighting, pavements, waterworks, and sewerage are among the improvements. It was settled in 1881. Population, 1900, 7,065; in 1910, 10,993.

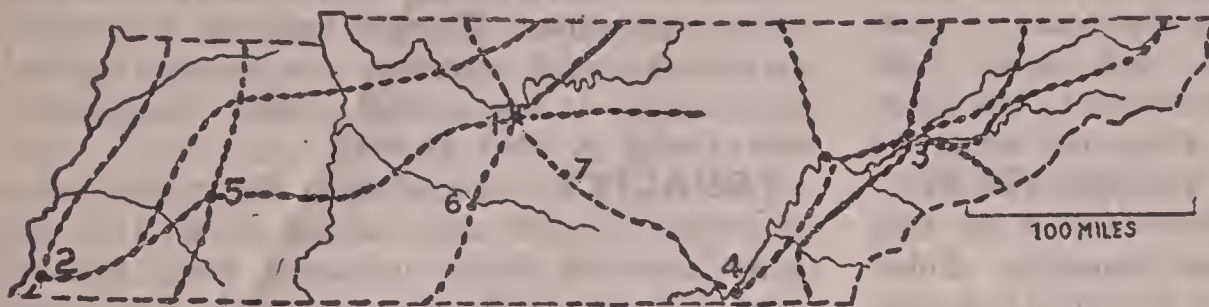
TENACITY (tĕ-nās'ī-tĭ), the power of a substance to resist being pulled apart. It is due to the cohesion of the molecules, hence tenacity varies greatly in different substances. The length of a bar or beam does not affect the number of molecules in the area of a given cross section. However, a long beam is likely to have a flaw or weak spot, hence it may be less tenacious than a short beam, since it inclines to break at its weakest part. Wood is more tenacious in the direction of its fibers than in the transverse direction, while metals usually have greater tenacity in the longitudinal direction. In most cases the simple metals have less tenacity than those which are mixed.

TENANT (tĕn'ant), one who holds or possesses real estate temporarily, the title of which is vested in another, who is known as the *landlord*. Such an occupant usually has possession under the terms of a lease, whereby the relation of the landlord and tenant is created. If an occupant has possession on no fixed terms, though with the will and knowledge of the landlord, he is said to be a *tenant at will*. Where two or more persons have possession of lands or tenements, each is called a *tenant in common*. The term *tenant for life* is applied to one whose possession is dependent upon his own life or that of another.

TENCH, the name of a fish of the carp family, found in the fresh waters of Europe and Asia. It is soft-rayed, rarely is more than 14 inches long, and has a yellowish-brown color. The tench prefers stagnant waters with a muddy bottom, and the winter is spent in a torpid state in the mud. It is tenacious of life and its flesh is not prized as a food.

TENDER (tĕn'dĕr), an offer to do an act which one person is legally bound to perform for another. The obligation as well as the offer may be to pay money or to deliver special articles. If the tender be of money, it is effectual only when the demand is one of money and the amount tendered is adequate. When a person makes a tender of lawful money to discharge a debt, it is termed a *legal tender*. Usually the

law specifies what constitutes a legal tender. Silver coins in denominations of less than one dollar constitute a legal tender for ten dollars or less in the United States. Silver coins in the denomination of one dollar and all classes of gold coin are legal tender for any amount, which is true also of United States bank notes. However, bank notes are legal tender only for



TENNESSEE.

1, Nashville; 2, Memphis; 3, Knoxville; 4, Chattanooga; 5, Jackson; 6, Columbia; 7, Murfreesboro. Chief railroads shown by dotted lines.

private debts and certain other debts, but not in payment of interest on the public debt or as duties on imports.

TENDON (tĕn'dŭn), in anatomy, white fibrous tissue which connects the end of a muscle with the bone that it is intended to move. Some tendons are formed like a broad ribbon, others are cylindrical, and still others are thin like a sheet. A tendon is not elastic nor extensible, and thus transfers immediately the motion imparted by the contraction of the muscle to the bone into which it is inserted. In many cases the tendons are long and slender, as those extending from the muscle in the upper part of the forearm to the fingers.

TENERIFFE (tĕn-ĕr-ĭf'), an island of the Canary group, one of the largest and most productive. It is situated about 150 miles northwest of Cape Bojador, Africa. The contour resembles that of a triangle, with the two longest sides sixty miles long and the western side about twenty miles. The area is given at 785 square miles. Most of the coasts are high and characterized by deep inlets, and the surface is diversified by plains, valleys, and mountains. The highest elevations are from 8,000 to 12,000 feet above the sea, Mount Teneriffe being the culminating summit. The island is volcanic and vapors rise constantly from some of the craters. Among the chief products are nuts, cochineal, cereals, silk, grasses, and fruits. Live stock, such as horses and cattle, is grown successfully. The island belongs to Spain, with which country it has a considerable commerce. Santa Cruz and Laguna are the chief seaports. Population, 1906, 137,620.

TENNESSEE (tĕn-nĕs-sĕ'), a southern State of the United States, the third to be admitted after the adoption of the Constitution, popu-

larly called the *Big Bend State*. It is bounded on the north by Kentucky and Virginia, east by North Carolina, south by Georgia, Alabama, and Mississippi, and west by Arkansas and Missouri. The length from east to west is 432 miles, and the greatest width is 109 miles. It has an area of 42,050 square miles.

DESCRIPTION. The flood plain of the Mississippi is located in the western part of the State, and between it and the narrow valley of the Tennessee is an extensive ridge running north and south, which is diversified by fertile valleys and plains. Between the Tennessee Valley and the Cumberland Mountains, in the eastern part,

is a valley region about 100 miles wide, whose surface is of a gently undulating character, with small elevations in many places. The Cumberland Mountains range about 1,000 feet above the Tennessee River, and between them and the Chaka and Smoky mountains is a valley more or less diversified by minor elevations, including ranges of the Unaka, Bald, and Stone mountains. This region contains many caverns and numerous subterranean streams. The Smoky Mountains have a general elevation of 5,000 feet, but many of the peaks are much higher. Klingman's Dome, height 6,663 feet, is the highest summit in the State.

The drainage belongs entirely to the Mississippi system, but the only rivers of considerable size that discharge directly into the Mississippi are the Obion and the Big Hatchie. These flow in a general direction toward the west, where the Mississippi forms the entire western boundary, while the Ohio forms all of the northern border. The Cumberland enters the State from Kentucky and flows toward the southwest until it passes Nashville, when it recrosses the Kentucky border in Stewart County. The Tennessee River is formed in the eastern part of the State by the Clinch and Holston rivers, both of which rise in Virginia, and crosses the southern border into Alabama and Mississippi, but reenters the State in Hardin County and flows across it into Kentucky. The French Broad is a tributary of the Holston River, which it enters a short distance above Knoxville. No lakes of material size are within the State, except the lagoons in the Mississippi flood plain. These include Reelfoot Lake, which is 5 miles wide and 25 miles long.

The climate is mild and favorable, but varies considerably on account of differences in alti-

tude. In the western lowlands it is less healthful than in the remainder of the State. The mean temperature for July is 77° and for January 38°. While the thermometer falls below zero in the mountains, the minimum in the State generally is seldom lower than 10°, and the maximum is about 104°. Chattanooga has a mean temperature of 59°. Rainfall is abundant in all parts of the State, ranging from 47 inches in the eastern to 50 inches in the western section, but it frequently reaches 60 inches in some localities of the central part.

MINING. The State has extensive mineral resources and the output of various minerals has grown constantly the past decade. Coal is mined in the counties lying west of the upper Tennessee River, and the annual yield is about 6,850,000 tons. In the output of iron ore, the State holds fifth rank. Phosphate rock is obtained in large quantities in the north central part of the State, in the vicinity of Nashville. There has been a constant increase in the output of copper. Building stone, such as granite and limestone, is quarried in many parts of the State for building purposes. Mineral waters, glass sand, and commercial clays are widely distributed. Other minerals include zinc, petroleum, natural gas, and mineral paints.

AGRICULTURE. Farming is the chief occupation. The farms average ninety acres, about one-seventh of which are operated by Negroes. The Cumberland plateau is not well suited for agriculture, but all other parts of the State possess fertility, especially the rich alluvial lands of the Mississippi bottom. Corn is grown on a larger acreage than any other cereals, and in the yield of this crop the State usually holds tenth rank. Wheat is the second crop in acreage and is followed in order by hay, cotton, and oats. Other important crops include tobacco, peas, potatoes, peanuts, rye, sweet potatoes, and sorghum. Fruit culture is the source of a large income, especially apples, strawberries, peaches, pears, and watermelons. Large interests are vested in the live-stock industry, especially in cattle and swine. Special attention is given to the rearing of fine grades of horses and mules, and sheep and poultry are represented in large numbers. More than one-third of the cattle are reared for dairy purposes.

MANUFACTURING. The progress in manufacturing enterprises has been very noticeable the past ten years, both in the quantity and variety of the output. The State is well supplied with commercial timber, such as hickory, beech, pine, ash, walnut, elm, sycamore, and other classes that are useful in the industry. It has an abundance of coal and minerals to stimulate this

industry. Flour and grist-mill products have long held the first place among the manufactures, but they are followed closely by both timber and machine-shop products. Manufacturing of this class is greatly facilitated by numerous navigable streams and rivers that furnish abundance of water power. Other manufactures that take high rank include tobacco products, cotton and woolen goods, paper, pottery, leather, railway cars, cotton-seed oil, and farming machinery. Large iron ore smelters, stone quarries, and sorghum molasses plants are operated.

TRANSPORTATION. The State has extensive navigation facilities on the Cumberland, the Mississippi, the Ohio, and the Tennessee rivers. These navigable highways furnish direct communication with many ports on the Atlantic and the Gulf of Mexico. The railroad lines aggregate 3,500 miles, and considerable facilities are furnished by electric railways that extend into rural districts from the larger cities. The principal railroads within the State are the Illinois Central, the Southern, the Louisville and Nashville, and the Nashville, Chattanooga and Saint Louis. Among the exports from the State are coal, tobacco, lumber, iron and steel products flour, and cereals. Nashville, Memphis, Chattanooga, and Knoxville are the leading commercial, railway, and manufacturing centers.

GOVERNMENT. The present State constitution was adopted in 1870. It vests the chief executive power in the Governor, elected for two years by the people. The secretary of State and the treasurer and comptroller of the treasury are elected by the Legislature, the former for four and the latter for two years, while the attorney general is appointed for six years by the judges of the supreme court. Educational work is supervised by the superintendent of public instruction, who is appointed by the Governor for two years and is confirmed by the senate. Five judges constitute the supreme court, and the term of service is eight years. The State is divided into circuit, chancery, and other court districts, and judges of these courts are elected by the people. Local government is administered in the counties, municipalities, and townships.

EDUCATION. A constant growth in educational work has been realized the past quarter of a century. In the decade from 1890 until 1900 the rate of illiteracy was reduced from 38.7 to 20.7 per cent. This wholesome, progressive development has continued to increase steadily. At present the illiteracy among native white people is 14.2 per cent. and among the colored inhabitants it is 41.6 per cent. The system of public schools is maintained by State and local aid, and the work is under the supervision of the State

superintendent of public instruction, who is nominated by the Governor and confirmed by the senate. In 1907 the Legislature passed a law which makes the county the unit of school organization instead of the school district. A board of five members has general charge of the schools in each county. This board is presided over by the county superintendent, who is the ex officio secretary, and the effect has been to increase the salary of teachers, consolidate many of the schools, and extend the length of the term. The State has about forty high schools of the first class and many graded schools, but the system provides for separate instruction for white and colored pupils. Normal instruction is given at the Peabody College for Teachers, at Nashville, and a number of other institutions.

The University of Tennessee, situated at Knoxville, is at the head of the educational system. Other institutions of higher learning include the Fisk University, Nashville; the Grant University, Athens; the Vanderbilt University, Nashville; the Maryville College, Maryville; the University of the South, Sewanee; the University of Nashville, Nashville; the Burritt College, Spencer; the Southwestern Baptist University, Jackson; and the Christian Brothers' College, Memphis. The State institutions are subject to investigation by a board of charities, which is appointed by the chief executive. Three hospitals for the insane are maintained, being located respectively near Bolivar, Knoxville, and Nashville. Knoxville has a school for the deaf and Nashville has institutions for the blind and for teaching the industries. A Confederate soldiers' home is situated near Nashville. The principal prison is likewise near Nashville. Many of the prisoners are required to work in the mines.

INHABITANTS. The population is about fifty to the square mile, and only 17,746 are of foreign birth. Nashville, on the Cumberland River, is the capital and Memphis is the largest city. Other important cities include Knoxville, Chattanooga, Jackson, Clarksville, Columbia, Johnson City, Murfreesboro, Union City, and Bristol. In 1900 the State had a population of 2,020,616. This number included 480,430 colored inhabitants, of which 108 were Indians and 480,223 Negroes. Population, 1910, 2,184,789.

HISTORY. The region occupied by Tennessee was first visited by De Soto, but settlements were not made until 1754, though these were destroyed by the Indians. In 1756 the first permanent settlement was founded on the Tennessee River, about thirty miles from Knoxville. Tennessee originally belonged to North Carolina and when that State proposed to surrender the territory to the United States, the settlers protested and or-

ganized a government known as the State of Franklin. This form of government continued from 1785 until 1789, when the region was ceded to the United States, and in the following year the Territory of Tennessee was established. It was admitted as a State in 1796, with the capital at Knoxville, whence it was removed to Nashville in 1802. In 1861 it joined the Southern Confederacy. However, the sentiment as to the war was divided, 31,000 of its citizens joining the Federal and 125,000 the Confederate forces. Many of the severe battles of the Civil War were fought within the boundaries of the State, including those of Murfreesboro, Lookout Mountain, Chickamauga, Island No. 10, and Nashville.

After the close of the war, in 1866, the State was readmitted to the Union, but much disorder prevailed for some time. In 1869 the Ku-Klux Klan caused some disturbances and several counties were placed under martial law. Subsequently much progress was made in the industrial and commercial developments. Prohibition was made an issue in 1908 and in the same year the Standard Oil Company was prohibited from doing business in the State. The general tendency of legislation has been toward progress in education and industrial enterprises.

TENNESSEE, a river of the United States, which is formed in eastern Tennessee, by the junction of the Holston and Clinch rivers, two streams rising in the southwestern part of Virginia. The course at first is toward the southwest, into northern Alabama, where it makes a bold turn toward the northwest and flows through Tennessee into Kentucky, entering the Ohio River at Paducah, Ky. The Tennessee is navigable for steamers to Florence, 258 miles, where a canal 35 miles long passes the Mussel-Shoal Rapids, whence boats ascend 250 miles farther up the stream. The entire length from the source of the Holston is 1,175 miles, and from the junction of the Holston and Clinch rivers it is 800 miles to its mouth. It receives the Duck, Flint, Big Sandy, and Hiawassee rivers.

TENNESSEE, University of, an educational institution at Knoxville, Tenn., founded as Blount College in 1794. The name was changed to East Tennessee College in 1807, and it was reorganized in 1840 as the East Tennessee University. In 1879 the present name was adopted. Besides the university proper, it comprises the college of agriculture and mechanic arts. The departments in the college include engineering, agriculture, a literary division, and an industrial department for colored students. The university maintains courses in law, engineering, medicine,

dentistry, and general academic work. The departments of medicine and dentistry are located at Nashville. A system of university extension work is carried on by means of conventions and institutes. The library has 20,000 volumes and the value of the property is placed at \$500,000. About 800 students attend the institution.

TENNIS, a game of ball played in a court by two persons, or by four persons divided as partners. The court usually is 96 feet long by 33 wide, inclosed with a wall sufficiently high to prevent the loss of balls by ordinary strokes. The ball is struck with a bat, called a *racket*, whose striking part is covered with a close, hard network of animal tendon. In tennis the persons strike the ball alternately, with the object of keeping it in motion as long as possible without falling to the ground. The same game is sometimes played without a bat, when the ball is struck with the palm of the hand, and is called hand tennis, or fives. *Hand tennis* is played to some extent in Great Britain and the United States, but the racket, or racquet, is used more commonly in France and Germany.

TENT, a dwelling made of canvas, felt, or the skins of animals. These materials are usually stretched upon cords or light frames, and are supported by poles set in the ground. Tents are the chief habitations of the nomadic tribes, like those of Arabia, Persia, and Turkestan. The children of Israel lived in tents for forty years while on their journey from Egypt to Palestine. The tents of the Saracens were not known to the nations of Europe until the time of the Crusades, and at that time they found many splendid tent habitations decorated with fine linen and costly furs. Marco Polo found the tents of the Khan of Tartary fitted with the richest skins brought from distant northern countries, such as the ermine of Siberia. The barbarous and wandering tribes of modern times continue to use tents as their chief dependence for shelter.

Tents are used extensively among the civilized nations, especially in military affairs and in exploring campaigns. In warm and dry climates they furnish shelter from the sun and are constructed in the form of an umbrella, with an open space all around for the circulation of the air. Those used in the colder countries are usually made of heavy duck, which is mounted on wooden frames and secured to the ground by pins or pegs. During the winter a double covering is used, the outer of these being an overlapping flap, and in this way they are comfortable even in very cold and damp weather. Tents of large size are employed in giving exhibitions and for Chautauqua purposes. These have a separate canvas for the walls, which are circular

in form, and the roof is supported on heavy poles by means of ropes.

TENURE OF OFFICE, the duration or term of an official position, as well as the manner of holding it. Several important acts relating to this subject were passed by the Congress of the United States, though these refer more particularly to those filled by appointment of the President with the consent of the Senate. Prior to 1820 no term of office was provided for any inferior officer, except United States marshals, but in that year a bill was passed providing that a large number of officials are to be appointed for terms of four years. The bill which requires that certain postmasters be appointed by the President for four years and confirmed by the Senate, subject to removal at the pleasure of the President, was passed in 1836. Various offices have since been given the same term. In 1867 the Tenure of Office Act was passed, and was amended in 1869. It provided that no officer subject to confirmation by the Senate should be removed without the consent of that body, except during a recess, when the President might remove such an officer and appoint a successor until the next session of the Senate. This series of legislation paved the way for the so-called *spoils system*, which resulted in appointment being made from political motives rather than efficiency. A contest between President Cleveland and the Senate caused the law to be repealed in 1887.

TEPIC (tă-pĕk'), a city in Mexico, capital of the territory of Tepic, 25 miles east of the port of San Blas. It has railway facilities, a mild and healthful climate, and a growing trade. The place is popular as a summer resort. The manufactures include cotton textiles, cigars, and clothing. It was founded in 1531. Population, 1906, 18,148.

TERCEIRA (tĕr-să'ĕ-ră), one of the Azores, the second largest island of the group, about 50 miles northeast of Pico. The area is 163 square miles. It has steep and rocky coasts and the surface is mountainous. Several of the summits are volcanic. Caldeira de Santa Barbara, height 3,500 feet, is the highest summit. Fertile lands are located in many parts of the island and fine pasturage is abundant. The products include wheat, corn, wine, lumber, and live stock. Angra, on the southeastern coast, is the seat of local government. A large number of the inhabitants were Portuguese. Population, 1906, 49,426.

TERMITES (tĕr'mīts), or **White Ants**, a class of insects confined chiefly to the tropics. They resemble in their mode of life the true ants, but belong to a different order. Most spe-

cies make their nests on the ground, but some build their dwellings among the branches of trees. Those making their nests on the ground construct them in the form of a cone, often 10 to 25 feet high, and these are divided into apartments, such as galleries, magazines, and chambers. Five classes of termites dwell in a single cone, including the males, females, neuters, soldiers, and workers. Soldiers, neuters, and workers appear to be imperfectly developed females. The males and perfect females have four large wings, but the principal part of the community is made up of workers, which are wingless. Mature males and females swarm into the air shortly after reaching maturity, when they lose their wings and become the so-called kings and queens of future generations.

The queen has a greatly extended abdomen, which contains the eggs, and these it drops pro-



TERMITES AND THEIR NESTS.

miscuously, to be carried by the workers into the different apartments. Other duties of the workers are to build the habitations, construct covered roads, minister to the wants of the young and the king and queen, and stimulate the exit of mature winged insects. The soldiers have a

large, square head, with projecting mandibles, and their duty is to defend the community, which they do with singular courage. Termites feed largely on branches of trees and dry wood, which constitute their principal diet, but also on other vegetable forms. They are found in considerable numbers in Western Africa and the warmer regions of America, and in many places their buildings are constructed to form villages of numerous conical dwellings. The male has a painful though harmless bite. Ants and birds destroy large numbers of termites, and in some places they are prized as human food.

TERN, a genus of gull-like birds which have the bill pointed and somewhat longer than the head. The wings are long, the tail is forked, and the plumage is chiefly white. They are smaller than most gulls, but are almost constantly on the wing, usually flying near the surface of the water in search of fish and other animal forms, upon which they feed. About fifteen species of terns are native to North America, including the royal tern, least tern, and Forester's tern. The royal tern frequents the Atlantic coast of North America. It is twenty inches long and has an alar extent of nearly fifty inches. Species of terns occur in Europe and Africa. Many of them are birds of passage and in the summer season reach high latitudes, both in the Northern and Southern hemispheres.

TERRACE (tĕr'rās), the name applied to a level tract of land bordering on a body of water, but elevated some distance above the surface. Terraces are found on the border of many rivers and lakes, and in many places occur near the ocean. They sometimes consist of a series of level tracts that rise above each other with the increase of the distance from the shore. The terraces that border rivers are explained by the action of the water at different periods. At an early date the streams were wider, when the flood plains were cut down, and successive terraces were formed as the channels narrowed and deepened from time to time, hence the older and higher elevations are removed farthest from the stream. Lake terraces may be traced to a shrinkage in the volume of the water, which is evidenced by the fact that they are usually well marked on several sides of the lake basin. Lake Champlain, the Great Lakes, and the sheets of water in the Great Basin have terraces due to this cause. These tracts are usually fertile and suitable for cultivation,

though there are exceptions in the arid and desert regions.

TERRA COTTA (tĕr'ra kŏt'tà), an Italian term meaning *baked clay*. It is commonly applied to a species of hard pottery much used in statuary, vases, and building ornamentation. Terra cotta was employed by the ancients in the construction of figures and architectural ornamentations, and many well-preserved and artistically beautiful specimens of works in terra cotta have been recovered from the sites of ancient cities. Some of the finest specimens belong to the period of Greek art, probably about 450 B. C., and others to even earlier periods. Fine productions were not limited to Greece, but beautiful specimens have been exhumed from the cities of ancient Phoenicia, Babylonia, Assyria, and Rome.

In the 15th century terra cotta was adapted in many parts of Europe to the most artistic and elaborate architectural purposes, as is still evidenced by the fine churches of Saint Catharine, in Brandenburg; Saint Stephen, in Tanger Munde; and Saint Maria, in Milan. It continued a popular material until the 18th century, when it became more uncommon, but its use has been revived to a large extent within the past 25 years. Fine powdered silica and potter's clay constitute the principal ingredients of terra cotta as made as present. Many beautiful color effects are obtained, the most pleasing being a cream color and a rich red. It is possible to enamel or glaze in white and colors, this work being done in a manner similar to tile glazing.

TERRA DEL FUEGO. See **Tierra del Fuego**.

TERRAPIN (tĕr'ra-pĭn). See **Tortoise**.

TERRE HAUTE (tĕr're hŏt), a city in Indiana, county seat of Vigo County, on the Wabash River, 72 miles southwest of Indianapolis. Communication is furnished by the Terre Haute and Indianapolis, the Evansville and Terre Haute, the Cleveland, Cincinnati, Chicago and Saint Louis, and other railroads. It is surrounded by a fertile agricultural and mining country. The city has an attractive appearance, being located on an elevated plateau, and has broad and beautifully improved streets. Among the principal buildings are the county courthouse, the State normal school, the Providence Hospital, the Rose Polytechnic Institute, the Coates College, and the Saint Mary's Seminary. Other features include the Federal customhouse, the public library, and Deming and Collett parks.

Terre Haute has a large trade in coal, grain, live stock, and merchandise. Among the manufactures are nails, flour, hardware, machinery, farming implements, packed meat, railway cars, and clothing. The streets are well lighted by

gas and electric lights and beautified by avenues of trees. It has water and sewerage systems, an extensive line of street railways, and brick, asphalt, and macadam pavements. A bridge across the Wabash River gives the city connection with the west side. Terre Haute was settled in 1816 and chartered as a city in 1833. Population, 1900, 36,673; in 1910, 58,157.

TERRELL (tĕr'rĕl), a city of Texas, in Kaufman County, 30 miles east of Dallas, on the Texas Midland and the Texas and Pacific railroads. The surrounding country is fertile, producing cereals, cotton, and fruits. It is important as a market for live stock, farm produce, and merchandise. Among the manufactures are flour, leather, clothing, machinery, cotton and woolen goods, cigars, and earthenware. Electric lighting, sewerage, and several fine school and church buildings are among the general improvements. It is the seat of the North Texas Hospital for the Insane. The place was so named from Robert Terrell, who settled here in 1872. Population, 1900, 6,330; in 1910, 7,050.

TERRIER (tĕr'rĭ-ĕr), the name of a species of the domestic dog, so called from its courage in attacking small animals both above and under the ground. It pursues rats, badgers, cats, and foxes by digging into the earth. The *Scotch terrier* is a well-known breed and is distinguished by its dark eyes, prick ears, and rough-coated body. It is either black, reddish brown, or red and black, and weighs from fifteen to twenty pounds. The *bull terrier* is a breed crossed with the bulldog and is especially noted for its infinite courage. A large dog with straight hair of a black-and-tanned color is known as the *Welsh terrier*, and a yellow species with wire-hair is called the *Irish terrier*. The *skye terrier*, a species of the Scotch terrier, is prized for its long, silky coats. Several breeds of these dogs are called *fox terrier* and are distinguished by their gay and lively disposition, black and tapering nose, and fox-shaped ears. Other breeds include the *Boston terrier* and the *Clydesdale*, the *Yorkshire*, and the *Maltese terriers*.

TERRITORY (tĕr'rĭ-tŏ-rĭ), the term applied in various countries to certain portions of the public lands that are under the direct control of the national legislature, which have not been organized into a state or a province. The territorial form of government is usually maintained until the territory has developed sufficiently in wealth and population to entitle it to admission into the federation or union of states or provinces. In the United States the term is applied to any tract under the Federal government, and, after attaining sufficient population, it may

adopt a constitution and be admitted into the Union on the approval of Congress. The term is used in a similar way in Canada and the republics of South America. Australia has one Territory, known as the Northern Territory, which is governed by the State of South Australia.

TERROR, Reign of. See **French Revolution.**

TERTIARY PERIOD (tēr'shī-ā-rĭ), or **Cenozoic Era**, the division of geologic time that preceded the Quaternary era and followed the Mesozoic era. Geologists divide the rock system of this division into five periods, and sometimes they use the term Cenozoic to embrace both the Tertiary and the Mesozoic. During the Tertiary period violent changes took place on the exterior of the earth. The surface was largely above the sea, and within that time large portions of the Rocky Mountains, the Andes, and the Himalayas were formed. Owing to the surface of the earth being elevated in many localities, the age of ice, known as the Glacial period, took place in the temperate zones. Within the period many changes were wrought in the animals, both upon land and in the sea. Prior to this time great reptiles were common, and they were succeeded by gigantic mammals. See **Geology.**

TEST OATH, the oath required under various acts of the Parliament of England, administered in connection with certain religious tests imposed upon persons who held public office. The first legislation of this kind was passed in the 17th century, and subsequent acts to secure the establishment of the Protestant faith were enacted at different times. Most important of these were the Corporation Act of 1661 and the Test Act of 1673. The former provided that all magistrates were to receive the communion according to the Church of England, after taking the oaths of allegiance and supremacy. This test was further strengthened by the law of 1673, which made it obligatory upon those who passed the ordeal to renounce the doctrine that arms may be taken up against the king. After making numerous modifications, the statutes were repealed in 1828. A form of test by oaths was imposed in the United States after the Civil War, both by State and Federal legislation, but it was held to be unconstitutional.

TETANUS (tēt'ā-nŭs), or **Lockjaw**, a disease characterized by painful and protracted contraction of a number of voluntary muscles. It is spasmodic in character and attacks sometimes succeed each other at intervals for several days or even weeks. Sometimes the muscular contraction is so intense that the lower jaw is

held firmly against the upper jaw, frequently so strongly that they cannot be separated. The chief causes are injuries, intestinal worms, excessive wet and cold, and the presence of a bacterium in a wound. It affects both man and animals and violent cases are frequently fatal. Horses and sheep are more liable to it than other domestic animals.

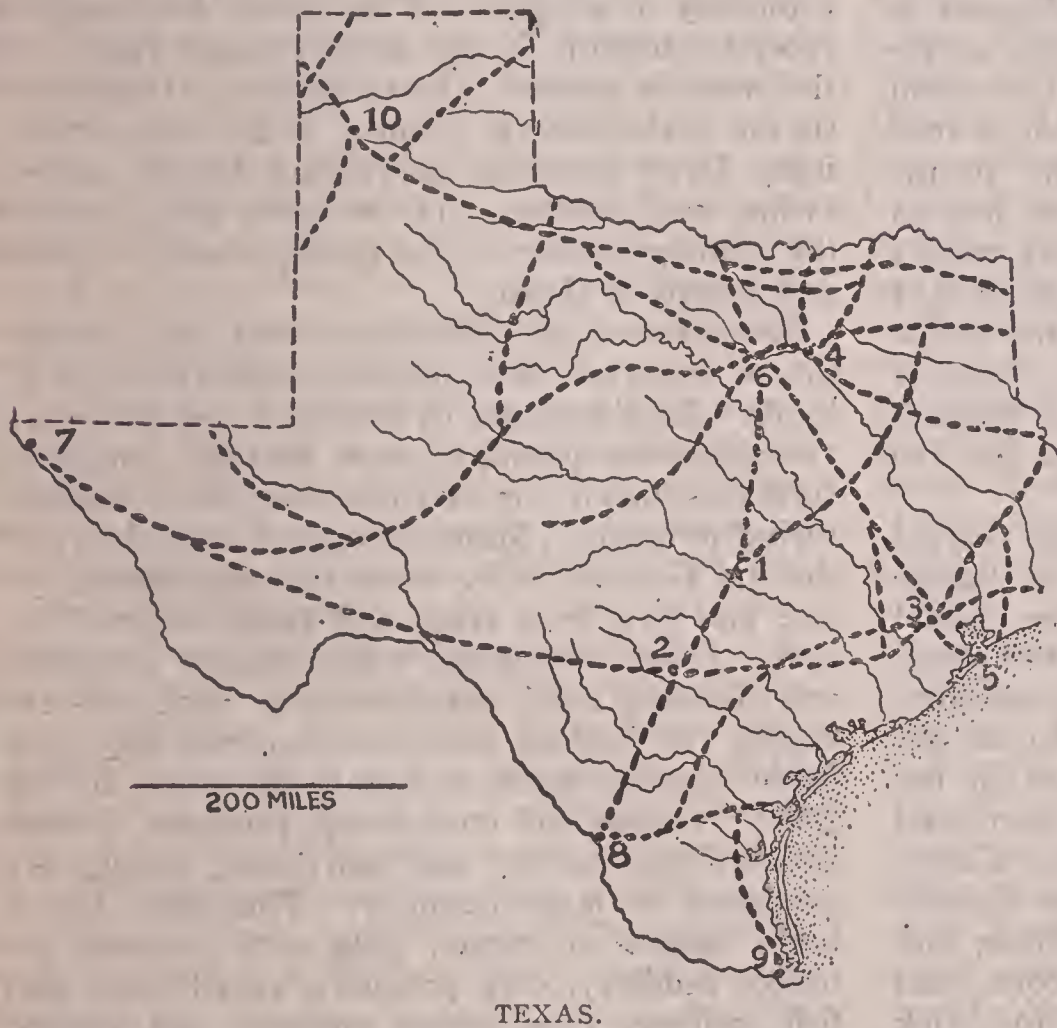
TEUTONIC KNIGHTS (tŭ-tŏn'ĭk nĭtz), a powerful military and religious order which originated at the time of the Crusades. It was founded by citizens of Bremen and Lübeck for the purpose of aiding the soldiers who suffered during the siege of Acre, in 1190, and Frederick Barbarossa of Germany raised it to an order of knighthood. The grand master first dwelt at Jerusalem, but when Palestine fell into the hands of the Turks he removed to Venice, and later the headquarters were established in Germany. During the 15th century the order became very powerful and many eminent men of Europe, including Henry IV. of England, fought under its banner. It continued until 1809, when it was dissolved by Napoleon. The order was revived by the Emperor of Austria, in 1840, and it now has a large membership in that country.

TEUTONS (tŭ'tŏnz), a tribe of Germans which inhabited the regions near the Baltic Sea, east of the Elbe. In 103 B. C. the Teutons joined the Cimbri to invade Gaul, where they successively destroyed three Roman armies. Soon after they proceeded to invade Italy, but were defeated with great loss by Marius in 102 B. C., in the region occupied by the French department of Vouches de Rhone. The name Teuton was ultimately applied to the Germanic people of Europe and is now used to denote Germans, Dutch, Scandinavians, and those of Anglo-Saxon descent, as opposed to the Celts. The Teutonic languages belong to the Aryan family and include three groups: the Low German, High German, and Scandinavian. The Low German dialects include the Gothic, Friesian, Flemish, Dutch, and English tongues; the High German tongues embrace the Old High German of the 7th to the 11th century, the Middle High German of the 12th to the 15th century, and the Modern High German; and the Scandinavian languages include the Swedish, Icelandic, Norwegian, and Danish tongues.

TEXARKANA (tĕks-ār-kän'ā), a city on the boundary line of Arkansas and Texas, being the county seat of Miller County, Arkansas, and situated partly in Bowie County, Texas. It is on the Saint Louis, Iron Mountain and Southern, the Kansas City Southern, the Texas Pacific, and other railroads. The surrounding country is a fertile agricultural region. The

noteworthy buildings include the county courthouse, the post office, the Saint Agnes Academy, the Y. M. C. A. building, the Texarkana Industrial College, and many schools and churches. Among the manufactures are cotton goods, cotton-seed oil, railroad cars, ice, tobacco products, machinery, and farming implements. It has systems of waterworks, sanitary sewerage, and public lighting. The trade is large in produce, lumber, cotton, and merchandise. A settlement was made in the vicinity in 1873 and both towns were chartered as cities in 1887. The census of 1910 credits a population of 9,790 to the portion in Texas and 5,655 to the portion in Arkansas; total, 15,445.

TEXAS (tĕks'as), a southwestern State of the United States, the largest in the Union, popularly called the *Lone Star State*. It is bounded



1, Austin; 2, San Antonio; 3, Houston; 4, Dallas; 5, Galveston; 6, Fort Worth; 7, El Paso; 8, Laredo; 9, Brownsville; 10, Amarillo. Chief railroads shown by dotted lines.

on the north by New Mexico, Oklahoma, and Arkansas; east by Arkansas, Louisiana, and the Gulf of Mexico; south by the Gulf of Mexico and Mexico; and west by Mexico and New Mexico. The greatest length from east to west is about 875 miles and the greatest width is 745 miles. It is in the form of an irregular triangle, the apex extending south, and a square known as the *Pan Handle* lying toward the north. The area is 265,780 square miles, of which 3,490 square miles are water surface.

DESCRIPTION. The coast line has a length of 372 miles along the Gulf of Mexico, being in the form of a crescent, and the shores are indented by numerous bays. Among the inlets are Sabine Pass and the bays of Galveston, Matagorda, San Antonio, and Corpus Christi. A number of islands of more or less importance lie near the shore, including Galveston, Matagorda, Mustang, Padre, and Saint Joseph. Padre Island is a narrow stretch of land extending from near the mouth of the Rio Grande toward the north, having a length of about 100 miles and forming the extremely salty Bay of Laguna de Madre. Farther north the lagoons extend inland as irregular bays and estuaries and are lined by marshy shores or high bluffs.

Texas has an exceedingly varied surface, the coast region being low and marshy, whence the surface rises gradually toward the northwest. A belt known as the Black Prairie extends along the Gulf. This region is about 100 miles wide in the north and south, but it is somewhat narrower in the central part. Near the Gulf the elevation is not only a few feet above the level of the water, but it rises gradually toward the inland, attaining a height of about 500 feet at a distance of 150 miles inland. This section is very level, but it merges into a gently undulating plain. In the eastern part it is covered by extensive forests, and toward the northwest is the Grand Prairie, a plateau of great fertility. The Staked Plains, or Llano Estacado, a region quite arid and treeless, occupies the western part. Between the Pecos and the Rio Grande are the Guadalupe, Eagle, and other mountains. In this region the general elevation ranges from 3,000 to 9,000 feet above the sea. Among the principal summits are Eagle Mountain, 7,000 feet, and Guadalupe Peak, 9,000 feet. The general altitude of the Staked Plains and the

Pan Handle ranges from 2,700 to 4,000 feet. Most of the State has an undulating surface and a fertile soil, but denuded and sandy tracts lie in the western part, where deep canyons have been cut into the plains by excessive rains in former periods.

The drainage is exclusively into the Gulf of Mexico, and the rivers have a general course toward the southeast. All of the boundary with Mexico is formed by the Rio Grande, which receives the inflow of the Pecos, its largest trib-

utary. These rivers and the Canadian, which flows through the northern part, rise in the Rocky Mountains. All the other streams rise within the State, including the Red River, which forms the greater part of the boundary with Oklahoma, while a part of the Louisiana border is formed by the Sabine River. Among the principal rivers within the State are the Neches, Trinity, Brazos, Colorado, Guadalupe, San Antonio, and Nueces. These streams flow chiefly into inlets from the Gulf, and a number are navigable during high water for considerable distances, but bars somewhat obstruct their mouths.

CLIMATE. The climate varies greatly with location in latitude and is noticeably affected by differences in altitude. As a whole the climate is drier than that of the other Gulf States. In January the mean temperature at Galveston is 45° and at Amarillo it is 40°, and the corresponding figures for July are 84° at Galveston and 76° at Amarillo. The freezing point is very seldom reached on the coast, but in the northwest the temperature sometimes falls as low as zero. On the coast the maximum heat ranges from 90° to 95° and in the western highlands it approximates 100°. Rainfall is abundant in the coast region and the central part, where it ranges from 30 to 50 inches, but in the western part it is scant, being about 10 inches at El Paso and 22 inches at Amarillo.

MINING. Texas has extensive and varied products of minerals. Large fields of lignite and bituminous coal are found, and the annual output now proximates about 2,250,000 tons. Phosphate rock is obtained in large quantities. Extensive fields of petroleum and natural gas occur in the valley of the Sabine and in the vicinity of Beaumont. Copper, pig iron, and gypsum are obtained in large quantities. Cinnabar is found in deposits along the Rio Grande and in the southwestern part of the State, and extensive beds of salt, granite, limestone, and sandstone are worked. Clays suitable for brick and pottery are abundant. Other minerals include silver, mineral waters, and asphalt.

AGRICULTURE. Texas is one of the chief agricultural states of the Union, having a favorable climate and a large area of productive land. About 75 per cent. of the total surface is included in ranches and farms, which average 357 acres. In the aggregate value of farm products the State takes fifth rank, but crop raising is confined chiefly to the central and eastern parts, though large areas in the northwestern section have been improved for farming within the last few years. Corn and cotton are raised on larger areas than all other crops combined, and the

acreage of each approximates about 6,650,000 acres. Wheat takes rank as the third crop in acreage, but it is closely followed by hay and oats. Other important crops include dry peas, sweet potatoes, Kaffir corn, sorghum and sugar cane, potatoes, peanuts, tobacco, and rice. Large areas of the lowlands along the coasts are devoted to the culture of rice and sugar cane. Kaffir corn, millet, oats, and wheat are important crops in the northwest. The most valuable lands lie immediately between the coastal region and the drier belt of the west and northwest. Fruits of all kinds are grown with profit, and some sections are especially valuable for raising oranges, lemons, bananas, vegetables, and small fruits.

While dairying is an important industry, cattle raising is chiefly for meat. Live stock is grown profitably in all parts of the State, but receives special attention in the great grazing region of the western section. In the number of beef cattle the State holds first rank. It has correspondingly large interests in rearing horses, sheep, swine, and poultry. Texas takes first rank in the number of horses and cattle, second in swine, and fourth in sheep.

MANUFACTURES. The State has vast quantities of materials to stimulate manufactures of all kinds. An abundance of timber in the east, such as oak, cedar, pecan, cypress, hickory, and pine, furnishes much for construction and manufacturing purposes. Many species of cacti thrive in the Rio Grande valley, some of which attain the size and height of trees and yield material for fuel. Flour and grist, coke, lumber products, and foundry and machine-shop products are among the leading manufactures, and these are made entirely from materials produced in the State. Cotton and cotton-seed products, tanned and finished leather, and spirituous liquors are produced in large quantity. The State has a large output of cigars, plug and smoking tobacco, saddlery, clay products, cured meat and fish, railway cars, steam engines, and canned fruits and vegetables.

COMMERCE AND TRANSPORTATION. The domestic and foreign trade is extensive. Local shipments are carried by steamboats along the coast and inland by numerous railways. Wool, live stock, cotton, lumber, fruits, vegetables, and tobacco products are exported. Galveston, Corpus Christi, Brazos de Santiago, Saluria, and Paso del Norte are the chief ports. Galveston takes rank as the second largest port on the Gulf.

The lines of railways have a length of 10,950 miles. The west central part is partly without railroad facilities, but all other sections are supplied with numerous trunk and branch lines.

Among the principal railroads are the Texas Pacific, the Kansas City Southern, the Southern Pacific, the Chicago, Rock Island and Pacific, the Missouri, Kansas and Texas, the Saint Louis and Southwestern, the Atchison, Topeka and Santa Fé, the International and Great Northern, and a number of others. Electric lines are operated in the larger cities and many interurban and rural districts. Much has been done to improve the highways by grading and the construction of bridges.

GOVERNMENT. The present constitution was adopted in 1875. It vests the chief authority in the governor, lieutenant governor, comptroller, treasurer, attorney-general, commissioner of the general land office, and superintendent of public instruction, all elected for two years. Three railroad commissioners are elected for three years. Several State officials are appointed by the Governor, including the adjutant general, the secretary of State, and a number of others. The supreme court consists of a chief justice and two assistant justices, each elected for six years. In addition there are a court of criminal appeals, five courts of civil appeals, district courts, county courts, and justices of the peace. Local government is administered by the counties, municipalities, and townships.

EDUCATION. Based upon the total population, the rate of illiteracy is 14.3 per cent., but among whites it is 6.1 and among blacks it is 36 per cent. A large State endowment is available for the support of the public schools, which, together with local school taxes, places the educational work on a very satisfactory basis. Elementary schools are maintained in the rural districts, while the towns and cities have well-organized secondary and high schools. Much progress has been made in establishing kindergarten and manual training work in the larger cities. The general supervision of the schools is vested in the State superintendent of public instruction, who is aided by a board of education, and separate schools are maintained for white and colored children. Normal schools for whites are maintained by the State at Huntsville, San Marcos, and Denton. At Prairie View, near Hempstead, is a normal school for Negroes. Summer schools are supported for training teachers. These institutions are in session a term of about four weeks and have an attendance of more than 6,000.

The University of Texas, located at Austin, is at the head of public instruction. Bryan has the Agricultural and Medical College and Galveston has the medical branch of the University of Texas. Many private schools and institutions of higher learning are in a flourishing condition.

These include the Polytechnic College, Fort Worth; the Texas Christian University, Hermosa; the Evangelical Lutheran College, Brenham; the Southwestern University, Georgetown; the Baylor University, Waco; the Henry College, Campbell; the Fort Worth University, Fort Worth; the Saint Edward's College, Austin; and the Trinity University, Tehuacana. Austin, Terrell, and San Antonio have asylums for the insane; Austin has a school for the deaf and dumb; and institutions for the blind, both for white and colored youth, are maintained at Austin. Corsicana has an orphans' home and Austin has the Confederate Soldiers' Home. Penitentiaries are located at Huntsville and Rusk, and a reformatory for penal offenders is situated at Gatesville.

INHABITANTS. The average density is about twelve persons to the square mile. It has a larger immigration than any other State in the South, and the foreign-born inhabitants number 179,357. The Baptist denomination has the largest membership. Other religious bodies strongly represented include the Methodists, Christians, Presbyterians, Roman Catholics, Episcopalians, and Lutherans. Austin, on the Colorado River, is the capital. Other cities of importance include San Antonio, Houston, Dallas, Galveston, Fort Worth, Waco, El Paso, Laredo, Denison, Sherman, Marshall, Taylor, Gainesville, Corsicana, Brownsville, Palestine, Brenham, Corpus Christi, and Greenville. In 1900 it had a population of 3,048,710, hence takes rank as the most populous State in the South. This number included a colored population of 622,041, of which 470 were Indians, 836 Chinese, and 620,722 Negroes. Population, 1910, 3,896,542.

HISTORY. Texas was originally a part of the Spanish possessions in America. It was explored by Cabeza de Vaca in 1528 and first settled by La Salle in 1685, on the Lobaca River, where Fort Saint Louis was founded. Many severe and extended contests with the Indians occurred to interfere with rapid development. In 1820 the eastern boundary of Texas was settled in a treaty with Spain and at the same time American colonists were invited to make settlements within the region. Representatives of 20,000 settlers met at a State convention in 1833 and adopted a constitution, but Santa Anna, President of Mexico, refused to recognize it as a State, preferring to establish several departments. He accordingly invaded Texas with a large army, but was defeated by General Houston, in 1836, in the Battle of San Jacinto. The people had already declared the independence of Texas and, after adopting a constitution, elected General Houston president. The new govern-

ment was recognized as independent by the United States, Belgium, France, and England in 1837, but a large majority of the people favored annexation to the United States. Both houses of Congress passed a joint resolution annexing Texas on Dec. 29, 1845.

The policy of the United States and the dispute over the western boundary of Texas caused the Mexican War, which terminated with the Treaty of Guadalupe Hidalgo. In 1850 all the previously Mexican territory lying outside the present limits of the State was ceded to the United States in consideration of the payment of \$10,000,000. An ordinance of secession was passed Feb. 1, 1861, but Texas was restored to the Union on March 30, 1870. The Federal policy of reconstruction caused the State to become in debt to the extent of several million dollars. However, the growth in wealth and population since the war has been phenomenal, and there are yet many opportunities for young men to find fields for the development of lucrative industrial enterprises.

TEXAS, University of, an educational institution at Austin, Tex., founded by an act of the Legislature in 1876. It was open for instruction in 1883, when it received an additional grant of land from the State. It embraces the departments of literature and science, civil engineering and mining, law, electricity and mechanical engineering, and medicine, the last mentioned being located at Galveston. The university conducts a line of summer school work. It has a library of 50,000 volumes and endowments of \$1,500,000. The attendance averages 1,450 students.

THALER (tä'lēr), a monetary coin first made in Bohemia in 1519, where it was known as *Joachimsthaler*. It was so named from Joachimsthal, the town in which it was first made. This coin was the unit of value in Germany until 1873, when it was superseded by the mark. A small quantity of these coins are still in circulation, valued at about seventy-one cents, or three marks.

THALIA (thá-lí'á), in Greek mythology, one of the nine Muses. She presided over comedy and idyllic poetry. In statuary she is represented with the comic mask, a wreath of ivy, and the shepherd's staff.

THALLIUM (thäl'lī-ŭm), a soft, white, crystalline metal occurring in small quantities, used in alloys and glassmaking. It is slightly heavier but softer than lead. Thallium has a specific gravity of 11.9, its salts are exceedingly poisonous, and it imparts a green color to a flame. Crookes discovered this metal in 1861 by the use of the spectrum, while inspecting deposits accumulated in a sulphuric acid factory.

Small quantities of thallium occur in iron pyrites, and it is obtained from the dust which collects in the flues of sulphuric acid works when these pyrites are burned for the production of sulphur dioxide. It is found in native sulphur and with copper. The salts of thallium are poisonous.

THAMES (tēmz), a river in England, which rises in the Cotswold Hills and, after a course of 222 miles toward the east, flows into the North Sea. The basin has an extent of 5,425 square miles. In the greater part of its course it forms the boundary line between a number of the counties of southern England. Large vessels ascend to London, 60 miles from its mouth. It is of vast commercial importance because of numerous canals that connect it with trade and manufacturing centers. Many bridges cross it at London, where extensive embankments and dock improvements are maintained. The tide is perceptible seventy miles up the river from its mouth, which is eighteen miles wide. Among the principal cities on the Thames are London, Gravesend, Greenwich, Windsor, Eton, Henley, Reading, and Oxford. Its tributaries include the Kennet, Mole, Darent, Medway, and Roding.

THAMES, Battle of the, an engagement of the War of 1812, fought at the Moravian settlement on the Thames River, in the Province of Ontario. It occurred on Oct. 5, 1813, when the Americans under General Harrison made an attack upon the British under General Proctor. The latter was aided by a force of Indians under Tecumseh, who was slain, and the British were defeated. Col. Richard M. Johnson led a famous cavalry charge against the British and it is claimed that he personally slew Tecumseh. The result of the battle was that the British lost all the advantages gained by Hull at Detroit and the confederation of Indians was broken.

THANE, the name of an ancient rank among the Anglo-Saxons, although it was first applied to the followers of kings and chieftains. Ultimately there were two classes of thanes, one known simply as thanes, and the other as king's thanes. It was possible for all to attain to the rank, which was bestowed either as a reward for valued services to the state or in recognition of those who possessed considerable property of value. The titles of thane and baron were used interchangeably after the Norman conquest, and, according to some writers, the thanes were subsequently called barons. It is probable that the inferior thanes were later termed knights and that the title of baron was extended only to the superior thanes.

THANET (thän'ět), **Isle of**, an island of England, on the northern coast of Kent, sepa-

rated from the mainland by the Stour River and its branches. It is about five miles wide and ten miles long. The area is 41 square miles. The surface is level and fertile and it has some interests in agriculture and stock raising. Ramsgate, Broadstairs, Westgate, and Margate are famous as watering places. Population, 1906, 68,450.

THANKSGIVING DAY, a festival of thanksgiving, set apart to return thanks for the harvest and mercies of the closing year, which resembles the feast of ingathering held by the Hebrews. The Pilgrim Fathers at Plymouth, in 1621, kept the earliest harvest thanksgiving in America, and in the succeeding centuries the practice was frequently repeated. In many of the colonies the governors appointed a day for rejoicing in the autumn, especially in the New England States, where thanksgiving services have been popular from the early settlements and where Thanksgiving Day still ranks as the special annual festival. Thanksgiving services were recommended by Congress for each year of the Revolutionary War, and in 1784 a special day of thanksgiving was appointed for the return of peace. After the adoption of the Constitution, in 1789, Washington appointed a thanksgiving day, while a special thanksgiving for the welfare of the nation was given in 1795, and another for the return of peace was appointed by Madison in 1815. The festival has been observed annually in New York since 1817, but its general observance in the United States dates from 1863, when Lincoln issued a proclamation recommending that the last Thursday of November be observed as Thanksgiving Day. All the succeeding presidents have regularly issued proclamations calling the attention of the nation to the observance of this festival, which ranks as a legal holiday, and the duty of observing it in a fitting manner is likewise proclaimed by the various governors, in whom alone is vested the legal authority to declare a holiday within the states.

THASOS (thä'sōs), an island in the Aegean Sea, off the coast of Macedonia. It has an area of 85 square miles. The surface is mountainous and quite barren and near the center of the island is Mount Hypsarion, height 3,428 feet. Lumber, honey, olive oil, gold, and wine are the chief products. The island was colonized by the Phoenicians at an early date and was captured by Darius in 492 B. C. It was subject to Athens for many years and later to the Romans. The Turks captured it in 1462, since which time it has been a possession of Turkey. Population, 12,150.

THEATER (thé'à-tēr), a building especially

adapted to the representation of dramatic, operatic, or spectacular performances. The theater had its beginning in Greece, where the first drama was presented in a movable vehicle about 750 years before the Christian era. Later wooden scaffolds were constructed in public places on which to give performances, but the occurrence of an accident in 500 B. C. suggested the construction of a permanent building capable of accommodating large numbers. Plans for the first noted theater were soon after completed, but the building itself was not finished until 340 B. C. In the meantime many theaters on the same model were erected in Greece and Asia Minor.

The great stone theater of Dionysus at Athens was built in an inclosure sacred to Dionysus, its auditorium being hewn in the solid rock at the southeast side of the Acropolis. All the celebrated Grecian theaters were similarly constructed, a fact evidenced by the ruins of ancient cities, but the Romans began to build them on level sites in the 1st century B. C. Some of these theaters surpassed in magnitude the finest temples, many having a capacity of 10,000 to 30,000 persons, and others even for a much larger number. The theater of Marcellus at Rome, whose external walls are still in existence, had a seating capacity of 30,000 spectators.

The theaters of Greece were semicircular, resembling the half of an amphitheater, and that part in which the chorus sang and danced was called the *orchestra*. The stage for the performers was behind the orchestra, facing the audience, and back of the stage was a permanent and finely decorated scene. The large paintings at the rear of the stage represented landscapes or buildings, as might best serve the purpose to convey a vivid impression in connection with the players and the plot of the drama. Roman theaters were similarly constructed, but the space between the stage and the audience was reserved to the senators instead of being occupied by the chorus. However, they were built on level ground instead of being hewn or cut in the side of a hill. The seats were arranged in tiers on a concentric plan and the buildings were not covered by a roof, but the portion containing the stage and chambers connected with it was usually surrounded by a portico.

Stage scenery was entirely unknown in the early period of the theater, but later it was introduced gradually, though the Romans employed stage effects of more elaboration than was the custom in Greece. Pericles made the theaters free to the public, the expense being borne by the government, and the scenes presented were of a character designed to teach the people history, poetry, oratory, and other

branches of useful knowledge. The theater declined with the decadence of Rome, and the only theatrical entertainments given during the Middle Ages consisted of the miracle plays, interludes, and mysteries, which were presented in many places in the churches and cathedrals, as well as in halls and convents. In many cities theatrical plays were acted in the open air.

The modern theater dates from the revival of classical literature in the 16th century, when the classical drama was revived. Among the first theaters of modern times is the one opened in Paris by the Confraternity of the Trinity in 1548, at which secular performances were given. The first to be erected in Italy was completed in Florence, in 1581, and one of excellent architectural design was built at Parma in 1618. In 1576 the first theater was erected in England, known as the London Theater, and about the same time were constructed the playhouses in Whitefriars, in Blackfriars, and the Curtain in Shoreditch. The playhouse in Blackfriars became famous because of being the scene of Shakespeare's plays, and the success attending them stimulated many others to write and act dramatic productions. Cardinal Richelieu built the Palais Royal in Paris in 1639, which, in the time of the Revolution, became one of the most famous theaters of Europe, being then known as the Theatre Français. France now has theaters of great beauty and artistic dignity, and the Grand Opera of Paris still ranks among the largest and finest in the world.

The first theater built in America was opened at Williamsburg, Va., in 1752, but performances in halls and other buildings date practically from the first settlements. The theaters of Germany are noted for paintings of very high artistic merit and splendid decorative effects in connection with stage scenery. Gas was first used in a Parisian theater in 1822, but electric light has gone into use in practically all the larger theaters, its effect in general lighting and for scenic flashing being the most beautiful. Theaters are controlled by national laws in most European countries, but in the United States and Canada they are regulated and licensed by the municipal corporations in which exhibits are given. The property is not only subject to general taxation, but in most towns and cities strolling companies are required to pay a license, while in some places an annual license is charged to the owner of the building. The larger theaters of North America include the Metropolitan Opera House, New York, and the Majestic and the Auditorium, Chicago. However, they are inferior to the great theaters of Europe, such as the Paris Grand Opéra, which cost \$4,000,000.

THEATINES (thē'á-tīnz), an order of monks in the Roman Catholic church. It was founded by Pope Paul IV. in 1524, who was then bishop of Theate, hence its name. Formerly it had a large membership in Spain, Portugal, and France, but at present it is represented chiefly in Italy. The main object is to oppose heretics, to reform the clergy, and to attend the sick and criminals.

THEBES (thēbz), a celebrated city of ancient Egypt, which was for centuries the capital of that country. It occupied an extensive site on both sides of the Nile, about 300 miles south of Cairo, and is thought to have been founded by Menes, the founder of the Egyptian monarchy. The river divided the city into four parts, two being on each side of the Nile. Those lying on the east bank were known as Karnak and Luxor, and those on the west bank, as Gurnah and Mendinet-Habu. The city had its greatest prosperity for the five centuries included between 1500 and 1000 B. C., and it began to decline rapidly about 800 B. C., when Memphis, the ancient capital of the Pharaohs, rose to importance as a rival city. No ancient city contains more splendid ruins than Thebes, but now only a few Arabs occupy its site, who earn their subsistence by directing tourists to the different places of interest. The Palace of Luxor and the Temple of Karnak, of which ruins still remain, occupied imposing sites on the east side of the Nile, and in front of the former were beautiful obelisks of red granite. One of these obelisks is now in Paris, in the Place de la Concorde.

Thebes was the seat of the cemeteries of the Theban monarchs, in which fine sepulchers were hewn in the rock, and from them thousands of mummies have been taken. On its site are the remains of extensive temples, palaces, and monuments. The notable statues include the one of Memnon, which is in ruin. This art product was supposed in early times to give out at sunrise a sound like the twanging of a harp string, but it is thought that the sound was made by a person concealed within. Other objects of interest include the Memnonium or temple of Rameses II., the temple and palace of Rameses III., the tomb of Sethi I., and the portico of Shishak I. Thebes was able to send forth powerful armies of charioteers, who enriched its temples and palaces with the wealth brought from Ethiopia, Arabia, and Asia Minor. It is estimated that the Persians obtained \$10,000,000 in valuable spoils at the time Cambyses plundered the city in 525 B. C., but it was not finally destroyed until about 86 B. C.

THEBES, a city of Greece, in Boeotia, thirty miles northwest of Athens. The ancient city

occupied a mountain slope between two streams and is said to have been founded in 1500 B. C. by Cadmus, after whom it was named Cadmea. This name was afterward applied only to the ancient citadel, while the enlarged city was named Thebes. Little is known of its history prior to the 6th century B. C. aside from the fact that it had an aristocratic constitution and claimed sovereignty over the other towns of Boeotia. Its relations to Athens were generally unfriendly, hence it sided with Xerxes at the time the Persians invaded Greece, but was saved from a retaliatory attack of the Athenians by the intervention of Sparta. Thebes sided with Sparta in the Peloponnesian War, but, when Sparta became the predominating influence in Greece, it gave shelter to the exiles from Athens, who were compelled to flee from their city by the oppressive rule of the Thirty Spartan Tyrants. This occasioned a prolonged war between Thebes and Sparta, but the former became victorious in 362 B. C., as a result of the heroic leadership of Epaminondas, and thus rose to the foremost political power in Greece.

However, Athens prospered and again rose to contest for supremacy, but under the leadership of Demosthenes the two cities united against Philip of Macedon. This military leader had invaded both Attica and Boeotia with a powerful army, and in 338 B. C. defeated the allied Thebans and Athenians at Chaeronea, thus crushing Grecian liberties. Thebes revolted against Alexander the Great in 335 B. C., but that general made short work of the city by slaying 6,000 Thebans and carrying 30,000 away as slaves. Cassander rebuilt the city in 315 B. C., but it was taken by Demetrius Poliorcetes in 290 B. C. and never again rose to importance. It sided against the Romans in the Mithridatic War in 86 B. C. and was plundered by Sulla. In the period between the 10th and 12th centuries Thebes became celebrated for its manufacture of silk and cloth, but was plundered by the Normans of Sicily in 1143, and when the Crusaders captured Constantinople, in 1204, it was made a fief of the feudal empire. The present town of Thebes occupies the ancient citadel of Cadmea. It is the seat of a bishopric and has a population of 3,875.

THEISS (tīs), or **Tirza**, a river in Hungary, which rises in the Carpathian Mountains and, after a course of 825 miles, joins the Danube about twenty miles above Belgrade. The source in the Carpathians is by two branches, the White Theiss and the Black Theiss, and its general upper course is toward the northwest, but it makes a bold curve in north central Hungary and flows toward the southwest, while its lower course is almost parallel to the Danube for 300

miles. The Körös and Maros are its principal tributaries. It is remarkably rich in fish and is navigable to Szolnok. The towns on its banks include Szegedin and Zenta.

THEOCRACY (thē-ōk'rá-sŷ), a form of government in which men recognize the immediate sovereignty of God and receive his revelations as civil law. The most famous example of a theocracy is that of the Israelites, to whom the law was given by God through Moses, and it continued to be the form of Hebrew government until the time of Saul. In such a government the priesthood or a class of ecclesiastics become the interpreters of the divine commands and serve as the officers both in political and ecclesiastical matters.

THEODOLITE (thē-ōd'ō-līt), an instrument used in surveying for measuring angles, both horizontal and vertical, that is, altitude and azimuth. It consists of a small telescope, which can be moved up and down, and the inclination is shown by a graduated circle called the *altitude circle*. In most instruments the telescope is so mounted that it can be twisted around a vertical axis so as to permit measuring the angular distances of objects of the north point, that is, azimuth. Various forms of construction have been followed in making these instruments, depending upon whether they are to be used in astronomical or other measurements. Railroad surveyors usually employ the transit instead of the theodolite.

THEOLOGY (thē-ōl'ō-jŷ), a term employed by classical authors to describe treatises on the nature and worship of the gods, such as Hesiod's "Works and Days" and Cicero's "Natura Deorum." It is now applied to the science which treats of God and the relations of God and man, and has special reference to the present condition and ultimate destiny of mankind. The two generally recognized divisions are *natural*, or *philosophical*, theology, which seeks a knowledge of God through the light of nature and reason, and *positive*, or *revealed*, theology, which embraces and systematizes the doctrines contained in the various books of the Bible. The theologies of all Christian churches are based chiefly on the New Testament. The earliest interpretation of the New Testament doctrines was made by the Apostolic Fathers, and later by the so-called Fathers of the Church. Doctrines were stated primarily in general terms and subsequently they were expounded by theologians, but ultimately clear and precise form was given to them by decisions promulgated through councils. *Protestant theology* had its beginning with Luther and Zwingli, who asserted their right to interpret Scripture by private

judgment. On the other hand, the theology of the Catholic churches is founded on the consensus of the fathers, on council decisions, and opinions promoted by the pontiffs. For this reason it is based less directly on individual investigations than that of the Protestants.

THEOSOPHY (thê-ôs'ô-fÿ), a term applied to a so-called sacred science. It differs from the science of philosophy and theology in that it professedly derives its knowledge of God from immediate communications with the Deity, instead of generalizing from phenomena to the being and attributes of God, as in philosophy, and instead of contenting itself with the relations of the soul to God, as in theology. Theosophy is closely related to mysticism, although the latter includes more in its scope. It dates from remote antiquity, but in its newer application arose from the organization of the Theosophical Society founded by Colonel Alcott in New York in 1875, who advocated the formation of a universal brotherhood. The tenets of modern theosophy are best set forth in "The Secret Doctrine," published by Madame Blavatsky, a Russian writer.

The theosophists teach that man possesses elements of essential divinity, but that the underlying principle of all manifestation is infinite and eternal and may be known through its spiritual and material manifestations. Throughout the universe, embracing the physical, mental, psychic, and moral planes, run a unity of consciousness and a unity of law. Some of the leading supporters of this system of thought hold that the divine principle manifests itself through occult phenomena, in which respect their tenets are somewhat allied to spiritualism. The Universal Brotherhood is an outgrowth of the Theosophical Society and was founded in New York, Jan. 13, 1898, by Katharine A. Tingley. It teaches the study of ancient and modern religion, philosophy, art, science, the divine powers in man, and the law of nature. At present the American section has 3,250 members, confined largely to the United States and Canada, and affiliated organizations are maintained in nearly all the countries of Europe.

THERAPEUTAE (thêr-â-pû'tê), an ascetic sect among the ancient Jews, sometimes closely associated with the Essenes. They had their seat near Alexandria, in Egypt, and were ardent as students of the law of Moses. In their religious work they were secluded, spending much of the time in meditation. They are described in a treatise by Philo, who credits them with observing the Sabbath and other Jewish festivals.

THERAPEUTICS, the branch of medicine which treats of the action of drugs and other

remedies upon the diseased system, or the means that may be used in assisting nature to restore health. It embraces a knowledge of the nature of diseases and the drugs or curative agents to be employed in treating them. Such knowledge is obtained by experimental investigation on animals as well as man, and the facts learned are to be considered in applying the remedies in treating the diseases common to mankind. The subject has been divided into *rational therapeutics* and *natural therapeutics*, the former having reference to the action of drugs as curative agents and the latter proposing to cure disease more particularly through natural laws. In the former the physician aims to apply remedies for their specific effect, while in the latter he supports the strength of the patient by administering food as a part of the mode of treatment. The term *electro-therapeutics* has come into use through the application of electricity in medicine. Where a physician attempts to treat the symptoms rather than the causes, the practice is said to be *symptomatic therapeutics*. Any remedy that is known to cure a disease, as quinine in the treatment of malaria, is termed a *specific*.

THERMAL SPRING (thêr'mal), the name applied to any spring whose mean annual temperature is higher than that of the locality where it is located. Thermal or hot springs range from some found in localities of a cold climate, whose temperature may be a few degrees higher than the freezing point, to those whose waters are heated to the boiling point. The causes of such springs are found in the interior heat of the earth. They usually occur in volcanic regions, where the water flows through a portion of the earth's crust that is highly heated. In many instances these springs are found in districts that are not subject to volcanic eruptions, at least not in recent geological times, and in that case they may be assigned to the heating influences of gaseous emanations from the interior of the earth. Many of the thermal springs have medicinal properties, while others yield minerals of value, such as sulphur, salt, or magnesia. Among the noted thermal springs are those of the Yellowstone National Park, Wyoming; the Rocky Mountain Park, Alberta; at Hot Springs, Ark.; and the geysers of Greenland.

THERMOELECTRICITY (thêr-mô-ê-lêk-trîs'î-tÿ), the branch of electrical science which treats of the properties and action of electricity developed by heat. If two bars of unlike metals, such as antimony and bismuth, or copper and iron, are soldered together at one end, the other end being connected by a conductor and heat being applied, an electro-motive force will be

produced and a current of electricity will flow in a certain direction through the circuit so provided. A current of electricity will likewise be produced if the soldered end be cooled, but it will flow in an opposite direction. In practice, the face of the pile, as a number of thermoelectric couples thus formed are called, is turned toward the source of heat, such as a polarized beam from an electric lantern. A galvanometer is then placed in the circuit of the pile and equilibrated. Any increase or diminution of the temperature in the beam is at once shown by the movement of the galvanometer needle. Currents of electricity produced by a thermopile, or battery, will continue to flow as long as there is any difference of temperature between the opposite ends of the bar. While a single couple, or cell, as the simple arrangement is called, will produce a weak electric current, considerable force may be developed by a thermoelectric pile, or battery.

THERMOGRAPH (thēr'mō-gráf), an instrument for automatically recording variations of temperature. It consists essentially of some form of metallic thermometer, to which is attached a circular disc of paper, and a pen is so connected that it moves vertically over the surface of the sheet. In most instruments the sheet of paper is drawn horizontally by clockwork so attached that it makes a complete revolution in 24 hours. The surface of the paper disc is graduated into spaces indicating minutes and hours, and degrees of temperature are shown in the spaces set off by concentric circles. Since the disc makes a complete circuit in a day, it is possible to read off the temperature at any given time. By replacing the disc daily and filing it for reference, a complete record of the temperature for a series of days may be preserved.

THERMOMETER (thēr-mōm'ē-tēr), an instrument for measuring temperature, or the intensity of heat, by means of a gas or liquid. It is based on the property that heat possesses of expanding bodies. The expansion of matter is proportional to the degree of heat applied, but it varies greatly in different substances, being greatest in gases, less in liquids, and least in solids. A thermometer consists of a long, straight tube, with a small internal diameter, closed at the upper end and widened at the lower end into a bulb of cylindrical shape. The bulb contains a quantity of mercury and the small internal bore or diameter, which must be of equal size throughout, is exhausted so as to produce a vacuum. The mercury rises in the tube when the thermometer is taken into a warm place, owing to the expanding influence of the warmer surroundings, but it contracts when

taken into a cold place, thus causing it to fall in the tube.

In making a thermometer, the tube is first carefully formed, and the bulb and part of the tube are filled with cold mercury before the tube is closed at the top. The bulb is carefully heated a little hotter than the highest degree of heat to be indicated by the instrument, thus causing a portion of the mercury to flow out at the top, thereby driving out all the air. The upper end of the tube is sealed before being cooled, which is done by being melted in the flame of a blow-pipe. A vacuum is left in the tube as the mercury cools and accumulates in the bulb. The tube is next graduated, or marked off into degrees. This is done by placing it into boiling water and afterward in contact with melting ice, thus ascertaining the *boiling* and *freezing* points. These points are marked off into degrees, and the parts of the tube below the freezing point and above the boiling point are similarly divided into degrees of the same length.

Three kinds of thermometers are in general use at present. They are the Fahrenheit, Reaumur, and Centigrade. The *Fahrenheit* thermometer, invented by the German physicist, Gabriel Daniel Fahrenheit (1686-1736), is in general use in America and the countries under the government of Great Britain. In this thermometer the freezing point is marked 32° and the boiling point, 212° . The inventor placed zero 32° below the temperature of freezing water because he considered that to be absolutely cold, but that point is now estimated at 492° below the freezing point according to his scale. In the *Reaumur* scale the freezing point is marked zero and the boiling point is 80° . It is the thermometer used in Germany. The *Centigrade* thermometer is at present in general use among the scientific men all over the world and in most European countries. The freezing point in the Centigrade scale is zero and the boiling point, 100° .

Degrees on all thermometers above zero are termed $+$ degrees, while those below zero are termed $-$ degrees. Mercury can be employed in the Fahrenheit scale only between -40° and $+661^{\circ}$, since it freezes at 40° below zero and boils in a temperature raised to 661° . Alcohol colored red is therefore used in thermometers designed to register low temperatures, being serviceable in a pure state to indicate temperatures exceeding -100° , but it is of less value than mercury in registering high temperatures, since its boiling point is much lower. Self-registering thermometers are designed to record the highest or lowest temperatures reached within a certain period, and to this class belong instruments that record all the changes undergone

at different times. To reduce degrees of one scale to those of another, the following formula will serve, the respective scales being represented by the initial letters:

$$\begin{aligned} C &= \frac{5}{9} (F-32) = \frac{5}{9} R. \\ F &= \frac{9}{5} C + 32 = \frac{9}{5} R + 32. \\ R &= \frac{4}{9} (F-32) = \frac{4}{9} C. \end{aligned}$$

THERMOPYLAE (thēr-möp'ê-lē), or **Pylae**, a famous pass mentioned in ancient history, the only one through which an invading army may pass from northern into southern Greece. It is situated south of the Sperchius River, forming a narrow passway between Mount Oeta and the Maliac Gulf. In its course are several hot springs, hence the name Thermopylae, meaning the Hot Gates. The Spartan king, Leonidas, made the pass famous in history by attempting to prevent the mighty Persian army under Xerxes, in 480 B. C., from overrunning southern Greece and capturing Sparta. His army numbered 7,000, but he selected a band of 300 Spartans to make a gallant stand against the invaders, who had been informed of the pass by a Thessalian. The defile was pointed out in the same way by a traitor to the Gauls under Brennus, who, in 279 B. C., forced the Greeks to retire. The pass has become widened by natural causes into a swampy plain, and is now of little importance as a strategic point.

THESEUM (thê-sē'ŭm), the name given by the Greeks to any building dedicated to Theseus. The largest and most celebrated temple sacred to him was located at Athens and appears to have occupied a site not far from the Acropolis. It was built about 473 B. C., when the remains of Theseus were removed from the island of Scyros to Athens. At present the name is applied to a temple on the west side of the ancient Agora, though it is not identified with the Theseum dedicated to Theseus. This structure is in the Doric style and is well preserved. Formerly it was used as a museum of art and history, but the interior has been remodeled as a Greek church. Many sculptures of note are within the building, taken chiefly from the myths of Theseus and heroes of the age of Pericles.

THESSALONIANS (thēs-sà-lō'nī-anz), **Epistles to the**, two books of the New Testament, addressed by Saint Paul to the church at Thessalonica. The first of these books was probably the earliest of all the epistles written by Saint Paul and was likely prepared while he was at Corinth, when Silas and Timothy had returned from Macedonia, about the year 52. It may be divided into two parts, one referring to the condition of religious work among the people to whom it is addressed, and the other instructing them in Christian duties and the fate

of the dead at the expected return of Christ. The second epistle was written about one or two years later, and aims to correct some mistakes respecting the coming of Christ. Paul commends the Thessalonians for their patience and faith in their persecutions, and refers to the coming of the Antichrist prior to the return of Christ.

THESSALONICA. See **Salonica.**

THESSALY (thēs'sà-lī), an important state in ancient Greece, the largest political division in that country. It occupied the region between the Pindus Mountains and the Aegean Sea, extending from the Khassia Mountains in the north and the Othrys Mountains in the south, corresponding nearly to the limits of the government of Thessaly in modern Greece. Within this region is the plain of Thessaly, supposed formerly to have been an interior lake, which is drained by the Salambria River (anciently the Peneus), and forms the most fertile tract of land in Greece. This region was originally occupied by the Aeolians, when it was called Aeola, but these inhabitants were divided into separate confederacies and subsequently were driven southward to Boeotia or reduced to serfdom. Philip of Macedon conquered Thessaly in the 4th century B. C. and in 344 B. C. made it subject to Macedonia. It was incorporated as a part of the Roman Empire in 197 B. C., fell to the Eastern Empire after the decline of Rome, and in 1355 A. D. came under the Turks. The Berlin Congress of 1878 restored the larger part of Thessaly to Greece, but additional annexations were made in 1881, thus giving Greece the larger part of the fertile region lying in the Salambria basin. It is traversed by several lines of railroad and has excellent cereal and fruit farms. Larissa is the capital.

THIAN SHAN (tê-än'shän), an elevated mountain system of Central Asia, which is situated in western China and extends into Turkestan. It trends a distance of 1,500 miles from east to west and contains many peaks towering 10,000 to 21,000 feet above the sea level. The loftiest summit is Tengri-Tagh, height 21,215 feet. Spurs of the Thian Shan Mountains penetrate into the Desert of Gobi. Many of their summits extend above the snow-line, but the slopes are well timbered.

THIBET. See **Tibet.**

THIRST, the sensation caused by the need of water in the body, which is relieved by drinking. It is accompanied by febrile excitement and usually by excessive heat, and is followed by a sensation of fatigue and weakness. The excessive use of salt is a familiar cause of thirst and is explained by the presence of too much salinity of the blood. Some diseases, such as

diabetes and cholera, are accompanied by great thirst. The craving for water while in a state of thirst is explained by a reduction in volume of the fluids of the body, and these are more saline under such a condition. Relief may be obtained not only by drinking water, but also by injecting fluids into the veins. Drinks that contain a small quantity of acid are most effective in relieving thirst, since they stimulate the action of the salivary glands.

THIRTY TYRANTS, the name of a body of rulers in Athens, who were chosen as magistrates after the close of the Peloponnesian War, in 404 B. C. They were native Athenians of the aristocratic party, and were chosen by the conquering Spartans with the hope that their government would prove unpopular to the democracy. These rulers were cruel and oppressive in their official acts and after one year they were expelled under Thrasybulus, who had been exiled by them. As a result of the Battle of Piraeus, in which he commanded, the democratic form of government was restored to Athens.

THIRTY YEARS' WAR, the name of a conflict in Central Europe, whose seat was chiefly in Germany. It was a struggle between the Protestants and Roman Catholics for supremacy, and extended from 1618 until 1648. The Treaty of Augsburg, concluded in 1555, had virtually ended the Reformation, and by its terms each of the states was permitted to choose its national religion. It had been planned to provide regulations under which each state might have uniform religious interests, hence all subjects were permitted to remove to states where their faith was sanctioned officially, but the inconveniences of removals overcame the desire for settling elsewhere than in the states to which the parties interested were subject. Differences in questions of government soon arose, and the growing strength of Protestantism in Bohemia and Austria caused a reaction to set in under the influence of the Jesuits. As a means of mutual protection, the Evangelical Union was organized by the Protestants in 1608, and the Catholic League, or Holy League, was formed the following year. Ferdinand of Styria, who had been educated by the Jesuits, became King of Bohemia in 1617. He immediately showed favors to the Catholics and caused many of the Protestant churches to be closed. In 1618 the Protestant estates petitioned Emperor Matthias of Austria for relief, but that monarch declared their meeting illegal.

The Protestants, under the leadership of the Count of Thurn, on May 23, 1618, expelled two representatives of the emperor from the royal palace at Prague. This action was taken as a protest against the infringement of the crown

against religious liberty and was the immediate occasion of the beginning of the war. Both Protestants and Catholics took up arms in defense of their faith. The concessions to Protestants in Bohemia were withdrawn by the authorities, and this act was immediately followed by an uprising. In 1619 the Protestants chose Frederick V., the elector Palatine, as King of Bohemia. The Catholic forces were repeatedly defeated by Count Thurn, but Maximilian of Bavaria defeated him at Weisseberg in 1620. An army of Spaniards under Spinola came to the relief of the Catholics, and the defeat of the Protestants upon the field was followed by persecution.

The seat of war was carried farther west immediately after the Protestant losses in Bohemia and for some time had its center in the Palatinate. The Protestant forces under Count Mansfeld were successful in holding their position on the Rhine, where they retaliated in 1621 for the tyranny shown by Ferdinand II. of Austria, formerly King of Bohemia. However, Tilly, the imperial commander, gained a victory at Wimpfen, in 1622, and the following year defeated the Protestants at Höchst and Stadtlohn. The war would likely have ended with these victories, but the Protestant princes in the north, fearing the growth of Catholic influence in the southern part of Germany, became aroused.

Christian IV., King of Denmark, joined the Protestant cause in 1624. He was supported by Holland and a British subsidy. His forces joined those of Mansfeld and Christian of Brunswick, and these forces took strong positions in Lower Saxony. Emperor Ferdinand was supported by two noted commanders, Wallenstein, the commander of the imperial army, and Tilly, the leader of the Holy League. In 1626 the Danes were defeated at Lutter by Tilly and at Dessau by Wallenstein. They overran Denmark and the northern part of Germany and Christian IV. was compelled to sign a treaty of peace at Lubeck in 1629. In the meantime Mansfeld gathered a powerful army and conducted a vigorous campaign in Moravia and Hungary.

The Swedish-German period of the war began in 1630, when Gustavus Adolphus, King of Sweden, came with a powerful army into Germany as a support to Protestantism. Ferdinand of Austria had previously ordered the restitution of certain estates to the Catholic church, an edict that was unpopular among many Catholics and an offense to the Protestants. The Swedish army landed at Usedom and drove the imperialists out of Mecklenburg and Pomerania, and the Swedish king concluded alliances with a number of German states, including Hesse, Branden-

burg, and Saxony. Tilly captured Magdeburg in 1631 and permitted the city to be plundered and many of the inhabitants to be slaughtered. The armies met near Leipzig, at Breitenfeld, where Tilly was defeated with great loss. Gustavus followed up his victory by advancing toward the south and east, and defeated his enemy on the Lech, in 1632, where Tilly was slain. His plan of campaign included the establishment of powerful organizations as a support to his cause, and Sweden soon became the head of the Evangelical Union. Wallenstein had been previously disgraced, but Ferdinand now recalled him as a means of checking the powerful advance of the Protestants. He promptly invaded Saxony, where the armies met on the field of Lutzen, in 1632. While Wallenstein was signally defeated, the Protestants sustained an irreparable loss in the death of Gustavus Adolphus, who was slain at the moment of victory. Oxenstierna now succeeded to the command of the Swedish army and sustained the advantages gained until 1634, when the Protestants under Bernard of Weimar were defeated at Nördlingen.

The French-Swedish period of the war began in 1636, when Richelieu joined the Protestant forces to defeat the ambitions of Austria. France thus became united with Sweden and Richelieu was given general direction of the war, but the conquest now became political rather than religious, and Denmark and Saxony united with Austria. Northern Germany was held by the Swedes under Banér, who defeated an army of Saxons and Austrians at Wittstock in 1636. Later the same army gained victories at Breitenfeld in 1642 and at Jankau in 1645. Another army under Condé and Turenne gained repeated victories in the regions of the Rhine and forced the opposing army to leave the Palatinate and Bavaria. It was planned to conduct a general invasion of Austria, but the different governments had been endeavoring to bring the war to a close, which was finally accomplished in 1648 by the Treaty of Westphalia. Protestantism was saved by the most terrible war of modern times, but at a cost that is astounding. Many provinces of Germany were devastated and the population was greatly decreased. From the effect of this contest Germany recovered only after a period of two centuries. See **Reformation**.

THISTLE (thîs'tl), an extensive genus of plants of the aster family. Some of these plants are troublesome weeds in many sections of Canada and the United States, where about thirty species have been described. They have prickly leaves and tubular flowers in a hairy receptacle. A tuft of hairs surmounts the seeds. Some species bear beautiful flowers, but the

plants are looked upon as obnoxious, owing to their roots being too deeply seated to be plowed up, and because small particles broken from the parent stalk grow and produce new plants. The *Canadian thistle* is one of the most troublesome.



SCOTCH THISTLE.

CANADIAN THISTLE.

It appears early in the spring, growing from the perennial rootstock, but the growth is most rapid in midsummer. Many states and provinces have enacted laws requiring owners of land to uproot and destroy it. The *Scotch thistle*, *pasture thistle*, *milk thistle*, *carline thistle*, and *cotton thistle* are other species that are widely distributed.

The thistle was adopted as the national emblem of Scotland in the reign of James III. Coins of that country formerly bore the Latin motto, *Nemo me impune lacessit*, meaning no one touches me with impunity. James VII. of Scotland instituted the Order of the Thistle in 1687. It fell into abeyance during the reign of William and Mary, but was revived in 1703 by Queen Anne and is now one of the recognized orders of Great Britain.

THISTLE, Order of the. See **Thistle**.

THOMASVILLE (tŏm'as-vîl), a city in Georgia, county seat of Thomas County, 200 miles southwest of Savannah, on the Atlantic Coast Line and other railroads. The surrounding country is fertile, producing large quantities of cotton, sugar cane, cereals, and fruits. The features include the public library, the Young Female College, the South Georgia Agricultural and Mechanical College, and many schools and churches. It is noted as a summer and health resort. Among the manufactures are flour, fertilizers, cotton-seed oil, furniture, hardware,

cigars, and farming implements. It has a growing trade in cereals and merchandise. Population, 1900, 5,322; in 1910, 6,727.

THORACIC DUCT (thō-rās'ik), the largest lymphatic vessel of the human body. It extends from the *receptaculum chyli*, the vessel in which the contents of the lacteals are collected, to the junction of the left internal jugular and the left subclavian veins, passing upward on the left side of the spinal column. This duct is from eighteen to twenty inches long, is about one-eighth of an inch in diameter, and has numerous valves opening toward the neck. Most of the lymph of the body and chyle is discharged by the thoracic duct into the left subclavian veins. The contents pass upward, but cannot pass downward owing to the valves within, and at the outlet are valves that prevent the entrance of blood.

THORIUM (thō'rī-ŭm), a rare metal discovered by Brezelius in 1828, so named from the Scandinavian god Thor. It is a grayish metallic powder, burns with a bright flame, and with oxygen forms a white dioxide called *thoria*. Thorium is found in Norway and North Carolina, where it occurs in thorite, orangite, and other rare metals. It is used for minor commercial purposes and in the manufacture of the mantle employed in the Welsbach gas burner.

THORN, a city of Germany, in the province of West Prussia, 86 miles northeast of Posen. It is divided into two nearly equal parts by the Vistula River. Among the principal buildings are the Church of Saint John, the public library, the municipal museum, the central railway station, and the castle of the Teutonic Order. It has iron foundries, soap works, machine shops, and tobacco manufactories. It is the center of a large trade in lumber, grain, and merchandise. The place was founded in 1812 and became important as a member of the Hanseatic League. In 1454 it was annexed to Poland, but it has been a part of Prussia since 1793. Population, 1905, 31,801.

THOUGHT, the power of the mind to form and rationally apply general conceptions. It involves the mental processes of comparing, judging, and reasoning. The function of apperception is primarily involved, but afterward it works upon the more abstract material used in arguments and reasonings. The lower exercises of mind are classed as *perception*, and in nature thought does not differ from the effort involved in that process, even in the higher processes of general conception. The latter do not include general concepts, such as represent classes of material objects, but inductions and all other

mental products which are formed by generalization. See **Apperception**; **Conception**; **Reasoning**.

THOUSAND ISLANDS, the name applied to a group of islands in the Saint Lawrence River, near the outlet of Lake Ontario. The river has an expansion at this place from four to seven miles wide and forty miles long, within which are about 1,750 small islands. Many of them have beautiful scenery and are visited by tourists during the summer. Thousand Island Park is one of the chief attractions. Alexander Bay, located within the park, is popular as a summer resort. The islands have a varied line of scenery, including precipitous rocks and beautiful groves. Many wealthy Canadians and Americans have summer homes in these islands.

THRACE (thrās), an ancient country of Europe, whose main boundary on the north was formed by the Danube, east by the Black Sea, south by the Aegean Sea and Macedonia, and west by Macedonia and Illyria. It coincided more or less closely with the region now included in Bulgaria, Eastern Rumelia, and central European Turkey. The region is more or less mountainous and is divided into two parts by the Haemus Mountains (Balkans), the northern part forming Moesia and the southern part Thrace. Large forests of chestnut, fir, oak, and other classes of valuable woods were abundant. Marshy swamps extended along the coast and in many valleys. The Greeks occupied the region along the coasts, though their settlements extended to the interior highlands, where productive mines were worked with success. Much of the soil possessed remarkable fertility, yielding large quantities of wheat, millet, hemp, and fruits, while horses, cattle, sheep, swine, and poultry were reared in large numbers.

The Thracian horsemen rivaled those of Thessaly and played a prominent part in the military affairs of Greece. Philip of Macedon was attracted by the production of gold and silver and in 359 B. C. conquered most of Thrace. It became a Roman possession in 168 B. C., being annexed along with the territory of the Macedonian kingdom. After the decline of Rome it was overrun by Alaric and Attila, and in 1353 was taken as a Turkish possession by Amurath, but since then Bulgaria and Eastern Rumelia have been separated from it. The most noteworthy places of ancient Thrace include Sestos on the Hellespont; Abdera, the birthplace of Protagoras and Democritus; and Byzantium, the ancient name of Constantinople.

THRASHER (thrāsh'ēr), the common name of a class of birds which resemble the thrush. In most species the bill is long and

somewhat curved, the wings are short, and the general color is ash or brown above. The *brown thrasher*, sometimes called the brown thrush, is the best known of these birds. It has a pleasing song and may be heard both in the morning and in the evening. This bird is migratory, passing from the southern part of Canada to the vicinity of the Gulf of Mexico. Other species include the *gray curvebill thrasher*, the *Arizona thrasher*, and the *California thrasher*.

THREAD, a small twine or cord made by doubling and twisting several thicknesses of yarn. Thread made of cotton is used very extensively for sewing clothing and other manufactures. It is made from the fibers of the best grade of cotton, usually the sea island cotton, and the process of manufacture is largely by machinery. The cotton fibers are first picked and passed through the carding machine, after which they are fed into the drawing frame. A series of rollers in the drawing frame causes the carded cotton to be drawn out into ribbonlike forms, this being effected by each succeeding set of rollers moving faster than the preceding. It is then taken to the doubling frame and compressed to form a delicate strip, and these strips are again carded, after which they are wound upon a bobbin. The finished product is obtained by twisting six of the strips into a cord or thread, but to obtain the proper size it is necessary to reduce them by spinning them several times successfully. Thread sold on the market is either white or colored. White thread is obtained by bleaching after the spinning has been completed, while the colored varieties are obtained by dyeing, after which the product is wound upon wooden spools. Several kinds of thread are made of linen and silk.

THREADWORM, the name of several worms classed with the entozoa, so called from the slender threadlike body. Several species have been described. They are parasites in human beings and are especially annoying in children. The common threadworm is four to six inches long, is one-tenth of an inch in diameter, and has a hard and muscular body. Some worms of this kind attain a length of three feet, while others are quite small. Species closely allied with those found in man occur in the brain cavity of birds.

THREE RIVERS, a town of Saint Joseph County, Michigan, 25 miles south of Kalamazoo. It is surrounded by a fertile farming and fruit-growing region, giving it a growing trade in produce and merchandise. It has extensive railroad facilities and is provided with good schools, numerous churches, and modern municipal improvements. Among the manufactures are flour,

lumber products, paper, chemicals, and farming implements. Population, 1910, 5,072.

THREE RIVERS, a city of Quebec, capital of Saint Maurice County, 75 miles southwest of Quebec. It is at the confluence of the Saint Maurice and the Saint Lawrence rivers, on the Canadian Pacific and the Grand Trunk railways, and is important as a port of entry. Near it are the famous falls of Shawanegan. The principal buildings include the county courthouse, the Protestant College, the Ursuline Convent, the high school, the Dominion Hotel, the public library, and a bishop's palace. It has manufactures of lumber products, boots and shoes, machinery, and clothing. The public utilities include sewerage, electric lighting, and waterworks. It was founded by Champlain in 1634, hence is one of the oldest towns in Canada. Population, 1908, 12,430.

THRESHING MACHINE, an important machine of modern construction, used to separate the grain from the chaff and straw. In primitive threshing the grain was beaten out of the straw by blows with the flail, which was swung by the workman. It consists of two pieces of wood fastened together by stout thongs, one of which is held in the hands of the workman, while the other swings loosely and is caused to strike the heads of the grain spread upon the ground or the barn floor. Anciently the Egyptians and Israelites threshed the grain by spreading the loosened sheaves upon a circular piece of ground and having it tread upon by oxen. The oxen were driven in the circle formed by the sheaves of grain, and in some cases were hitched to the threshing sledge, which was rolled over the sheaves. This process was continued until the grain was well shelled out of the ears, when the straw was carefully removed by hand and the remaining grain and chaff were gathered and fanned, thereby separating the grain from the impurities. While the sledge has gone out of use, the flail is still employed to some extent, even in America and Europe, especially to thresh beans and peas.

The modern threshing machine may be said to date from 1786, when Andrew Meikle, a mechanic of Scotland, constructed a thresher that contained the principal parts of a modern machine. It utilized the rotary beater, or flail type, as seen in the *beater*, or *drum*, of the modern types. This beater contains iron teeth held in place by burs, and similar teeth are in the *concave*. The teeth of both parts are so fitted that those of the beater pass closely by those of the concave as the beater revolves rapidly. Sheaves of grain are loosened and fed with the ears toward the machine, and the straws are taken up

as the beater revolves, though sheaves must be fed regularly so as not to permit the machine to run empty. Immediately back of the beater is a *revolving drum*, or *apron*, which carries the grain and straw. Rakes and beaters strike downward upon the straw to separate from it the loosened grain, and the latter is secured by a *shaker* and carried to the blowing drum and then to the *winnowing apparatus*, where the chaff is blown out by a *fanning mill* as it passes upon screens, through which the grains fall. In the modern machines there are screens of different sizes fitted for various kinds of grain, such as wheat, oats, barley, rye, timothy, spelt, etc., and a second set of screens causes small seeds of weeds to be separated from the grain. The straw is carried by a stacker, or is blown from the machine by a set of fans that revolve rapidly. In most modern machines the apron is entirely dispensed with and the agitator, or vibrator, models are used instead.

It requires ten horses to furnish sufficient power for a threshing machine. The power is transmitted by a belt or a tumbling rod from the machine known as the *horse power* to the separator. However, horses have been displaced largely by traction engines with a capacity of twelve to fifteen horse power. A modern machine will thresh from 800 to 1,500 bushels of grain per day. Machines of special construction are used for threshing peanuts, peas, rice, beans, and clover. Coal is used chiefly as fuel, and the smokestack is screened as a protection against fire. In sections of country where fuel is scarce or expensive, the straw-burning furnace is used to some extent.

THRESHER SHARK, or **Fox Shark**, a species of shark found in the warm seas. The tail is peculiarly long and is used in aiding to obtain food. This shark usually rushes into a school of gregarious fishes and kills or stuns many by threshing about with the tail. The larger specimens are about fifteen feet long and are whitish beneath and gray-bluish above. These fish are found in the Mediterranean and the Atlantic. They are not valuable as a commercial fish.

THRIPS (thrips), the name of a genus of minute insects. The body is slender and has four wings, but they appear to leap rather than fly. About thirty American species have been described and they bear a close resemblance to the plant lice. These insects attack the flowers and leaves of plants, but some species feed upon other insects. Some are injurious to tobacco, while others damage onions and timothy grass.

THRUSH, a genus of birds common to all the continents and most of the islands. They

embrace a great variety of species. Some are gregarious, others live solitarily or in pairs, and some are migratory. The *wood thrush* is one of the most widely distributed species of North America, ranging from Guatemala to Southwestern Canada. It migrates southward in the fall, usually to the Carolinas and beyond. The length



BROWN THRUSH.

is eight inches, with an alar extent of about fourteen inches. It is quite shy, usually preferring its native woods, and the song is clear and beautiful. The *brown thrush*, or *thrasher*, is another widely distributed bird and its song is the most beautiful of the American thrushes. It is reddish-brown above and yellowish-white below, and somewhat resembles the mocking bird. The *hermit thrush* is an American bird of solitary habits. The best known of the European species is the *song thrush*, a bird of beautiful song. Its plumage is brown and yellowish, with numerous spots of dark brown. It inhabits all parts of Europe, but moves southward on the approach of winter. Both male and female are attentive to their young, usually four to six in number. The body of a full-grown song thrush of this kind is nine inches long. Its song is very beautiful and it may be taught simple airs in captivity. Other species include the *West Indian thrush*. The common robin belongs to the thrush family.

THRUSH, or **Sprue**, a disease common to infants, but sometimes seen in adults. It attacks the lining membrane of the mouth and throat, the angles of the lips, and the surface of the tongue. In most cases the affected parts are characterized by whitish specks. These small specks or patches develop into ulcers, causing a painful rawness of the affected parts. In some cases the affection is rather a symptom than a disease, and requires the attention of a physician. Cleanliness is especially important.

THUGS (thüg-z), a class of religious thinkers formerly numerous in India, so called from a Sanskrit word meaning *a cheat*. The members

of this sect formed a secret society made up of gangs numbering from 10 to 200. They were banded together and traveled under various disguises with the view of attaining the confidence of the wealthier travelers and traders, and at a favorable opportunity strangled and robbed them. The practice is known as *thuggee* and was first mentioned by travelers in India in 1356. Each band was accompanied by officers specially assigned to them, such as leaders, teachers, spies, stranglers, gravediggers, and guards. They infested the mountain regions and river valleys, and usually came out to the towns and populated districts to secure the confidence of those designed to be murdered and robbed. This system of lawlessness was practiced from religious motives, being considered acceptable to their goddess, Kali. Rigid measures were taken against the Thugs by Lord William Bentinck in 1829. In the period between 1830 and 1835 fully 2,000 arrests were made, and of these 1,500 were convicted and sentenced to death or imprisoned. The law of 1830 made membership in a gang of Thugs punishable by imprisonment for life at hard labor. This rigid course practically exterminated the once powerful order, though some gangs still linger in remote regions.

THULE (thū'lē), the name given by the ancient Greeks to the most northerly portion of Europe known to them. It is thought to have referred to a part of Norway or the Shetland Island. Later the Romans applied the same name to the northernmost parts of the earth, and in this sense it was used in oratory. *Ultima Thule* had reference to the most distant unknown land, and the term was used in this sense by the Romans.

THUN (tōn), a lake of Switzerland, in the canton of Bern. It is located about 1,835 feet above sea level and is two miles wide and ten miles long. On the eastern shore is the town of Interlaken and on the northwestern coast is Thun. These places are connected by a railway. The Aar discharges the overflow. Large numbers of tourists visit the vicinity at all times of the year.

THURSDAY. See **Thor**.

THYME (tīm), an aromatic plant of the mint family. The genus comprises about thirty species, mostly native to the southern part of Europe. The common thyme has an upright stem, about a foot high, and a strong odor. It is cultivated in gardens as an ornamental plant and yields an essential oil used for flavoring. Several species have been naturalized in North America.

TIAN SHAN. See **Thian Shan**.

TIARA (tī-ā'rā), the name of a headdress first used by the reigning family of Persia, but

later adopted by the priests and potentates of other countries. Nicholas I., Pope of Rome, adopted the tiara as symbolical of the Pope's temporal authority in 860. The tiara worn by the popes consists of a cap of cloth made of gold. It is encircled by three golden coronets and surmounted by a cross of gold. A fringed and embroidered pendant hangs from either side. This tiara is the crown of the Pope, but in purely spiritual ceremonies that official wears the miter, like other bishops.

TIBER (tī'bēr), in Italian, *Tevere*, a famous river in Italy, which rises on the southern slope of the Apennines, in Tuscany, and, after a course of 245 miles toward the south, flows into the Mediterranean. The channel forms a zigzag line, especially in the upper part, and there are rapids between Todi and Passo del Forello. It receives the water from the Nera at Orte, to which place it is navigable for boats of light draught, a distance of about 96 miles from the Mediterranean. Three miles above Rome it is joined by the ancient Anio, now the Teverone, and within the city it divides to form the ancient island of Tiberina. Rome is situated fifteen miles from its mouth and is reached by large vessels. Although it enters the sea by a large delta, the main channel is 300 feet wide and 10 to 20 feet deep at the place where it discharges. A number of substantial improvements have been made in the way of embankments, excavations, and canals to facilitate navigation. The valley of the Tiber is a fertile region and is traversed by several railroad lines. Its water is colored yellow by the clay forming the basin through which it flows, hence it is often spoken of as the yellow Tiber.

TIBET (tī-bēt'), or **Thibet**, a country of Central Asia, nominally a province of the Chinese Empire, though largely independent in its government and internal relations. It is situated north of the Himalayas, forming the large region between those mountains and the Kuen-Lun on the north, and extending from Cashmere and the Karakorum range to western China. The region has not been explored extensively, but is supposed to have an area of 651,500 square miles and a population of 6,125,000. It consists of a high plateau, which in few places is lower than 10,000 feet, and contains the sources of several of the great rivers of China and India, among them the Brahmaputra, Hoang-ho, Indus, and Yang-tse-Kiang. The surface is generally elevated to heights varying from 12,000 to 15,000 feet, though in some places peaks tower 20,000 feet above the sea, and numerous salt and fresh water lakes prevail at elevations approximating 14,500 feet. Though situated in latitude almost

due east of central Italy, the climate is rigid, owing to its vast elevations. The summers are extremely dry and hot, while the winters approximate those of the Frigid zones. The air is deprived of its moisture before reaching the Tibetan plains, thus making the climate arid, especially from October to March, when nearly all forms of vegetation become dry. Some regions are sandy deserts and others contain a rich soil and considerable forests, but the greater part of the country is best adapted to grazing.

The early history of Tibet is wrapped in tradition, and little was known of its people prior to the 5th century of the Christian era, when they became converted to the teachings of Buddhism. China made it tributary in 821. The first authentic accounts of the country were published by Marco Polo in the 13th century. The inhabitants, though mild in character, have maintained a stubborn opposition to foreign travelers and European trade. Several explorations were made inland in the latter part of the 19th century, and from that period dates the information obtainable regarding the people and their industries. Agriculture is the chief occupation in the valleys, but in many sections irrigation is necessary, while the great scope of country lying in the hilly and less fertile regions is utilized for grazing. It has deposits of gold, silver, tin, copper, niter, sulphur, borax, and salt, but development in mining has been slow on account of a scarcity of transportation facilities and a limited supply of fuel. The soil products include cereals and fruits, while the domestic animals embrace mainly cattle, sheep, camels, and horses. The natives engage in the manufacture of carpets, toys, jewelry, fabrics, and utensils. Most of the trade is with China and consists of exchanging native products for tea, idols, incense, chemicals, metals, tobacco, cotton and woolen clothing, and rice. Lhasa is the seat of the civil government and of a number of monasteries and Buddhist institutions. The Tibetans speak a language which is related to the Chinese tongue. They have a copious literature, both religious and secular. Lamas or priests, who represent a form of Buddhism, rule the country. Yatung, a town beyond the Sikkim frontier, was opened to foreign trade under a treaty agreed upon in 1894 and is now the residence of several European representatives. Two Chinese represent the government of China at Lhasa.

Great Britain has looked with suspicion upon the movements of Russia in the valley of the headwaters of the Yang-tse-Kiang River, claiming that its safety and progress in the northern section of India demand the freedom of the upper valley from Russian control. On the

other hand, the Russians assert that the British are seeking to establish a protectorate over Tibet. In 1904 a British expedition of 1,000 men, under General McDonald and Colonel Younghusband, invaded the country to hold a conference with the view of agreeing upon certain treaty misunderstandings and to prevent further border depredations. When the expedition reached Guru, about half way from the British India border to Lhasa, it was met by a body of Tibetans with the view of preventing an attack upon Lhasa. In the first encounter the Sikh troops were routed with a loss of 300 men, but later reënforcements were sent and the march to Lhasa was continued. Those who accompanied the expedition described the capital city as an interesting relic of a former civilization. British troops were stationed at the capital until 1908, when they were withdrawn, on the payment of an indemnity.

TIC DOULOUREUX (tik dōo-lōo-rōō'). See **Neuralgia**.

TICK, a class of parasites that infest the skin of certain vertebrate animals and various plants. They abound in many parts of the world, but chiefly in warm countries. The mouth is in the form of a sucker, which they bury in the skin of animals and suck the blood. Most species are found on different plants, clinging to the outer bark or coating, but watching a favorable opportunity to fasten themselves to animals. They suck the blood with great greed after becoming attached, thereby causing considerable pain and inflammation, and are frequently fastened with such a firm grip that it requires quite an effort to loosen them. In some warm countries, especially in South America, ticks are very numerous and, unless detached, attain the size of a large bean. The *dog tick* is a familiar species in the United States, frequently attaching itself to dogs, cattle, and even to man. The *carapata* is native to Brazil, and the *tampan* is found in South Africa. Some species are aquatic and frequently fasten themselves to tortoises and other reptiles.

TICONDEROGA (ti-kōn-dēr-ō'gā), a village of New York, in Essex County, 98 miles north of Albany, on the Delaware and Hudson and other railroads. It occupies a fine site a short distance north of Lake George, has an abundance of water power, and is the center of a large trade in graphite, lumber, and merchandise. The French built Fort Carillon, later called Fort Ticonderoga, in 1755, as a means to command lakes George and Champlain. In 1758 a British force under General Abercrombie made an attack upon it, but was repulsed with a loss of 2,000 men. The British numbered 15,000 and

the French under Montcalm only 3,600. General Amherst appeared before Ticonderoga in 1759, but the French abandoned it with little opposition. On May 10, 1775, Ethan Allen arrived on the shore of Lake Champlain with a small force and surprised and captured the fort without striking a blow. Burgoyne led a British army against Ticonderoga on July 1, 1777, and, after planting a battery on Fort Defiance, compelled the garrison, 3,000 in number, to evacuate. The fort fell into ruins shortly after the war, but traces of its walls still remain. Population, 1905, 2,014.

TIDES, the periodic rising and falling of the oceans and the waters connected with them, caused by the attraction of the moon and sun. No satisfactory explanation of these movements of oceanic waters was made until Sir Isaac Newton traced their origin to the law of gravitation, which he discovered in 1666. The tides assume the form of a general wave of water, scarcely perceptible on the open sea, but rising to considerable heights in the estuaries of rivers and inlets having precipitous banks. They are observed twice in the course of a lunar day, or in 24 hours 49 minutes of mean solar time, and occur 52 minutes later from day to day than on the day preceding. The rising of the water is called *flood tide*, and the falling, *ebb tide*. Flood tides and ebb tides follow each other every six hours. The waters remain stationary for a few minutes, when they reach their highest and lowest points, these points being called, respectively, *high water* and *low water*. Gravitation has an equally strong influence upon the land and water, but, since the latter is free to move, it tends to rise under the attraction of the moon and sun as these bodies pass their influence over the surface of the earth as it rotates upon its axis. The water thus drawn by attraction is accumulated in the part of the earth nearest to the moon. That body has an attraction for the bulk of the earth, and, while causing a flood tide on the side of the earth turned toward it, it also causes a flood tide on the opposite side of the earth by pulling it away from the water, although the latter is somewhat less perceptible.

The influence of the moon is not instantaneous, but requires a little time to produce full effect, hence flood tides occur a few hours after the moon is on the meridian of any particular place. While flood tides occur on the two sides, those turned to and from the moon, ebb tides occur in the regions situated halfway between them, owing to the waters being necessarily depressed. The sun being 400 times farther from the earth than the moon, it has a less marked effect, but it tends to increase or diminish the

lunar tides, according to the position of that body in the heavens. When the sun and moon act simultaneously on the same hemisphere of the earth, the tidal wave is higher than usual and is called a *spring tide*. However, when the sun and moon are 90° apart, each produces a tide on the portion of the earth directly influenced by it, and the lunar tide at that period is called *neap tide*. Spring tides occur only at new and full moon, and neap tides take place at first and last quarters, the sun being then at quadrature with the moon. When the moon is in perigee, its attraction is stronger, hence the flood tide is higher and the ebb tide is lower than at other times.

The height of tides is very different, owing to the difference in the depth and size of the water and to the modifications of the contour and outline of the coast. On midocean it is hardly noticeable and rises from a few inches to three feet, but, where the moving water comes in contact with a precipitous shore, it frequently piles up many feet in height. This is true especially off the coasts of continents having shelving bays, deep gulfs, or broad river mouths. The difference between ebb and flood neap tide at New York is about three feet, and that of spring tide about five feet, while at Boston the difference is about ten feet. A headland extending into the ocean diminishes the tide, as off Cape Florida, where the average height is only fourteen to twenty inches. Spring tides in the Persian Gulf and China seas sometimes rise 30 to 38 feet; at the mouth of the Severn, 40 to 48 feet; and in the Bay of Fundy, 65 to 90 feet. A strong wind blowing in the direction of the tide tends to greatly increase the depth of the inflowing water. Where the coasts are low, as is the case in many places, the tide waters flow inland several miles. Tides are utilized in commerce, since they enable ships to sail up the mouths of rivers and land in many harbors otherwise too shallow for approach.

TIEN-TSIN (tĕ-ĕn'-tsĕn), or **Tientsin**, a city of China, at the junction of the Huer and Peiho rivers, 70 miles southeast of Peking. The city is reached by small vessels and is the chief railroad center of China. It has undergone remarkable improvement, especially in its buildings and municipal facilities, within the last few years. Formerly it contained only illy constructed houses of mud and dried brick, but its streets have been macadamized, trees have been planted, and water and drainage systems have been introduced. The streets are lighted by gas and electricity and telephone and telegraph connections are maintained with other centers of trade. These improvements have been carried

forward by foreign enterprise, but the native Chinese have entered into the spirit of progress and have given sanction to the newer and better conditions.

Among the principal buildings are an imperial military college, a mint, an imperial university, an arsenal, and a number of schools, churches, temples, and missionary stations. The Chinese Mining Company has its headquarters in the city, its mines being at Tong Shan, about 180 miles to the north. Much of the machinery for the mines was brought from England and Germany. The city has a large export trade in coal, cotton, peas, dates, and wool. Opium, clothing, sugar, and machinery are imported. At present the annual foreign trade is estimated at \$45,500,000. The allied armies of France and England captured the Taku forts in 1860 and shortly after took possession of Peking. In 1900 the allied armies of Germany, France, Russia, the United States, and England captured the city, the disturbances being caused by the wholesale destruction of missionary interests by the Boxers. Shortly after the allied armies entered Peking. Population, 1908, 1,050,000.

TIERRA DEL FUEGO (tê-ër'ra dël fwâ'-gô), meaning land of fire, an island group near the southern extremity of South America, which is separated from the mainland by the Strait of Magellan. The archipelago consists of one large island and numerous small islets, the total area being 32,000 square miles. Tierra del Fuego, the chief island, is 300 miles long and tapers toward the southeast into Cape San Diego. The point farthest south is formed by a small island and is known as Cape Horn. These islands are of volcanic origin. They have a mountainous surface, their peaks ranging from 4,500 to 5,450 feet above sea level. The line of perpetual snow extends some distance below the summits of the more elevated peaks and vegetation consists principally of stunted forest trees, shrubs, and grasses. These islands have a very cold and disagreeable climate. The inhabitants are Patagonians, who subsist by fishing and hunting. Magellan discovered these islands in 1520 and named them from the numerous fires along the coast kept at night by the fishermen. Population, 1906, 2,162.

TIFFIN (tif'fin), a city in Ohio, county seat of Seneca County, on the Sandusky River, 35 miles southwest of Sandusky. It is on the Baltimore and Ohio, the Pennsylvania, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. Among the noteworthy buildings are the county courthouse, the high school, the public library, the Heidelberg University, and the Ursuline College. Other features include the

Riverview Park and the soldiers' monument. It has manufactures of pottery, cigars, woolen goods, earthenware, machinery, glass, and farming implements. Tiffin was settled in 1819 and incorporated in 1850. Population, 1910, 11,894.

TIFLIS (tyë-flyës'), a commercial city of Russia, capital of Caucasia, on the Kur River. It has good railroad facilities and a large trade in raw and manufactured silk, cotton goods, carpets, dried fruits, and merchandise. Among the manufactures are cotton and silk goods, soap, leather, carpets, linens, machinery, and utensils. Electric lighting, rapid transit, telephones, waterworks, sewerage, and street pavements have been constructed under Russian engineers. The principal buildings include those occupied by the government, such as the grand ducal palace, the post office, and the townhall. It has a number of schools and institutions of secondary learning and several hospitals and scientific institutes. The architecture is a mixture of European and Asiatic plans of construction. A large number of the inhabitants are of Armenian, Georgian, or Persian descent. Tiflis was founded in the 5th century. It was destroyed in 1795 by Aga Mohammed Khan, Shah of Persia, and in 1801 became a part of Russia. Population, 1906, 161,520.

TIGER, a powerful carnivorous mammal of the cat family, about eight feet long and three to four feet high. An adult tiger weighs about 500 pounds. The front feet have five toes and the hind feet four, and all are characterized by strong retractile claws. The color is tawny yellow above and white beneath, with vertical black stripes on the body and black rings on the tail. It is able to swim with ease and frequently crosses rivers and inlets. The tiger is found in the region of Asia lying east of the Caucasus and south of central Siberia, but is most numerous in the swamps and grassy plains along the shores of great rivers, especially in India, Sumatra, and Java. Its voice is a loud grunting sound, being hardly comparable to the loud roar of the lion. It is very active and graceful and exercises fierce cunning in the capture of its prey.

Tigers lie in wait near the brook or other places frequented by animals, and spring forward with remarkable certainty to grasp and tear the prey to pieces. They are more feared by the natives than the lion, being more active and cunning. *Bengal tigers* are the best representatives of the species, and *man-eating tigers* are the old and nearly toothless specimens, finding man a favorite prey. The female is somewhat smaller than the male, and differs from it in not having a long growth of hair on the

cheeks. Tigers are caught alive in various ways, but mostly by exposing a looking-glass within a room, near the door. A tiger on the outside, seeing its image in the glass, is enticed into the room by thinking it another tiger, and is caught by a trapdoor dropping. The Romans caught tigers in large numbers and brought them to the gladiatorial fights in Rome.

TIGER CAT, the name commonly applied to any wild cat of large size, especially if it has

tant cities on the Tigris at present are Bagdad, Mosul, and Diarbekr.

TILE, a flat or curved sheet of clay that has been baked for use in covering roofs and floors. Tiles are made for a variety of purposes and in construction differ vastly according to the use for which they are intended. Drain tiles are cylindrical, usually twelve inches long, but the larger sizes are two feet in length. Small tiles for draining, ranging from three inches to twelve



BENGAL TIGER.

some resemblance in form and markings to the tiger. The name is frequently given to the chati of South America, as well as to the serval and the ocelot. See **Cat**.

TIGRIS (tí'grís), the second river of Western Asia, which rises on the southern slope of the Anti-Taurus Mountains, near the upper course of the Euphrates. It receives the Bitlis River at Tilby and joins the Euphrates at Korna, about 100 miles from the Persian Gulf, the united streams being known as the Shat-el-Arab. The general course of 1,175 miles is toward the southeast and almost parallel to the Euphrates, Mesopotamia lying between the two rivers. It is navigable for light freight-bearing steamers to Bagdad and for smaller vessels to Mosul. The upper course forms a rapid stream, bringing down large quantities of silt. It was the great channel for commercial navigation in ancient Assyria and on its banks were the cities of Nineveh, Ctesiphon, and Seleucia. The most impor-

inches in diameter, inside measurement, are made chiefly of clay, while large tiles, from fifteen inches to three feet in diameter, are now made largely of concrete. Tiles used to cover floors are of a variety of colors and when worked to a special pattern they give a pleasing as well as durable effect. Roof tiles overlap each other like slates.

TILSIT (tíl'sít), a city of Germany, in the province of East Prussia, 60 miles northeast of Königsberg. It is finely located on the Niemen River, has good railroad facilities, and is surrounded by a fertile fruit-growing and farming country. Among the manufactures are leather, glass, clothing, and lumber. It has a considerable trade in lumber, grain, and dairy products. The river is navigable beyond the city. Tilsit is celebrated for the treaty concluded here in July, 1807, by Prussia, Russia, and France, by which Prussia lost half of its possessions. Population, 1905, 37,148.

TIMBER. See **Lumber.**

TIMBUCTOO (tīm-bŭk'tōō), or **Tembuktu**, a trade center in the Sudan, near the southern boundary of the Sahara, seven miles north of the Niger. It occupies a site only slightly elevated above the river, and the region between it and the main channel of the Niger is frequently flooded, thus leaving a number of channels and bayous in the sandy wastes. Walls formerly surrounded the city, but they are now in ruins and almost totally destroyed. Most of the buildings are low and constructed of clay, but it has several fine architectural structures, among them the Mosque of Sankore, the Great Mosque, and several structures erected by the French, whose sphere of influence extends throughout the region. Timbuctoo owes its importance to its situation near the Niger, since reaching that stream near the city is an object sought by the many caravans passing between the Mediterranean and the Gulf of Guinea, and between the Atlantic and the interior of Northern Africa. The city was founded in the 11th century and the Great Mosque dates from 1325. Among the articles of trade are ivory, tobacco, ostrich feathers, gold dust, salt, tea, cutlery, and fruits. The inhabitants include Arabs, Tuaregs, Mandingoes, Jews, Africans, and Fulahs. French occupation has greatly increased the importance of Timbuctoo as a market. Population, 1908, 12,480.

TIME, Standard. See **Standard Time.**

TIMOR (tê-mōr'), an island of the Malay Archipelago, the largest of the Lesser Sunda Islands. It is situated southeast of Celebes, about 700 miles east of Java. The length is 280 miles; average breadth, 55 miles; and area, 12,375 square miles. It is traversed by a range of lofty mountains, some of which are volcanic, but it has a large area of fertile land. The highest summits approximate 11,800 feet, but the slopes are well wooded. Among the chief products are sugar, rice, sago, indigo, fruits, pearl oysters, buffaloes, and sandalwood. The inhabitants are chiefly Malaysians, but are mixed more or less with Negroes. Politically the island is divided between Holland and Portugal. The Dutch possess the southwestern half with the capital at Kupang, while the Portuguese have the northeastern half with their seat of government at Deli. Nearly all of the Europeans reside in the portion controlled by Holland. The total population is given at 400,000.

TIMORLAUT (tê-mōr'lout), a Greek group of islands in the Malayan Archipelago, situated 240 miles southeast of Ceram, one of the Moluccas. Yamdena, Larat, and Selaru are the largest islands of the group. Though of volcanic origin, some of the islands are partly of coral forma-

tion. The total area is 2,060 square miles. Most of the inhabitants are a mixture of Malaysians and Negritos. They engage in trepang fishing, agriculture, and stock raising. These islands are noted for numerous brilliantly colored birds. Population, 24,950.

TIMOTHY GRASS, a species of grass widely cultivated, which is one of the most valuable for hay. It was named timothy from Timothy Hanson, who did much to promote its cultivation in America, after it had been introduced from Europe. The seed is usually sown along with wheat, rye, or some other cereal, as a means of protecting the young plants, and the grass becomes fit for cutting the second year. It attains a height of three to five feet, is tender and nutritious, and yields one to three tons of hay per acre. The stems are cylindrical and the flowers form a seeming spike. Timothy is a perennial plant. It comprises the greater part of the hay crop of the United States, and is grown extensively in Canada, especially in Ontario, but it taxes the soil more than clover. In England it is generally known as *herd's grass*. It requires considerable moisture early in the spring to develop a good crop.

TIN, a silvery-white and highly lustrous metal. It has a specific gravity of about 7.3. Tin is found in two ores—the native dioxide, called *tinstone*, and a sulphide of copper and tin, called *tin pyrites*. The only workable ore is the dioxide. The ore is crushed and the dioxide is separated from the lighter earthy matters by washing in a stream of water, and to expel the sulphur and arsenic the dioxide is roasted in a furnace. In this partially purified state it is mixed with charcoal and fed into a cupola furnace, where the combustion is supported by a blast of air. The reduced tin collects in the refining basins, where it is stirred in order to disperse the gases, which tends to reduce any oxide that has been formed and to bring foreign matters to the surface of the molten metal. The tin is further purified by melting at a moderate heat on the inclined hearth of a reverberatory furnace, and is made to pass into a cavity prepared for it, while the less fusible metals remain on the hearth. It is next cast into blocks, called *block tin*, while the purest specimens are known as *refined tin*.

Pure tin melts at 442° Fahr. It burns with a brilliant light when raised to a white heat, and at 212° Fahr. becomes sufficiently ductile to be drawn into wire. Air at ordinary temperatures does not affect it, but it absorbs oxygen when melted, and may be converted into the dioxide by stirring when in the melted condition. Nitric acid converts it into dioxide, giving off torrents

of red vapors. A bar of tin produces a peculiar noise when bent, due to the sliding of the crystals over one another. The sound thus produced is called the *cry of tin*.

Tin is probably one of the earliest known metals. It was obtained by the Phoenicians from Sicily and by the Romans from Spain, but the principal tin mines are in England, China, India, Australia, Bolivia, and the Malay Peninsula. Large deposits of native dioxide occur in Bohemia, Germany, Bolivia, Australia, and the Straits Settlements. Limited quantities are obtained in a number of the states, particularly in California and Missouri, but the tin used in the United States is quite largely of foreign importation. In 1908 England produced 4,500 tons of tin; Australia, 7,042 tons; Bolivia, 16,890 tons; and the Straits Settlements, 58,385 tons. In that year the United States imported 75,068,568 pounds, valued at \$19,500,000.

Tin is a highly useful metal, being employed in the manufacture of tinfoil, a product used for enveloping chocolate, tobacco, and other manufactures. It has an important use for tinning iron and copper, which is done by dipping the perfectly clean objects into a bath of molten tin. Its resistance to the action of vegetable acids renders it of economic value in coating knives, forks, spoons, and other household utensils. A number of alloys of tin are utilized, such as plumbers' solder, which is an alloy of tin and lead, and gun metal, bronze, and bell metal, which are alloys of tin and copper. Tin plating is a simpler process than gold plating, but is done similarly, the tinfoil being prepared by rolling cast tin into plates, after which they are beaten and doubled as in goldfoil.

TINDER, a material used for kindling fires before the invention of matches. It is made of half-burned linen, partially decayed wood, and certain fungi, the last named furnishing the so-called *German tinder*. In kindling fires with tinder, it is necessary to have materials that cause sparks by striking, such as a piece of steel with a flint, and the spark is made to ignite the tinder, which in turn inflames a match dipped in sulphur.

TIPPECANOE (tĭp-pĕ-kā-nō'), a river in northern Indiana, which rises in Lake Tippecanoe and, after flowing 200 miles toward the southwest, joins the Wabash eight miles above Lafayette. It was made famous in history by a battle fought on its banks on Nov. 5, 1811, when General Harrison routed the Indians under Elskwatawa, brother of Tecumseh, who was assisted by the chiefs Stone Eater, White Loon, and Winnemac. General Harrison gained considerable prestige in this battle, and when he was a

candidate for President, in 1840, the cry "Tippecanoe and Tyler, too," became popular. Battleground, a village in Tippecanoe County, Indiana, is near the site of the battle. The valley of the Tippecanoe is highly fertile, producing cereals, grasses, and fruits.

TIRLEMONT (tĕr-l'-'mōn'), a city in Belgium, on the Geete River, 31 miles east of Brussels. It is conveniently connected by railway with European trade emporiums, has numerous manufactures, and is surrounded by a fertile region. Among the noteworthy buildings are the Church of Saint Germain, the Church of Notre Dame du Lac, and the city hall and jail. The city is celebrated on account of a success of the French under Dumouriez over the Austrians in 1793. Population, 1906, 18,540.

TIRYNS, an ancient city of Greece, near the Gulf of Argolis, a short distance southeast of Argos. It belongs to the prehistoric period of the Achaean race and is supposed to have been founded by Proetus, a legendary king of Argolis. The city was the home of Hercules and the refuge of the Cyclops, who built massive walls of solid masonry. Tiryns is thought to have reached its greatest splendor in the 11th and 10th centuries B. C., but it remained a powerful city until 468 B. C., when it was destroyed by the people of Argos. Schliemann made excavations on its site in 1884 and found remains of Greek palaces dating from the 10th century B. C. Some of the finest specimens of Cyclopean architecture extant were secured from its remains, among them a fine frieze of white alabaster. This relic is studded with enamel and glass, and the decorations are interlaced with fine sculptures in relief. Remains of walls and palaces indicate elaborate and substantial stone masonry.

TISSUES (tĭsh'ūz). See **Connective Tissue**.

TITANIUM (tĭ-tā'nĭ-ŭm), a metallic element discovered in 1789, so named from the Titans. Although it was first discovered by William McGregor, Berzelius was the first to separate this metal in a state of purity. It occurs as a mineral in three forms—as brookite, which crystallizes in the trimetric system, and as anatase and rutile, both of which crystallize in the dimetric system, although with different angles. Titanium is a heavy, dark green powder, and burns with a brilliant white flame. The hardness and strength of steel is increased by adding a small quantity of this metal. It is employed to some extent in the carbon points of arc lamps and to increase the luster of silver. This metal is found in many parts of North America and Europe, especially in Vermont, New Hampshire, New Brunswick, England, and Germany.

TITHES (tīthz), a tax of one-tenth of the profit derived from the use of land. The name is from the Anglo-Saxon word *teotha*, meaning *a tenth part*. Formerly tithes were levied very extensively for the assistance of the poor and to support religious worship, but at present this form of taxation is not in extensive use. It is mentioned in Gen. xiv, 20, and was levied among the Jews to support the Levites, the priestly class. The second council of Tours, in 567, passed the first enactment for that purpose, and it was afterward enforced under pain of excommunication. Later other countries of Europe established this system of taxation, the first constitutional decree of a synod in England dating from 786. After that time all the lands, except those of the crown and of the church itself, were tithable, but after the Reformation many of the church lands were exempted as a condition of sale of these lands to private owners. These partial exemptions caused those who were required to pay the taxes to become dissatisfied and they made a complaint for two centuries. Since the year 1200 all landowners in England have been required to pay tithes for the support of the clergy in their respective parishes, but the payment is now in money instead of a part of the products.

The Roman Catholic clergy collect tithes in Quebec, under a French law which is still enforced. No tithes were ever levied in the United States, except by the Mormon church, which levies tithes under a system that is modeled after the Jewish law. Some Protestant denominations, as the Adventists, voluntarily pay one-tenth of their income to the support of the church.

TITICACA (tīt-ē-kā'kā), a lake in South America, on the boundary between Peru and Bolivia, about 200 miles from the Pacific. The length is 130 miles; width, 35 miles; and elevation above sea level, 12,575 feet. It receives the inflow from many small streams, but has no outlet to the sea, discharging into Lake Aullagas, from which the water finally evaporates in salt marshes. The lake abounds in valuable fish and contains a number of islands. It has an area of 3,275 square miles. In the vicinity of the lake and on a number of the islands are ruins dating from the prehistoric period of America, the extent and workmanship of which give evidence of a higher civilization than that found when the region was explored by the Spanish. Some of the ruins contain remnants of substantially constructed walls, finely sculptured blocks of stone, and figures of men and animals cut on the sides toward the interior. The lake was navigated by steamboats as early as 1871, the vessels being

carried across the country in pieces and put together at the lake shore. Several railroad lines now extend to the vicinity of the lake, one from Cuzco and another from Arequipa. Puno is the principal railroad town and lake port on the western shore.

TITLARK (tīt'lärk), or **Pipit**, a class of birds resembling the larks both in habit and appearance, closely allied to the wagtails. The *meadow pipit* is the smallest and most widely distributed of the species. It is dark olive-brown, with greenish markings on the upper parts, and brownish-white beneath. The greenish tint on the back becomes more conspicuous in the autumn. Its body is about six inches long, the wings are very long, and the tail is slightly notched. The nests are built on the ground, usually in a tuft of grass. Another species common to America is the so-called *American titlark*, which closely resembles the water pipit of Europe. These two species are the only ones native to America, but there are fully fifty species in the genus, and representatives are found in nearly all countries of the world. They usually lay five or six eggs, both sexes incubating.

TITLE, in law, the term used to designate ownership of property, based upon all the elements which constitute title to real estate or personal property. It involves the elements of possession and the right of possession, and is based either upon title by descent or by purchase. Inheritance is the single mode of acquiring title by descent, while all other methods refer to title by purchase. However, the death of the owner operates to transfer property in various modes, which may be classed as by will, by descent without will, by occupancy, and by verbal gift, though the amount transferred by the last mentioned method is limited to personal property.

Title by *purchase* is based upon original acquisition, as by finding or government grant; *lapse of time*, as by possession for a certain length of time; *eminent domain*, as taking land for public use; and *conveyance*, as by gift or sale. In the sale of real estate it is essential to examine the title set out in a statement called an *abstract of title*. Such a statement contains a complete history of all the transfers that have been made from the beginning or from some public act, as of a legislature. It shows whether any taxes or assessments are unpaid, what mortgages or judgments affect the title, and the nature of the title of the grantee in the property. An abstract of title is required under the law of England, and it is usually given voluntarily in Canada and the United States.

The term *title* is applied in legislation to that

part of an act by which it is known and distinguished from other acts. It is a requirement in most states and countries that the subject of every act be expressed in the title thereof. The term *title* is applied in pleading to the words whereby a particular suit at law is designated. It consists in most cases of the name of the court, the venue, or place of trial, and the parties to the same.

TITLES OF HONOR, the designations by which persons are addressed in consequence of some office or dignity in their possession or inherent in them. They were used to a limited extent among the Greeks, but the Romans bestowed them more freely upon their public officials. The honorary title of *Magnus* pertained to the descendants of Pompey, while those of *Africanus* and *Asiaticus* had reference to those who descended from Scipio. Some offices carried their titles with them, independent of the merits or services of the incumbent, as the words *Caesar* and *Augustus*. These originally were family names, but they came to be applied to all who held the imperial throne of Rome.

Many titles are in use at present, but they are confined chiefly to monarchical governments. Those applied to chief rulers are termed sovereign titles, as *King of England* and *Emperor of Austria*. The Russian title *Czar* and the German title *Kaiser* were derived from Caesar and correspond to emperor. *Mikado* is the title used in Japan, and *Sultan* and *Shah* are sovereign titles of Persia and Turkey. Minor titles include duke, prince, marquis, archduke, viscount, baron, knight, baronet, esquire, and chevalier. It is customary to prefix certain terms before the title, as majesty, royal highness, his excellency, etc.

TITMOUSE (tīt'mous), or **Tit**, a subfamily of birds belonging to the warblers. They are remarkable for their boldly defined color, quick movements, and skill in flitting from tree to tree. They feed on grain, seeds, and insects, catching the last named while on the wing. The female defends its nest and young with much courage. It has been observed that a pair of blue tits carry flies and other pests to their nests every few minutes, thus making them extremely serviceable in the destruction of obnoxious insects, especially caterpillars. The American species include the tufted titmouse, the chickadee, the bush tit, and the verdine. The *tufted titmouse* is the largest of the American species and the *verdine* is one of the most beautiful, having a yellow head and chest and a grayish back. Among the species native to Europe are the *blue tit*, called also *tomtit*, the *great titmouse*, the *hanging tit*, and the *bluecap tit*. Most tits have

a shrill and wild voice, but imitate the voice of other birds.

TITUS, Arch of, a triumphal arch on the Sacred Way, in Rome, facing the Forum. It was erected in 81 A. D. by Domitian to commemorate the capture of Jerusalem by Titus. The material used is chiefly Pentelic marble. It is adorned with reliefs to represent the triumph of Titus, and contains a representation of the seven-branched candlesticks and the shewbread upon the table.

TITUS, Epistle to, a book of the New Testament, written by Saint Paul to Titus. It is included with the two epistles to Timothy in the writings termed pastoral letters. Titus appears to have been left in Crete, and the apostle laid down certain rules of conduct and warned him against certain false teachers. He describes the virtues that become all classes, warns against idle speculations, and encourages obedience, gentleness, and moderation.

TITUSVILLE (tī'tūs-vīl), a city of Pennsylvania, in Crawford County, 18 miles north of Oil City, on the Pennsylvania and the Dunkirk, Allegheny Valley, and Pittsburg railroads. It is finely located on Oil Creek and is the center of a coal and oil producing region. Among the features are the high school, the public library, the city hall, several large oil refineries, and a number of fine schools and churches. The manufactures include machinery, stoves, hardware, chemicals, oil, and earthenware. It has good municipal facilities, such as sewerage, waterworks, electric lighting, and street pavements. The first oil well in the United States was sunk and operated here in 1859. Titusville was settled in 1796 and chartered as a city in 1866. Sixty lives and much property were destroyed by a flood and fire in 1892, when several oil tanks were burned. Population, 1900, 8,244; in 1910, 8,533.

TIVOLI (tīv'ō-lī), a city in Italy, on an elevated slope of Monte Ripoli, 17 miles northeast of Rome. It occupies a site on the Teverone River, the ancient Anio, which joins the Tiber near Rome. The streets are mostly narrow and tortuous, but it has a number of fine buildings, among them the cathedral, known anciently as the Temple of Hercules, which served as a court in the time of Augustus. Near the Teverone River, which has a magnificent falls at Tivoli, is the Temple of Vesta, a structure dating from 70 B. C. In its vicinity are remains of baths, mausoleums, aqueducts, and villas dating from the time of the Roman emperors, especially that of Hadrian. The city is thought to have been founded in 446 B. C. and is mentioned in the poems of Virgil, Propertius, Horace, and Catul-

lus. It was a favorite resort of Numidicus, Scipio, Marius, and other Romans. Here Queen Zenobia of Palmyra and King Syphax of Numidia spent their last days. Beautiful gardens, orchards, and vineyards surround it, giving the city a most pleasing appearance, especially when the orchards are decked with flowers in the spring and laden with fruit in autumn. Population, 1906, 12,108.

TOADFLAX, a genus of plants found in the temperate and colder regions. It grows both in fields and highways, and in some sections is considered a troublesome weed. The stem is from one to three feet tall and has narrow leaves. The yellowish flowers appear on a terminal spike. Locally it is called *snapdragon* and *butter-and-eggs*.

TOADS, a genus of tailless amphibians allied to the frogs, but differing from them in



TOADS.

1, Common toad; 2, Natterjack toad; 3, Surinam toad.

having a thicker and more clumsy body. The hind legs are short and the toes are slightly webbed, thus making it impossible to leap with facility. The common toads have toothless jaws and rounded muzzles, and the skin is covered with warts containing glands that secrete a yellowish, irritant fluid. They spend most of their time in moist and shady places, but come out in the evening in search of food, which consists of insects, worms, and small shelled animals. The winter is spent in a hole or other place of hiding, in a torpid state, from which they emerge after the return of warm weather in the spring. They are scarcely able to swim, their feet being insufficiently webbed, and they take to water only to deposit their eggs. The eggs are laid in spring and are fertilized externally at the moment of extrusion, and, like those of the frog, are held in a gelatinous tube or envelope, which is coiled spirally in the water. Tadpoles similar to those of the frog soon develop, and they be-

come toads on shedding their gills and tails. Toads are useful for the destruction of insects and grubs in gardens, which they catch by suddenly protruding the tongue, and for that purpose are kept in some of the larger gardens and hothouses. They may be tamed and trained to act with considerable intelligence. Many widely different species have been described. They are found in all the continents and larger islands, though their occurrence is rare in Australia and the Celebes. Ten species are native to North America.

TOBACCO (tō-bāk'kō), a widely cultivated plant of the nightshade order, belonging to the genus *Nicotiana Tobacum*. The upright stem of the common tobacco plant grows to a height of three to five feet, has lance-shaped leaves fully five to eighteen inches long, and bears rose-colored and terminal flowers. The stem and

leaves are covered with hairs, which are glandular and viscid at the tip. All species possess narcotic properties, for which some are cultivated extensively in the tropical and temperate zones. Tobacco is native to the tropical regions of America, and was unknown in Europe prior to the discovery of the New World by Columbus. The genus is called *Nicotiana*, from a Frenchman named Jean Nicot, who sent seeds of the plant to France in the time of Catherine de' Medici. It probably came to be called *tobacco* from Tobaca, an island near Trinidad, whence a Span-

iard introduced it into Portugal and Spain in 1559. From the Spanish peninsula it was successively introduced into France, Germany, Denmark, and England.

USES OF TOBACCO. The smoking of tobacco was practiced in America at the time of its discovery, but the plant was first used in Europe in the form of snuff, smoking being introduced later by Sir Walter Raleigh. The use of tobacco was opposed by many priests, sovereigns, and learned men, and the practice was met by the severest opposition. Users of tobacco were tortured in Russia, executed in Turkey, and fined and imprisoned in Switzerland, and Popes Urban VIII. and Innocent IX. issued bulls against it. James I. of England published a proclamation against the use of tobacco, describing it as harmful to the brain, hateful to the nose, dangerous to the lungs, and injurious to the eyes. However, the tobacco habit spread alike to the high and low, among the Christians and Moham-

medans, and in fact among all classes and in all countries. In America and most European countries the nature and harmful effect of tobacco upon the human system are taught in the schools in connection with the subject of physiology, and it is hoped that under a system of rational instruction the habit of using it will be entirely eradicated among the young, as well as limited generally.

CULTIVATION. The two classes of tobacco that are most extensively cultivated are the *Virginian* and the *green tobacco*, but allied species have been obtained by propagation. It is aimed to select for commercial cultivation the plants bearing the largest and most numerous leaves, though



TOBACCO IN BLOOM.

hardiness in enduring the climate is also an objective point. The seeds are sown early in the season in beds, and when the young plants are about four inches high they are transplanted in a field containing rich soil. Transplanting takes place about the early part of May, this depending upon the latitude and season, since the plants are easily affected by frost. The young plants are placed in the ground in rows about four feet apart, thus facilitating cultivation by machinery. It is necessary to guard against injury by insects, especially the tobacco worm, a caterpillar which is fond of the leaves. The stalks are topped and freed from false leaves or suckers appearing at the bottom, the purpose being to direct the growth of the plant so as to develop the largest leaves possible.

The plants mature in about three months after being transplanted, and they are then cut immediately above the ground and hung in the tobacco

barn with heads downward. Tobacco barns are buildings with the sides and ends open, thus allowing the air to pass through freely. In some countries the barns are inclosed and the plants are dried by means of artificial heat, usually 100° at first, and later the temperature is raised to 175°. The portion having a light and even color is considered of the finest flavor and brings the highest price in the market. When thoroughly dried, the tobacco is crated and transported to the manufacturer.

Tobacco is grown in North America chiefly from Florida to Wisconsin and along the Atlantic coast as far north as New Brunswick. However, the finest quality comes from Cuba. Other countries that yield large quantities include China, Austria-Hungary, Russia, Germany, France, Borneo, the Philippines, Ceylon, Brazil, Spain and Australia.

MANUFACTURE. The manufacture of products from tobacco is one of the great industries, involving a large capital and employing many thousands of laborers. When taken to the factory the leaves are cleansed with salt and water and the midrib of the leaf is removed. The largest and finest cured leaves are set aside for *cigars*. Other grades are used for *smoking* tobacco and for *snuff*. Snuff is made largely of the midrib, and the inferior grades of smoking tobacco are obtained from the smaller leaf ribs and waste in cigar making. *Plug*, or *chewing*, tobacco is chiefly manufactured from a middle class of leaves, which are moistened and pressed into cakes or sticks. *Cheroots* are made by rolling leaves in the shape of a slender cone, and *cigarettes*, by inclosing small particles of tobacco in a tubular paper wrapper. It is estimated that 875,000,000 people use tobacco and that the total annual consumption of the world reaches 1,250,000 tons. The annual consumption in the United States is given at 490,000,000 pounds. Large quantities of cigars are smoked in Canada and the United States, while snuff, cigarettes, and pipe tobacco are used more commonly in Europe. Tobacco is consumed more extensively as a sedative, or narcotic, than any similar substance, but it is rivaled by opium and next by hemp.

TOBACCO WORM, an insect which attacks and destroys the leaves of tobacco. It is the larva of a large green caterpillar, but is known as the tobacco worm while in the larval state. The pupa of this insect lies dormant in the ground during winter and the caterpillar comes out in May or June, when it begins to lay eggs on the under side of the tobacco leaf. As soon as the larvae hatch they begin to feed upon the plant, and do much damage by feeding vigorously. One or two broods appear each sum-

mer, depending upon the region where the tobacco is grown.

TOBAGO (tō-bā'gō), an island in the West Indies, situated 20 miles northeast of Trinidad and classed with the Windward group. The area is 114 square miles. It is of volcanic origin, has peaks elevated about 2,000 feet above the sea, and the general surface is mountainous. A large part of the island has a fertile soil, suitable for the cultivation of coffee, cotton, tobacco, and sugar cane. The plants resemble those of Trinidad and the northern part of South America. Columbus discovered the island in 1498. It was settled by the Dutch in 1632, but has been a British possession since 1763. For the purpose of government it is a dependency of the colony of Trinidad. Scarborough is the capital and principal port. About 200 of the inhabitants are whites. Population, 1906, 18,858.

TOBOGGAN (tō-bōg'gan), a vehicle for coasting upon the snow and ice. It differs from a sled in that the bottom is flat and is not provided with runners. Toboggans were used originally by the Indians of Canada to convey dead game over the new snow. They constructed these vehicles of slabs of birch. This mode of construction gave them the advantage of light vehicles that could be pulled easily over loose snow and even over rough ground. Strips of whalebone are used for making toboggans among the Eskimos, and some tribes employ dried bark.

Toboggans for sporting purposes are made chiefly of thin strips of wood, such as ash or maple, and are about eighteen inches wide and six to ten feet long. They carry from two to four occupants. The vehicle is taken to the upper end of a slideway, consisting of one or more chutes, covered with snow or ice. The speedway is from 500 to 900 yards long and inclines sufficiently to permit attaining a great speed. In some cities toboggan slides are constructed in parks for the free use of children, who may use either sleds or toboggans. However, in some localities tobogganing is a private enterprise and those who take part in the pastime pay a small fee.

TOBOL (tā-bōl'y'), a river of Asia, in Western Siberia. It rises in the southern part of the Ural Mountains, has a general direction toward the northeast, and discharges into the Irtish near Tobolsk. The Tobol is about 745 miles long and is navigable about half that distance.

TOBOLSK (tō-bōl'sk'), a city of Siberia, capital of the government of Tobolsk, at the confluence of the Tobol and the Irtish. It is on a branch of the Trans-Siberian Railway, about 300 miles northwest of Omsk, and is the

center of a large trade in furs, fish, and live stock. The chief buildings include the museum, a seminary, a gymnasium, and several churches. A monument erected to the memory of Yurmak, a Russian pioneer in Siberia, stands in the public square. It has manufactures of soap, leather, clothing, cured meat, and sailing vessels. The city was founded in 1587, hence is one of the oldest Russian settlements in Siberia. Population, 1908, 20,500.

TOCANTINS (tō-kän-tēns'), a river in Brazil, which rises in the government of Goyaz by several branches, and, after a course of 1,575 miles toward the north, flows into the Atlantic by the estuary of the Rio Pará. The principal tributary is the Araguayá, which it receives in latitude 6° south. It is eight miles wide at its mouth, and the tide affects it fully 300 miles from its mergence into the Pará. Boats ascend it for 1,025 miles, but navigation is obstructed in several places by extensive falls and rapids, particularly between the Araguayá and the Pará. The valley is fertile and contains fine forests of valuable timber.

TODY (tō'dy'), a genus of birds found in the West Indies, related to the bee-eaters and kingfishers. The bill is long and much depressed, the wings are short and rounded, and the tail is quite short. Most of the species are small birds, not more than three inches in length, and the plumage is richly colored with green and red. The *common green tody* is native to Jamaica and is frequently called robin redbreast. Several species are found in the northern part of South America. These birds frequent damp places, living alone most of the time, and feed upon insects and the tender part of plants. They are easily approached and caught, being somewhat dull and stupid.

TOGA (tō'gā), a popular garment worn by the Romans, constituting the principal outer article of attire. While it differed somewhat in fashion at various periods, the general form was semicircular. One corner of the garment was placed upon the left shoulder and the remainder passed behind the body, over the right shoulder and across the breast, the end being thrown back over the left shoulder. The garment reached nearly to the feet, behind the wearer. The togas worn by officers were made chiefly of white woolen cloth, while children and both sexes wore patterns in white with a broad purple border. After the introduction of the *sola*, that garment was assigned to the women, while the toga became the peculiar distinction of Roman men. Exiles and foreigners were not permitted to wear it. In the home the *tunica* was regarded sufficient, but the toga was worn out of door,

and later more convenient garments of foreign origin were added to the costume.

TOGOLAND (tō'gō-länd), a colonial possession of Germany, situated on the Gulf of Guinea, between Dahomey and Ashanti. The coast is only 32 miles long, but inland the country broadens considerably. It has an area of 33,750 square miles. The Volta River forms a part of the western boundary and is the principal stream, but there are numerous others of more or less importance. The country has a general rise from the coast toward the inland, the surface being low and level along the gulf and considerably elevated in the northern part. Among the principal productions are coffee, maize, wheat, rye, barley, ivory, palm oil, gums, and many varieties of fruits. Fine forests are abundant, including the rubber tree, oil palms, cocoa, and dyewoods. The native manufactures embrace textiles, pottery, clothing, and utensils. Togoland has a considerable trade in native products, and imports cotton goods and machinery. The colony is not only self-supporting, but yields a fair revenue. The government is administered by a residential imperial commissioner. Lomo is the chief port and capital. Togo, on a lake of the same name, is the principal native town. Togoland became German territory in 1884. Population, 1908, 1,450,000.

TOKAT (tō-kät'), or **Tocat**, a city in Asiatic Turkey, in the vilayet of Sivas, about 60 miles south of the Black Sea and 375 miles southeast of Constantinople. It occupies a site among elevated hills, thus giving it an almost unbearable heat in the summer. The region is noted for its extensive gardens and vineyards. Tokat has a considerable trade in merchandise, fruits, camels, and textiles. The streets are mostly narrow and tortuous. Besides several cotton printing and dyeing institutions, it has several smelters for iron and copper ore. A large majority of the inhabitants are Turks. Population, 1906, 31,465.

TOKAY (tō-kā'), a town in Hungary, at the confluence of the Bodrog and Theiss rivers, 41 miles north of Debreczin. It is noted for a kind of wine made from grapes grown in the vicinity, the product being known in the market as *Tokay wine*. Vast vineyards cover the regions adjacent to the town, fully 18,000 acres being utilized for grape culture. The wine made from the Tokay grapes is of a greenish hue and possesses a fine flavor and an agreeable taste. Imitations of this grade of wine are sold in the market. Fully 1,575,000 gallons of Tokay wine are produced annually, and large quantities of it are exported to foreign countries. The town

is unimportant, having a population, in 1906, of 5,870.

TOKIO (tō'kê-ō), or **Tokyo**, formerly Yeddo, the capital and most important city of Japan, on the island of Hondo, separated into two parts by the Sumida River, which discharges into the Bay of Tokio at this place. It occupies a fine site on the north shore of the Bay of Tokio, has railroad facilities, and is one of the best built cities of Asia. Most of the streets are wide and regularly platted, crossing each other at right angles. They have substantial pavements and are lighted by gas and electricity. It has an extensive system of waterworks, telephones, and sewerage, and the streets are kept clean and free from rubbish. Among the principal buildings is the court of the Mikado, who has his residence at Tokio. Among the noteworthy buildings are the mansion of the Barons of Mito, the public library, the Imperial Museum, the Temple of Sankakuji, the city hall, and the customhouse. The city contains a large number of Shinto shrines and Buddhist temples, about 800 elementary schools, and the national university. It is famous for its fine parks and gardens of flowers.

Tokio has a vast system of electric railways and large railroad and machine shops. Among the manufactures are silk goods, cotton and woolen textiles, paper, carriages, vehicles, sailing vessels, machinery, clothing, toys, and chemicals. The interior and foreign trade is considerable. The harbor, being both commodious and secure, is the seat of much activity in commercial enterprises, having steamship connections with the chief ports of the world. It has a large wholesaling and jobbing trade, both with the cities of Japan and Corea. The government is administered by a mayor, a municipal council, and a municipal assembly.

Yeddo was made the seat of the Japanese government by Iyeyasu in 1600, since which time it has continued to be the principal seat of governmental and social influences. The name was changed to Tokio in 1868, when a revolution displaced the Shogun government and established the court of the Mikado. Commodore Perry concluded a treaty between the United States and Japan in 1854, by which it became open to foreign trade. Formerly the foreign legations were confined to particular parts of the city, but the extra territoriality has been abolished. Population, 1906, 2,063,828.

TOKIO, University of, an institution of higher learning founded at Tokio, Japan, in 1868, by the union of two schools. This institution is the outgrowth of extensive reforms in politics and social affairs, and occupies a high place in

the educational system of the country. It is supported by the government, under the administration of a board of councilors. The departments include those of the sciences, law, medicine, and engineering. Originally it had a faculty composed largely of foreigners, or natives trained in Europe, but at present instruction is almost exclusively in the hands of Japanese. It has a fine library, an observatory, and modern apparatus. The attendance is 3,250 students.

TOLEDO (tō-lē'dō), the third city of Ohio, county seat of Lucas County, on the Maumee River, 90 miles west of Cleveland. It is on the Wabash, the Grand Trunk, the Michigan Central, the Père Marquette, the Pennsylvania, the Lake Shore and Michigan Southern, the Cincinnati, the Chicago and Saint Louis, and other railways. Large vessels navigate the Maumee through the city, and it has an extensive harbor on Maumee Bay. Steamships of the largest size enter the city, furnishing direct communication with the leading ports of the Great Lakes. About 25 miles of docks are maintained in the harbor, a large part of which is devoted to ore and coal. A number of bridges span the river, which averages a half a mile in width, and a system of electric street railways furnishes communication with all parts of the city. A number of the electric lines extend inland to points within the State.

The city has an area of about forty square miles, extending on both sides of the river, and the business section is built largely upon ground that has been improved by grading. Originally the ground near Lake Erie and along the river was a swamp, while the settlements were made chiefly on two hills. However, extensive improvements have made the site safe and beautiful. Shade trees ornament the residential portions and the streets are paved largely with stone, brick, and asphalt. The parks include 850 acres. Walbridge Park, on the west side, has a fine herbarium and zoölogical gardens. Bay View Park is at the point where the river enters the bay, Riverside Park is farther upstream, and Navarre Park is on the east side. Other pleasure grounds include Collins Park, Ottawa Park, and Central Grove Park. A system of boulevards leads to the outlying parks. The city has a public cemetery that is self-supporting, and other burial grounds are maintained by private interests.

The county courthouse is located in a beautiful park in the central part of the city, which contains a fine statue of President McKinley. Other public buildings of note include the public library, the Masonic Temple, the Soldiers' Memorial Building, the Valentine Theater, the

Saint Paul's Church, the Saint Patrick's Church, the Toledo Club, and numerous office buildings. The city has about fifty public schools, including several high schools, and is the seat of a State normal school. It has the Toledo Medical College, the Saint John's College, and numerous hospitals and private educational institutions. A gallery of paintings is maintained by the Museum of Art. The public library contains 50,500 volumes.

Toledo has a large commercial and jobbing trade. It receives iron ore and lumber from the Lake Superior region of the Great Lakes, and is a distributing point for coal mined in Ohio and Pennsylvania. A fertile farming country is tributary to it, hence it is important as a market for grain, live stock, fruits, and vegetables. Among the larger industrial plants are wagon factories, blast furnaces, machine shops, glass works, breweries, and steel and iron foundries. The general manufactures include automobiles, clothing, earthenware, plate and cut glass, cigars, bicycles, flour and grist, scales and balances, and farming implements. The city has extensive systems of waterworks, sanitary sewerage, and gas and electric lighting.

The site of Toledo was formerly occupied by the Miami Indians, who made it a central point for hunting and trading expeditions. White men made the first settlement in 1832 and the city was chartered five years later. Both Ohio and Michigan claimed the surrounding territory, and the controversy is usually known as the *Toledo War*, though it consisted only of a prolonged discussion of legal points. The settlement of the State and the construction of the Wabash and Miami canals mark the beginning of its rapid growth. About one-fifth of the inhabitants are of foreign birth, chiefly Germans, Irish, and Scandinavians. Population, 1900, 131,822; in 1910, 168,497.

TOLEDO, a city of Spain, in a province of the same name, on the Tagus River, 54 miles southwest of Madrid. It is centrally located on a number of important railroads and is surrounded on three sides by the Tagus, which flows through a region of hills and constitutes a means of defense. The side not inclosed by the river is secured by strong walls, the inner of which was built in the 7th century by the Gothic king Wamba, and the outer wall was constructed in 1109 by Alfonso VI. The streets are narrow and tortuous and wind over the hills. They are illy paved. Among the most noted buildings is a fine Gothic cathedral, completed in 1492, and in the same vicinity are several large convents and churches. It has a number of government buildings, hospitals, secondary schools, and ruins

of a palace and fortress dating from the 16th century. Toledo was once a city of much commercial importance, but at present it has only a limited trade and few productive industries. The leading manufactures comprise the Toledo blades, a class of swords renowned for their fine temper for more than two centuries, but these are made under government supervision. Other manufactures include machinery, woolens, leather, paper, guitar strings, utensils, chemicals, and clothing. Toledo is a very ancient city and is intimately connected with the history of Spain. The Romans under Marius Pulvius captured it in 192 B. C., when it was important as a strategic and commercial point, and it was taken by the Moors in 714 A. D. Castile annexed it in 1085. The French occupied it from 1808 to 1813. It contained 200,000 inhabitants when in the height of its prosperity. Population, 1906, 24,208.

TOLTEC (tōl'tĕk), or **Tolteca**, the name of a native race in Mexico, which occupied a large part of that country before the arrival of the Aztecs. They had their capital at Tula, north of the valley of Mexico, where the Spaniards found extensive ruins at the time of the Spanish conquest. It is evident that these people were well advanced in agriculture and many of the mechanic arts. They were workers of clays and metals and invented a system of time which was later adopted by the Aztecs. They were the founders of the civilization which prevailed in ancient Mexico. It appears that they migrated from the north in the 7th century A. D. and expelled a savage race from Anahuac and that they themselves were driven out of the country by the Aztecs when that conquering tribe came from the north.

TOLTEC GORGE, a scenic cañon of the Rocky Mountains, in Colorado, on the Denver and Rio Grande Railroad. The railway line passes through a tunnel in the mountain forming the walls of the gorge, and as the train passes near the brink of the mountain side, fully 1,250 feet above the bottom of the cañon, a fine opportunity is afforded to observe the grand aspect of the walls of the gorge and the foaming water that dashes in torrents below. Few places in the Rocky Mountains present more beautiful and remarkable natural scenery. To the grandeur of the natural aspect are added the remarkable extent of trestle work and masterful ingenuity in constructing the railway through the rocks and along the edge of the precipice.

TOLUCA (tō-lōō'kā), a city of Mexico, capital of the state of Mexico, 35 miles southwest of the City of Mexico. It is situated on a lofty plateau, on the line of the Mexican National

Railway, and has a cool and healthful climate. The streets are clean and well improved. It has manufactures of flour, cotton and woolen goods, clothing, and earthenware. Toluca is thought to have been founded by the Toltecs and it was occupied by the Aztecs at the time of the conquest. Population, 1908, 25,940.

TOMAHAWK (tōm'ā-hāk), the name of a war club used by the Indians in North America, later extended to include the war hatchet. The Indians made these hatchets of stone, usually granite. They cut a depression or furrow on opposite sides, so as to permit fastening a wooden handle by means of sinews or cords of skin. Later, hatchets of steel, furnished by European traders, took the place of the primitive kind. Much skill was developed in the use of the tomahawk, which was either used in a hand-to-hand combat or thrown with great force, when it was directed so the edge would strike first. To bury the hatchet signifies peace, while to dig up the hatchet is equivalent to a declaration of war.

TOMATO (tō-mā'tō), a plant of the nightshade family, which is extensively cultivated for its edible fruit. The tomato is native to



CULTIVATED TOMATO.

South America, whence it was introduced to the United States about 1830. It is a weak-stemmed trailing annual with jagged leaves, resembling the potato in its general appearance, and bears small flowers of a yellowish color. Many species have been evolved by propagation, bearing fruit ranging in size from a small plum to that of a large apple. The fruit is shaped more or less irregularly and is mostly of a red or yellow color. The seed is sown early in March and the young plants are transplanted to the garden as soon as all danger of frost is past, though this mode of treatment applies only in the Tem-

perate zones. It is best to fasten the plants to a wall or other support where the sun may strike them with full effect, thus keeping the vines off the ground and hastening the ripening of the fruit. Tomatoes do not ripen much farther north than 45°. The fruit is used for a condiment before fully ripened, and the ripened product is eaten raw. However, its greatest value is in preparing sauces, preserves, and pies. Large quantities of tomatoes are canned and sold in the market at all seasons of the year. Maryland, New Jersey, Indiana, and California take the lead in the cultivation of this plant.

TOMB, a structure for the burial of the dead, usually of stone, either within the ground or upon the surface. In ancient times it was customary to construct tombs of great strength, and the dead were embalmed with the view of preserving the bodies until they would take on immortality. In many countries, as in Egypt, the highest efforts of art were bestowed upon the burial places. Remains of these are very extensive, some in a high state of preservation, and innumerable mummies are preserved that date back to the early kings of Egypt. The catacombs of Rome are among the remarkable tombs of antiquity, and similiar burial places are preserved in various parts of Greece. Such burial places are numerous in Asia, especially in regions that were occupied by the ancient Greeks. The most famous is the mausoleum of King Mausolus of Caria, whence the name mausoleum originated, and this tomb is counted one of the seven wonders of the ancient world.

During the Middle Ages it became customary to construct tombs, or sarcophagi, in the churches. Originally they were set on the floor of the church, but later tombs were constructed under the floor and stones with inscriptions were placed so as to make a part of the floor. This style continued in vogue until modern times, and many examples of it may be seen in America, as in the Saint Paul's Church of New York City and other ecclesiastical edifices dating from the pre-Revolutionary period. Another modern form of tombs is that used in constructing vaults entirely within the ground, in the form of a cistern, suitable for depositing a large number of corpses, as the burial place of Benjamin Franklin in Philadelphia. The largest number of tombs found in America at present is at New Orleans, where the ground is too damp for interment below the surface. These tombs are constructed of solid stone, above the surface of the ground, chiefly of granite. They resemble in appearance small buildings and are constructed on a regular plan so as to permit reaching them by walks and drives. The tombs

of New Orleans number several thousand and many of them are very beautiful.

TOMBIGBEE (töm-bîg'bê), a river of the United States, which rises in the northeastern part of Mississippi, enters Alabama a short distance below Columbus, and joins the Alabama River 45 miles above Mobile to form the Mobile River. The general course is toward the southeast, and the total length is 452 miles. It is navigable to Columbus, Miss., a distance of 410 miles from Mobile Bay. The Black Warrior River is its chief tributary, which joins it at Demopolis, Ala.

TOMSK (tôm'sk), a city of Siberia, on the Tom River, a tributary of the Obi, about midway between the boundary of Europe and Lake Baikal. It is reached by the Trans-Siberian Railway, with which it is connected by a short branch line. The manufactures include soap, spirituous liquors, leather, hardware, lumber products, clothing, and implements. It has a very extensive trade with the Mongols and Kal-mucks in the region lying south of Siberia, and contains a number of excellent government buildings, numerous churches, and an imperial university. The government of Tomsk, of which it is the capital, is one of the richest in Siberia. It has extensive mines of gold, silver, copper, zinc, lead, iron, and coal. It produces large quantities of wheat and other cereals and has extensive interests in rearing cattle, horses, and sheep. Tomsk was founded in 1610, but its greater prosperity dates from the construction of the railroad line connecting it with European trade centers. Population, 1906, 65,534.

TOM-TOM (töm'töm), or **Tam-Tam**, a musical instrument used by many Asiatics, chiefly in China and India. It is in the form of a metal disk, is concave in the central part, and is suspended from the neck by a loop. The player strikes the instrument with the fingers or a set of sticks that have a soft knob. The tom-tom is used to produce tones for dancers and in some cases to attract attention.

TON, a measure of weight used in Great Britain and the United States. It is equivalent to 20 standard hundredweights of 112 pounds each, or 2,240 pounds. This is the long ton, while the short ton contains 2,000 pounds. The hundredweight in the latter contains 100 pounds. Unless otherwise specified, it is understood that a ton consists of 2,240 pounds avoirdupois. The liquid ton, or tun, contains 252 gallons.

TONAWANDA (tôn-â-wôn'dâ), a city of New York, in Erie County, on the Niagara River and the Erie Canal, ten miles north of Buffalo. It is on the Wabash, the New York Central, the Erie, and other railroads. Among

the features are the public library, the high school, the armory, the public park, and electric railway connections with Buffalo and Niagara Falls. The chief manufactures are flour, iron-ware, lumber products, and machinery. Tonawanda is now practically united with North Tonawanda, which is situated in Niagara County. The census of 1910 accords the former a population of 8,290 and the latter, 11,955; total, 20,245. Tonawanda in 1905 had a population of 7,904; in 1910, 8,290.

TONE, in music, the sound produced by a sonorous body, as a string or a piece of metal. The term is specially applied to the larger intervals of the diatonic scale, while the smaller intervals are known as *semitones*. Tones are classified according to the qualities and relations of the sound, depending upon their place on the scale, as high or low tones, or as fine, clear, or feeble tones. Some writers use the words *step* and *halfstep* instead of *whole tone* and *semitone*.

TONGA ISLANDS (tō'ngà). See **Friendly Islands**.

TONGKING, or **Tonquin**, a French protectorate in the southeastern part of Indo-China. It is bounded on the north by China, east by China and the Gulf of Tongking, south by Annam and Siam, and west by Laos. The area is about 46,500 square miles. It is traversed by the Red, or Song-Koi River, which has an extensive delta as it enters the Gulf of Tongking. The eastern part is level and alluvial and the northern section is a plateau and is heavily timbered. Coal, copper, gold, and iron are mined. Among the chief crops are corn, opium, coffee, tobacco, rice, and sugar cane. Large interests are vested in growing live stock, especially cattle and buffaloes. A number of railways are in operation and the harbors are well improved for shipping. Hanoi and Haiphong are the chief commercial and manufacturing centers. Tongking remained an independent state until 1802, when it was annexed to Annam. In 1885 it was made a possession of France, to which country it belongs at present. The inhabitants are mostly Annamese and reside principally in the valley of the Red River. Population, 1906, 7,125,000.

TONGUE (tǔng), an organ situated in the mouth of nearly all vertebrates, though most completely developed in mammals. In man the tongue is a highly muscular organ, covered with mucous membrane, and the sides, upper surface, and front part are free to move under nerve stimuli. Hence, it is highly useful in mastication, deglutition, and the articulation of speech. The mucous membrane is covered by peculiarly developed papillae, or eminences,

which constitute the chief seat of the sense of taste. It has three kinds of papillae—the filiform, the fungiform, and the circumvallate. The *conical filiform papillae* are minute structures on the upper surface; the *fungiform papillae* are somewhat larger than the filiform and are scattered irregularly; and the *circumvallate papillae* are near the posterior part, forming eight to ten of the largest structures of this kind, and are somewhat V-shaped. A slight furrow, called the *raphe*, characterizes the tongue along the middle, extending nearly its whole length, and often terminates by a depression behind called the *foramen caecum*, into which mucous glands open.

A restraining band or fold, called the *frenum*, abridges the backward movement of the tongue-tip. A person in whom it extends quite to the tip is prevented more or less from the free use of the tongue in chewing and articulating speech. This occurs most frequently in children, who are then said to be *tongue-tied*. The tongue in the lower mammals is essentially the same as that in man. As a rule birds have a small, cartilaginous tongue, which serves in most species rather for prehension than taste, though some birds have a soft and fleshy tongue, as in the parrots, thus giving them ability to imitate the human voice. The horny tongue found in some birds is a prolongation of the hyoid bone. Most lizards have a long, protrusile tongue, usually forked, though in some species it is fleshy and not protrusile. In fishes the tongue is rather an organ of prehension than of taste, and in some species is covered with toothlike projections. The name tongue is applied loosely to very different structures in invertebrate animals. See **Taste**.

TONIC (tǒn'ík), a medicine used for increasing permanently the strength of organic action. It is intended to induce greater energy in all parts of the body, without necessarily causing any apparent or unusual increase in the healthy action of particular organs. Tonics are usually divided into two classes, those that influence the stomach so as to increase its digestive functions and those that pass directly into the blood and act as stimuli. Among the former are the bitters, such as gentian, boneset, quassia, and chamomile. Various preparations of salts and iron have a favorable influence upon digestion and exert an influence upon the blood. Bathing, friction, and open air exercises are tonics, although they are nonmedical in character.

TONKA BEAN (tǒn'kà bēn), or **Tonqua Bean**, a tree native to Guiana. It has pinnated leaves and purplish flowers. It bears a fibrous

drupe containing a single seed. The seed has a strong, agreeable odor, and is used in the adulteration of vanilla, for perfuming snuff, and for flavoring smoking tobacco. A number of drupes are put into chests to communicate a pleasant odor to clothes and preserve them from insects. The wood of the tonka bean is hard, heavy, and close-grained and is valued in making cabinetwork. The eboe tree belongs to the same class of plants. Although the fruit has no odor, the wood is valuable, being hard and durable.

TONNAGE (tŭn'nāj), the unit on which the assessment of dues and charges on shipping is based. The carrying capacity, or weight expressed in tons, is termed the tonnage of a ship. For each 100 cubic feet of internal measurement, it is reckoned that a vessel may carry a ton. This unit is sometimes used in buying and selling vessels. *Gross tonnage* is the entire space within the ship, while *net tonnage* is the actual space that may be used in carrying cargo or passengers. The term *displacement tonnage* signifies the weight of the contents and of the ship, when immersed to a fixed point, and *dead-weight tonnage* is the actual capacity that the vessel can safely carry.

TONSILS (tŏn'silz), the name of two ovoid bodies situated in the throat, one on each side, between the pillars of the fauces. They are almond-shaped, with the larger end directed upward, but vary in size in different individuals. The tonsils are classed with the ductless glands, but possess minute mucus follicles that give out a secretion which aids in the passage of the food. They are sometimes affected by an acute or chronic inflammation known as *tonsilitis*, which may be due to the presence of an infectious microorganism that may gain access through the mouth or nasal passages. Other causes are specific diseases, as scarlatina and smallpox. Severe attacks of tonsilitis may completely block the throat, or develop into *quinsy*. The tonsils are sometimes enlarged by a cold or sore throat. They may be removed without danger, and such an operation is sometimes necessary when they have become enlarged or supuration has set in.

TONSURE (tŏn'shŭr), the practice of shaving a portion of the hair from the head of a priest, as a mark of distinction between the clergy and the laity. It was not in vogue prior to the 5th century, but at that time the monks began to clip the hair in small places or to shave the entire head. This was done partly to show their contempt of the world. In the 6th century the clergy began to practice tonsuring. In 721 it was made obligatory on all priests by Pope

Gregory II. to use the so-called *tonsure of Peter*, which consists of shaving the entire head and leaving a circular crown of hair. The practice of shaving the front part of the head from ear to ear, known as the *tonsure of James*, was practiced in Ireland for many years. Priests, bishops, and cardinals of the Roman and Greek Catholic churches still practice this religious observance more or less extensively.

TOP, a toy used extensively by children. It is constructed in the form of a pear, either of wood or metal, and is made to spin on its point by drawing off a string wound round its stem or surface. A well-made top will spin on a smooth surface for some time and the motion may be continued by the use of a whip. Metal tops are hollow and have openings at the side, causing them to whistle when whirling at a high speed. The blending of colors can be illustrated by whirling a top whose upper part is painted differently, which, when in motion, shows the effect of mixing different colored pigments.

TOPAZ (tŏ'pāz), a mineral which has a high rank among the gems. It has a vitreous luster and is either transparent or translucent. The color ranges usually from white to yellow, but there are sometimes light shades of green, blue or red. Pure topaz has a specific gravity of 3.498, and its hardness is greater than that of quartz. It is composed of silicate of aluminum, with a little oxide of iron, and a quantity of fluoric acid. Topaz is found in many parts of the world, generally in primitive rocks. Fine specimens are obtained in Brazil, Ceylon, Siberia, Scotland, Germany, and at Cornwall, England. Brazilian topaz is regarded the most valuable and, when cut in facets, it closely approaches the brilliancy and luster of the diamond. False topaz is a variety of yellow quartz.

TOPEKA (tŏ-pē'kā), the capital of Kansas, county seat of Shawnee County, 65 miles west of Kansas City, on the Kansas River. It is on the Union Pacific, the Missouri Pacific, the Chicago, Rock Island and Pacific, and the Atchison, Topeka and Santa Fé railroads. The site is a rolling tract of land, elevated about 800 feet, and the river is crossed by a number of bridges. Many of the streets are paved substantially with brick and asphalt and avenues of trees make the residential part attractive. An extensive system of electric railways provides communication with all parts of the city and many points within the State. The streets are well lighted with gas and electricity and systems of waterworks and sewerage are maintained.

The State capitol, located in the heart of the city, is the most notable building. Other public edifices include the county courthouse, the public library, the post office, the city hall, and the auditorium. It is the seat of the Washburn College, the Kansas Medical College, the College of the Sisters of Bethany, the State insane asylum, the Santa Fé Railway Hospital, the State reform school, and a number of other institutions. The public library has about 30,000 volumes of well-selected books. The public schools are well graded and organized and the system culminates in a high school with advanced courses.

Topeka is surrounded by a fertile farming country, hence is important as a market for grain, live stock, and fruits. It has the extensive shops of the Santa Fé Railroad, flouring mills, steel and iron works, and numerous wholesale and jobbing houses. The general manufactures include machinery, clothing, earthenware, cured and packed meat, starch, and cigars. Topeka was platted in 1854 and became the center of antislavery men in the contest following the passage of the Kansas-Nebraska Bill. The so-called *Topeka Constitution* was adopted by an antislavery convention in 1856. It was chartered as a city the following year and in 1861 became the capital of the State. Population, 1905, 37,641; in 1910, 43,684.

TORNADO (tôr-nā'dô). See **Storms**.

TORONTO (tô-rôn'tô), the second city in Canada, capital of the Province of Ontario, 330 miles southwest of Montreal. It occupies a fine site on the northwestern shore of Lake On-



tario, on an inlet called the Bay of Toronto, near the Don River. An area of about 17.7 square miles is included in the city. The water frontage is about eight miles and the city extends inland over three miles. The harbor is one mile wide and five miles long. It is protected by a crescent formed island that serves as a natural breakwater. Ships of the largest

capacity are accommodated in the harbor, from which steamers sail to the leading ports on the Great Lakes. Railroad transportation is facilitated by the main lines and numerous branches of the Grand Trunk and the Canadian Pacific railways. An extensive system of electric street railways has lines to all parts of the city, with which are connected interurban railways that reach many towns and places of interest.

DESCRIPTION. The streets of Toronto are broad and regularly platted, crossing each other at right angles. Fine avenues of trees shade the residential sections, in which the lawns and parkings are well maintained. Queen's, or University, Park, near the western part, is a beautiful section of the city. It occupies a rolling tract sufficiently elevated above the lake to afford an outlook over the harbor, and within it is the monument erected to the memory of those who fell at Ridgeway in 1866. Other public grounds include Riverdale Park, Island Park, and the exhibition grounds. The last named tract is the seat of the annual fairs of the Industrial Association. All parts of the city are well drained. The public utilities include gas and electric lighting, waterworks, and sewerage. The pavements are constructed largely of stone, asphalt, and macadam.

BUILDINGS. The Parliament buildings, situated in Queen's Park, are of brown stone in the Romanesque style. Other buildings of note include the customhouse, the Governor's residence, the post office, the city hall, the Foresters' Temple, the Traders' Bank building, the county courthouse, the public library, and the King Edward and Queen's hotels. Among the institutions are the Victoria University, the Trinity College, the University of Toronto, the Knox College, the Upper Canada College, the Wycliffe College, the Saint Michael's College, the College of Technology, and the Government School of Practical Sciences. It has numerous hospitals, asylums, and scientific and educational associations. The leading ecclesiastical buildings include the Saint James's Cathedral, the Saint Michael's Cathedral, the Jarvis Street Baptist Church, the Metropolitan Methodist Church, the Bon Street Congregational Church, the Church of the Ascension, and the Saint James's and Saint Andrew's Presbyterian Church. The public library has over 100,000 volumes and branches are maintained for the accommodation of different parts of the city. Toronto Island, or Hanlon's Point, as it is generally called, is famous as a pleasure resort and is known as the Coney of Canada.

INDUSTRIES. Toronto is important as a jobbing and wholesaling center. It has a large lake

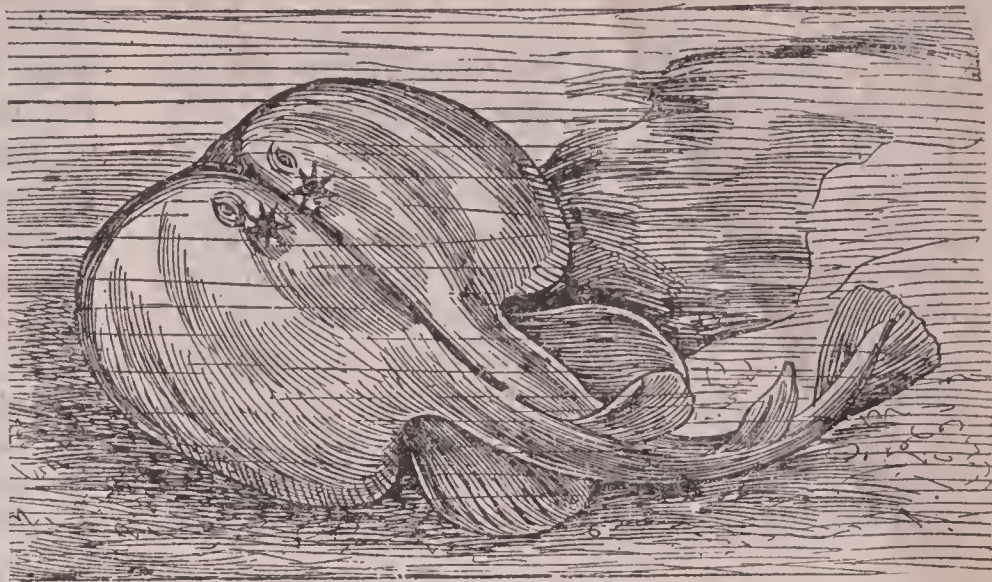
and railway trade in supplying markets in different parts of the Dominion. The manufacturing enterprises include shipyards, flour and grist mills, steel and iron foundries, railway shops, lumber yards, and brick yards. Among the general manufactures are clothing, boots and shoes, furniture, carpets, pianos, hardware, cigars and tobacco, bicycles, and spirituous liquors. Electric power is supplied from Niagara Falls.

HISTORY. Toronto was founded in 1794, when it was called York, and until 1841 served as the capital of Upper Canada. It became the capital of Ontario in 1867. The American army captured the city in 1813. Its greater prosperity dates from 1834, when the name was changed to Toronto and a charter of incorporation was granted it by the provincial legislature. Montreal is the only Canadian city that is larger than Toronto. Population, 1901, 208,040; 1909, including suburbs, 265,500.

TORONTO, University of, an educational institution at Toronto, Ontario, founded as King's College in 1827. It was formally opened for instruction in 1841 and the departments of law, medicine, arts, and divinity were established the following year. It received its present name in 1849 and since has undergone reorganizations that have contributed to make it one of the leading educational centers in America. In 1853 the functions of the institution were divided into the corporations of the University of Toronto and the University College (q. v.). The former has faculties in law, arts, medicine, applied sciences, and engineering. Courses are maintained in music, dentistry, agriculture, pharmacy, pedagogy, and domestic economy. With it are affiliated a number of professional institutions, and several colleges and universities are federated as a part of the university system. Both men and women are admitted. It has a library of 80,000 volumes and property valued at \$3,750,000. The enrollment averages about 1,750 students.

TORPEDO (tôr-pē'dô), a class of fishes allied to the rays and skates, having an electrical apparatus with which they stun or kill their prey and defend themselves against enemies. Six species are common in the Atlantic and Indian oceans. Three of these are native to the Mediterranean, but there are many allied species often spoken of as belonging to the same class. They vary in size. The larger specimens are about four feet long and two feet wide at the head, and weigh 50 to 75 pounds. On each side of the head is a mass composed of

plates and prisms, each forming a kidney-shaped enlargement, and within them are the electrical organs. These organs, frequently including many thousand plates and prisms, convert nervous energy into electricity. To complete the



TORPEDO.

circuit the animal or object aimed at must come in contact with two distinct points, either directly or through the medium of some conductor. Full-grown torpedoes are able to inflict a severe shock, the larger and healthy specimens being able to stun a man. The American species are dark brown above and white beneath. The larger specimens have a length of nearly five feet. They have from 250,000 to 300,000 plates in each battery.

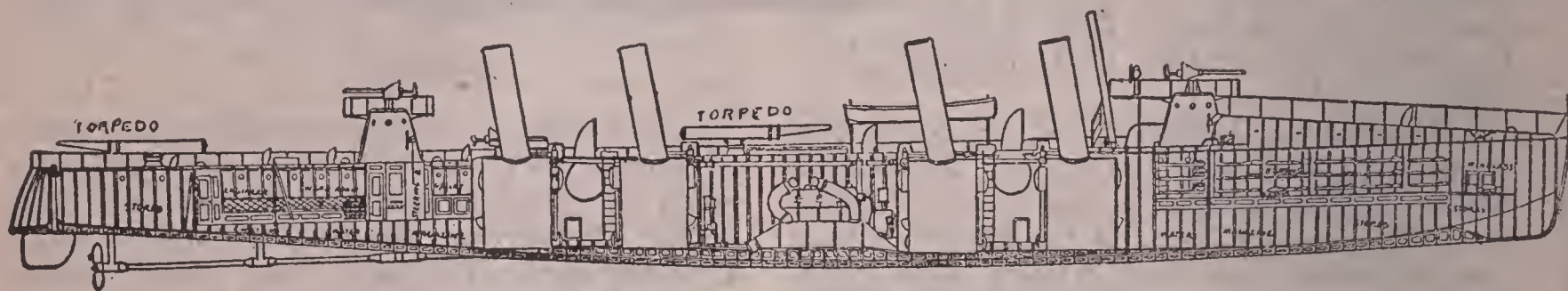
TORPEDO, a powerful military device, containing an explosive commonly designed to be fired by concussion. Two distinct forms of the torpedo are in general use. These are in the form of a cigar-shaped boat, which is projected and carries a powerful charge under water against a hostile vessel, and a submarine mine placed stationary in the water and intended for the destruction of vessels of an enemy. Torpedoes of a stationary nature are usually called *submarine mines* and others used for offensive operation are known as *locomotive torpedoes*. Three general classes of submarine mines are constructed. They include those fired from the shore by means of an electric current, when the enemy is observed within the area of the mine; those connected with the shore by an electric wire and fired when struck by a ship of the enemy; and those fired by some contrivance within themselves when struck by a vessel. Mines are placed in position in channels or near coasts to supply protection against the approach of vessels. They consist of a strong metallic case heavily charged with gun cotton or some equally effective explosive. Efforts to use tor-

pedoes in naval warfare were first made in the latter part of the 17th century, but no material progress resulted until the middle of the 18th century. However, the first successful application of them was made in the Civil War of the United States, within the period from 1861 to 1865.

Many ingenious and improved forms of the locomotive torpedo are now in successful use. The Sims-Edison is a typical form. It carries its own motor, but is controlled and receives its motive power from the shore through a controlling cable. The torpedo is mounted by a long boat-shaped float, usually fourteen to eighteen feet long and fourteen to eighteen inches in diameter, and is prevented from sinking by buoyant ballasts. In the front end is the dynamite or gun cotton, which explodes when coming in contact with a vessel. An elec-

but they have not proved effective in active service.

TORPEDO BOAT, the name of a vessel used in modern warfare, fitted to use the torpedo as a weapon with which to attack the enemy. Vessels of this class are of high speed and are fitted with apparatus to launch torpedoes with facility. In construction they are long, slender, and low in the water. They carry one or two torpedoes, which are on the deck and in such a position that they can be turned readily in any direction. Larger vessels carry the torpedoes near the side, while the smaller ones have them on the fore-and-aft midship line. At the time of battle the torpedo boat is employed to approach the ships of the enemy secretly, usually under cover of night or in a storm, and the torpedoes are thrown against the vessels. A brilliant search light is used to



VERTICAL SECTION OF A TORPEDO BOAT.

tric motor in the center supplies the power to drive the screw propeller at the stern, thus causing it to move forward in the direction desired by the person operating the controlling cable on the shore, and it is set off either by concussion or by an electric fuse. The Howell torpedo is discharged by powder from a firing tube, instead of being carried by a motor. The Patrick torpedo is propelled by carbonic acid and is one of the heaviest, weighing about 7,250 pounds. It is eighteen inches in diameter and forty feet in length. The Hall torpedo has a flask eight feet in length filled with compressed air, by which it is propelled instead of by electricity. Other modern implements of this kind include the Harvey, the Whitehead, and the Brennan torpedoes.

Most torpedoes have a balance rudder to regulate their depth below the surface, thus enabling them to be propelled in the water at any depth desired, and consequently may be fired at any distance above or below the armor of ironclad vessels. The implements of war are carried on torpedo boats (q. v.), which are especially fitted to launch torpedoes when the ships of the enemy are some distance from the land. As a protection against torpedoes, ships sometimes suspend nets made of steel rings from spars,

locate the opposing vessels, and as soon as the torpedoes are discharged the torpedo boat hastens to escape.

Four distinct classes of these vessels are in use, though they differ widely in construction. These include seagoing boats, harbor boats, torpedo boat destroyers, and portable boats, the last mentioned being carried by men of war. A *torpedo boat destroyer* is a torpedo boat of large size and high speed and is employed to combat against the approach of the enemy's torpedo boats as well as to destroy them. The newer style of vessels of this class is submarine, that is, it is capable of sailing under water. Two classes of submarine torpedo boats are in use, the submerged and the submergible. The former moves in the water with a small part of the hull exposed, while the latter, as the name indicates, is so constructed that it may be entirely submerged.

The best test of the torpedo boat in modern warfare was made during the Russo-Japanese War. It proved that the most serviceable torpedo boat destroyers have a length of 220 feet, a beam of over twenty feet, and a draft between nine and ten feet, giving a displacement of between 300 and 400 tons. These vessels were used successfully for scouting work, in fact

they took the place of ordinary cruisers with 5,000 tons displacement. Torpedoes were thrown so successfully against two of the best battleships and one of the finest cruisers of the Russian navy that they had to be beached.

TORRES STRAIT (tôr'rêz), a channel separating New Guinea from Australia. It was so named from Torres, who discovered it in 1606. It is eighty miles wide and is difficult to navigate on account of numerous reefs and shoals. Cape York, the northernmost point of Australia, projects into it.

TORRINGTON (tôr'ring-tün), a borough of Connecticut, in Litchfield County, on the Naugatuck River, 27 miles northwest of Hartford. It is on the New York, New Haven and Hartford Railroad and has communication by electric railways. The features include the public library, the municipal building, the high school, the public park, and the Y. M. C. A. building. Among the manufactures are hardware, woolen goods, clothing, bicycles, needles, plaited goods, nails, and machinery. The place

both a tort and a crime, as in the case of maintaining a nuisance or committing the offense of assault and battery. In either of these cases the injured party may recover damages and the offender may be punished under the criminal law.

TORTOISE (tôr'tis), a class of reptiles which belong to the same order as the turtles, but differing from them mainly in that they frequent the land, marshes, and inland waters, while the turtles live principally in the sea. The skeleton of both classes is mostly a horny inclosure of the body, which forms an outside bony case to protect the fleshy part and the true skeleton, and is covered by a skin or by horny epidermic plates. The upper part of the shell is called the *carapace* and is formed of bony plates fitting into or overlapping each other, while the lower part, or *plastron*, takes the place of the breastbone in other animals. In most species the latter consists of one piece. Inside the body proper is the true skeleton, the bones of which serve as levers for the animal



GREEN TURTLE.

TORTOISE.

was first incorporated in 1740 and became a borough in 1887. It is the birthplace of John Brown, the abolitionist. Population, 1910, 15,483.

TORSION BALANCE (tôr'shün bäl'ans), an apparatus used to measure delicate attractions and repulsions. The essential part consists of a metal wire, or a silk thread, to which a needle is attached, and the apparatus is suspended from a fixed point. The attraction or repulsion is measured by the resistance offered to it by the torsion of the wire, that is, by its being twisted.

TORT, in law, a civil wrong or injury, in contradistinction from a crime against the public or state. Tort may be committed where a contract or other agreements exist, but it is not necessary that a claim for damages be based upon a contract, since torts are injuries or infringements of the civil rights that belong to individuals. However, an offense may be

to propel itself. When walking or swimming, the head, legs, and tail are protruded from the shell, but in a state of rest or during a time of danger they are carefully drawn into the shell for protection. Some species have plates that may be closed down to protect the fleshy parts and the head when drawn into the shell. All are oviparous and lay 75 to 125 eggs at a time. The eggs are deposited in a sandy place near a marsh or body of water, where they are hatched by the heat of the sun.

The species are very numerous and the sizes range from small forms about the size of a hen's egg to the gigantic land tortoise of the tropics, which attains an age of 100 years and a weight of 875 pounds. Land tortoises are slow and awkward in their movements, but those living in water move with remarkable rapidity, either to seize their prey or to escape danger. The food of a few terrapins, land tortoises, and

some marine turtles consists of herbs, but many species are carnivorous, preying on frogs, fishes, and small aquatic animals. The *salt-marsh terrapin*, or *diamond back*, is native to the Atlantic coast of North America and is famous for its delicate flesh. It is caught in great numbers in summer and kept in pens for sale in winter, the females with eggs being considered the best. The *green turtle* is caught in large quantities in the West Indies and on the coast of the Gulf of Mexico. It is considered an important article of food.

Species of tortoise known as the *loggerhead turtles* are very common along the Atlantic coast of North and South America and Europe. They are also abundant in the Mediterranean. The flesh of the adult is rarely eaten, but that of the young is considered quite nutritious. The *hawksbill* is native to the warmer parts of America and is not eaten to any considerable extent, but it is caught in large numbers for its shell, the horny plates of which form the *tortoise shell* sold in the market. It is used for ornamental work. Tortoises are very numerous in all parts of the world, but they are not so large as the turtles. The *snapping turtle* found from Florida to New Brunswick is one of the largest, some specimens being four feet in length. Other species common to North America include the *mud tortoise*, *gopher tortoise*, *spotted tortoise*, *soft-shelled tortoise*, and *box tortoise*. Animals of this genus found in the Temperate zones hibernate. All reside throughout the year in the same locality, except the marine turtles, which migrate periodically to breeding stations. Many fossil turtles have been described, some of which attained an immense size.

TORTOISE SHELL, the name commonly applied to the scales that cover the shell of the hawksbill, a large turtle found in the tropical seas. These scales are remarkable for their plastic quality and under the influence of heat may be formed into various shapes. It is possible to weld pieces of the shells under pressure when heated. Artisans use the chips and filings after molding and shaping them when heated. Tortoise shell is used in the manufacture of toilet articles, such as combs and handkerchief boxes. The Romans used this material in veneering furniture, and products of this kind are still made by the Japanese. Horn and celluloid are used extensively as imitation of tortoise shell.

TORTUGAS. See *Dry Tortugas*.

TORTURE (tôr'tûr), a form of punishment employed to extract evidence from unwilling witnesses, to compel confession by inflicting pain, or to increase the punishment after ju-

dicial conviction. The Greeks used torture as a judicial procedure for the punishment of slaves, which was the case in Rome until in the later period of its history, when it was extended to various cases of a criminal nature. Torture was adopted as a form of punishment under ecclesiastical sanction about the middle of the 13th century, reaching its most hideous form in the practices of the Inquisition. The modes of punishment were very numerous, including the rack, an apparatus to stretch the body; the boot, containing pegs or wedges of iron; the thumbscrew; the scourge; and confinement in dungeons. Other forms were to pour melted lead in the ears, to cut off the limbs, to put out the eyes, to suspend the body over a slow-burning fire, to crush the body, and to crucify. In the last mentioned form the body was frequently covered with honey that insects might torment the helpless and unfortunate victim. Torture was employed in England until the reign of Charles I., but it continued in use in Scotland until near the beginning of the 18th century. Prussia and Austria abolished it about the middle of the 18th century, France in 1789, and Russia in 1801. A few cases of torture are on record in America, especially the case of Giles Corey of Salem, who, in 1692, refused to plead when arraigned for witchcraft. Cruel and unusual punishments are especially prohibited by the Constitution of the United States and by those of most states.

TORY (tō'rĭ), the name of a leading political party in Great Britain. It was originally applied to the Roman Catholic outlaws who lived in the marshy district of Ireland. About 1679 it came to be used as the name of all, irrespective of descent, who were opposed to the bill that excluded the Duke of York from succession. Those who favored the succession of the duke used the term to imply that his opponents had sympathies with the Roman Church. The name was finally adopted by the great political party that opposed the Whigs in British politics, but in 1830 this party was displaced by the Conservatives. The British loyalists during the American Revolution were called Tories.

TOTAL ABSTINENCE (tō'tal äb'stĭ-nens), a term commonly used to imply entire abstention from the use of alcoholic liquors, except under medical prescription. Temperance societies were first organized to limit the use of liquor to reasonable quantities, rather than to teach the duty of totally abstaining from using all forms of intoxicants. Members were pledged to observe moderation, calmness, and self-control, not only for their own good, but for the sake of their fellows. The history of the tem-

perance movement dates from ancient times, and we learn that the Jewish Nazarites acted on total abstinence principles. Mohammedans and the higher Hindu castes nominally abstained from intoxicating liquor, this being a religious obligation placed upon them.

The first temperance society on record is that of Saint Christopher, founded in Germany in 1517, whose members were pledged to exercise moderation. An organization formed at East Hampton, Long Island, in 1651, for the purpose of limiting the sale of intoxicants, was the first to be instituted in America. In 1789 a society of farmers was formed at Litchfield, Conn., the members pledging themselves to abstain from the use of liquor in their farm work. Total abstinence was recommended by H. Humphrey in 1812 and by Lyman Beecher soon after, thus giving rise to various temperance societies. However, the American Temperance Union was not instituted on the basis of total abstinence until in 1836. It was followed by a number of similar associations, and many powerful organizations with associated societies sprang up.

Among the influential temperance societies of America are the Washingtonian Temperance Society, organized in Baltimore in 1840; the Sons of Temperance, instituted in New York City in 1843; and the Independent Order of Good Templars, founded in the State of New York in 1851. The last mentioned adopted a platform in 1859, declaring for total abstinence, no license, and absolute prohibition. It is one of the most powerful organizations in the world, having at present 85 grand lodges, and a membership of 650,000. This number includes the juvenile branch with 181,382 members. The organization is in the form of a civic order, having a ritual, signs, and passwords. The Royal Templars of Temperance, formed in 1877, is a similar organization, but in addition has a form of life insurance and benefits for those who are in need or distress.

A temperance crusade was started at Washington Court House, Ohio, in 1873. It was an organized effort against saloons and resulted in closing many places where liquors were kept for sale. In these campaigns men and women armed with weapons and hymn books either persuaded the keepers to close their places of business or forcibly destroyed their wares. The most powerful society of temperance workers ever organized is the National Woman's Christian Temperance Union. It has auxiliaries in every State and Territory of the United States and is organized locally in more than 10,000 towns in the Union. Affiliated with it are branch organizations in Canada, the Hawaiian

Islands, Cuba, Great Britain, Japan, Madagascar, India, South Africa, the Philippines, France, Germany, Russia, and almost every civilized nation. This organization is a union of Christian women for the purpose of educating the young, reforming the drinking classes, stimulating public sentiment, and ultimately securing the abolition of the liquor traffic by legal enactments. The society owns the Woman's Temple, one of the finest buildings in Chicago, which is the headquarters and principal seat of influence.

The crusade against intemperance was materially stimulated in the British Isles by Theobald Mathew, who may justly be regarded the apostle of temperance in Ireland. He began work in 1838 and in less than a year secured 1,800,000 recruits to the cause. The Independent Order of Good Templars was founded in England by Joseph Malins in 1868, though similar organizations had operated some years previous. At present many allied organizations are maintained in Great Britain, including the Scottish Temperance League, the National Temperance League, and the Irish Temperance League. Cardinal Manning in 1873 began a vigorous temperance movement among the Roman Catholics. A greater interest is developing in favor of temperance in all countries under Christian influence, both along the line of moderation and total abstinence.

Prohibition of the sale and manufacture of liquor is another form of the temperance movement. Legal enactments were directed against the use of liquor as early as 1639 in the Massachusetts colony, and Connecticut and several other colonies enacted similar laws. Pennsylvania imposed a duty on imported liquors in 1756, and measures to abolish the manufacture have been introduced into the American Congress at different times. The first restrictive liquor law was passed in Maine in 1846, and in 1851 a more stringent prohibitory one, known as the *Maine Law* and drafted by Neal Dow, was enacted in its place. This law has been in effect practically ever since. Prohibition laws were enacted in New York, Vermont, Connecticut, New Hampshire, Kansas, Iowa, Rhode Island, and many other states, but they have been modified or repealed more or less at different times. More recently, from 1907 to 1910, prohibitory laws have been enacted in Georgia and other states of the South. Oklahoma has constitutional prohibition and many states have stringent local option laws. The enforcement of these laws has been largely obstructed by the importation of liquor from adjoining states, which, under prohibition, is sold in the packages in which it is imported or secretly through

vendors. The Prohibition party, a political organization, placed its first candidate for President before the people in 1872. This party advocates removing the liquor traffic by enacting a national prohibitory law, thus stopping both the manufacture and sale of intoxicants. See **Prohibition Party**.

TOTEMISM (tō'tēm-iz'm), a form of worship found in many savage communities, especially among the Indians of North America.



TOTEM POLES.

The word totem is from the Ojibway tongue and signifies a family or tribe. Various applications are made of the term totemism, but in general it may designate a clan, a religion, or a social aspect. The clan usually has a totem pole, on which are carved figures that represent the totem belonging to it. This pole, or rather the figures upon it, indicate political and social standing and at the same time are worshiped. Totem poles decorated with curious figures and colored variously are met with in many parts of Alaska and in the northern part of Canada. They vary in length from ten to fifty feet. When planted in the ground, only the portion having the figures is exposed and these are chiefly on one side. Poles of this class are made of the bodies of trees measuring from one to two feet in diameter.

TOUCAN (tōō'kăn), a class of climbing birds which are native to tropical America. They are noted for their immense beak, which is toothed along the margins of the mandibles. The *yellow toucan* is about eighteen inches long, the tail is short, and the bill is orange-red.

The beak is about nine inches long, but is comparatively light owing to its being penetrated by numerous air cells. About fifty species have been described, but all are American birds. The plumage of most toucans is gaudy, commonly diversified by red, blue, black, and yellow. Among familiar species are the *toco toucan*, the *aracari toucan*, and the *yellow-breasted toucan*.



TOUCAN.

These birds never approach houses, but instead live in the shade of the forests, usually in pairs, though at some seasons they congregate in small parties. Their diet consists almost exclusively of fruits, but in the absence of this kind of food they feed on fish, birds, and small quadrupeds. They may be tamed and kept in confinement but are much more beautiful in the native state. The food, after being swallowed, is brought up to undergo mastication, an operation corresponding to the chewing of the cud among ruminants.

TOUCH (tūch), the sense of feeling, giving man cognizance of solidity, temperature, smoothness, and other palpable properties of bodies. It is frequently called the *general sense*, since its nerves are spread over the whole body and

by it we become conscious of all sensory impressions which are not the objects of the four special senses of taste, sight, smell, or hearing. The principal end organs of the nerves of touch are in the skin, called the *papillae*, which are minute conical projections covering the cutis. Each one of these papillae contains the tiny nerve twigs, which receive the impression and transmit it to the brain, where the perception is produced.

Although there are terminal organs of the sensory nerves all over the body, the sense of touch is more acute in some places than in others, owing to the presence of a greater number of papillae. The points of the fingers are more sensitive than any other part of the body, being able to convey the largest number of different impressions, but the forehead requires less pressure to receive sensations than any other portion. Keeness of touch is likewise found in the tongue and the red parts of the lips. The least acute surfaces are those of the middle arm and thigh and of the middle of the back and the neck. This may be demonstrated by placing two objects in contact with the neck, when the sensation produced is that of one object, though the two points in contact with the skin are a short distance apart. The sense of touch is capable of a wide range of cultivation. Physicians acquire by practice the so-called *tactus eruditus*, or *learned touch*, and the blind develop a delicacy of touch that almost compensates the loss of sight. This is due to the sympathy between the different organs, since, when one sense fails, the others develop to remedy the defect.

TOUCHSTONE, or **Lydian Stone**, a hard variety of jasper, so named from its use in testing the purity of metals, which is done by rubbing them across the surface. The name *Lydian stone* is applied from Lydia, in Asia Minor, where a peculiar species is found. In making the test, a series of needles, known as *touch needles*, is used. The metal to be tested is first rubbed across the surface of the stone and then a needle of the same material is drawn across the surface, the purity being judged by the nature of the streak. In testing gold, a needle of pure gold is used and the streak made by it is compared to the streak made by the metal tested.

TOULON (tōō'-lōn), a seaport city of France, in the department of Var, 35 miles southeast of Marseilles. It occupies a sheltered site on the Mediterranean and ranks next to Brest as a naval stronghold of the republic. The city is defended by strong forts on the adjacent mountains, has well-constructed re-

doubts and arsenals, and contains a secure harbor. Among the principal buildings are the townhall, the military and naval schools, and a Romanesque cathedral dating from the 11th century. It has a large interior and foreign trade. The manufactures include cotton and woolen goods, silk textiles, pottery, ships, engines, and farming implements. The streets are wide and straight, crossing each other at right angles. Gas and electric lighting, rapid transit, waterworks, sewerage, and several fine parks are among the improvements. The Romans utilized the advantageous situation of Toulon in making it a trade port. It was destroyed by the Saracens in 889 and was captured by the allied army of Spain and England in 1793. Subsequently its fortifications were greatly strengthened and its harbor has been improved by the construction of moles. Population, 1906, 103,549.

TOULOUSE (tōō-lōōz'), a city of France, on the Garonne River, 140 miles southeast of Bordeaux. It is entered by a number of important railroad lines, has well-paved streets, and is improved by modern facilities. The city has gas and electric lighting, street railways, waterworks, fine public parks, and several institutions of higher learning. Among the noteworthy buildings are the Cathedral of Saint Etienne, the municipal theater, the palace of justice, the city hall, the central railroad station, the Church of Saint Sernin, the Musée, the university, and several hospitals, asylums, and professional institutions. It has a number of well-patronized associations of science, art, law, and economics. The manufactures embrace cloth, glass, paper, leather, starch, macaroni, pottery, furniture, flour, saddlery, tobacco, machinery, cutlery, wine, and musical instruments. Large quantities of agricultural, dairy, and fruit products are sold in the market. It has a vast trade in raw and manufactured silk. Toulouse was made the capital of the Visigoths in the 5th century. On April 10, 1814, it was the scene of a battle, in which the French under Soult were defeated by the allies under Wellington. Population, 1906, 149,438.

TOURCOING (tōōr-kwān'), a city in northern France, in the department of Le Nord, seven miles northeast of Lille. It has railroad facilities and is surrounded by a fertile agricultural and fruit-growing region. Among the chief buildings are the city hall, the public library, the Gothic church, and many schools. It is important for its extensive interests in the manufacture of cotton, linen, wool, and silk textiles, this enterprise employing about 50,000 spindles. Other manufactures include carpets, woven goods, soap, sugar, furniture, dyes, and ma-

chinery. The streets are regularly platted and well improved, having pavements, rapid transit, sewerage and waterworks. Population, 1906, 81,671.

TOURMALINE (tōōr'mā-līn), a crystalline mineral ranked among the gems, occurring in primitive rocks, usually in gneiss, granite, and mica slate. It includes opaque, transparent, and translucent species. The principal components are silica and alumina, these forming about three-fourths of the whole, the remainder being largely lime, magnesia, fluorine, iron, manganese, potash, and other substances. The prevailing colors are red, green, blue, brown, and black, though colorless specimens are not rare. It crystallizes in prisms that are either three or six-sided and has a vitreous luster. Tourmaline is a double-refracting crystal and has the property of polarizing light. Jewelers prize the fine specimens, though they are comparatively rare. Tourmaline occurs in Siberia, Brazil, Ceylon, New Brunswick, New Hampshire, California, Vermont, and New York.

TOURNAMENT (tōōr'nā-mēnt), a military sport practiced in the Middle Ages by armed knights, usually as an exercise of skill at some great event, as a royal marriage or military festival. The knights were mounted on horseback, the name tournament coming from the skill exercised in turning the horses while taking part in the contest. A single contest between two knights was called a *joust*, while the name *tournament* was applied to a number of jousts and to combats among several parties of knights. They were held by the solicitation of princes or nobles, who sent out invitations by heralds, but certain qualifications of birth were required for admission. The contests took place within an open space surrounded by a rope or railing, and around it were galleries for spectators, heralds, and the judges. Each knight carried a light armor, which was generally adorned with some device of a lady's favor. After the prizes were awarded by the judges, they were delivered to the successful knights by the queen of beauty, who received her appointment by the lady spectators.

The practice of holding tournaments reached its full perfection in France and Germany in the 9th and 10th centuries, and was introduced into England shortly after the Norman conquest. In most countries the arms employed were made especially for the purpose, the lances being without heads, while the swords were without points and had blunt edges. The ordinary weapons of warfare were used on some occasions, and it was not infrequent to arouse angry passions that resulted in severe injury

or death. Henry II. of France received a fatal wound at a tournament, by which much opposition to the sport was aroused and the practice was finally abandoned with the decline of chivalry. Tournaments were given in America to a limited extent as a sport, but the practice never gained a wide foothold.

TOURNIQUET (tōōr'nī-kēt), an instrument used by surgeons to check the flow of blood from wounds. It consists of a pad to compress the artery, which is held in place by a strong band, and pressure is obtained by a screw that serves to tighten the band. A simple form of the tourniquet may be made by placing a cord between the wound and the heart and applying pressure by means of a stick, which is used to twist the cord or band.

TOURS (tōōr), a city in France, capital of the department of Indre-et-Loire, 130 miles southwest of Paris. It occupies an imposing site at the junction of the Cher and Loire rivers, has numerous railroads, and is famous for its manufacture of silk. Two suspension bridges and a fine stone bridge 1,225 feet long cross the Loire. It has a beautiful Gothic cathedral, numerous other churches, a museum, and a library of 60,000 volumes. The inhabitants include many persons of wealth and leisure, who have encouraged the organization of societies devoted to art, science, agriculture, literature, and horticulture. Besides a large output of silk, it has manufactures of stained glass, boots and shoes, carpets, edged tools, paint, pottery, and wine. Tours lost many of its most skilled artisans at the revocation of the edict of Nantes and from that loss it has never recovered. The German army occupied it in the Franco-German War. Population, 1906, 67,601.

TOWER (tou'ēr), a building of simple and compact form, usually cylindrical and not much higher than it is wide. The ancients constructed towers only for defense, but later this form was used in lighthouses. In the Middle Ages it became popular to ornament castles and churches with towers, and those used in ecclesiastical buildings usually served for hanging bells, though in Italy the bell towers were near but separate from the churches. Palaces and castles had towers for the purpose of watching or giving signals. Many towers are constructed by Asiatics, such as the minarets on the Mohammedan places of worship and the emblematic towers of Indian and Chinese temples.

TOWER OF LONDON, an ancient structure outside the eastern wall of the city of London, on the northern bank of the Thames. It was begun by Bishop Gundulf under the direction of William the Conqueror in 1078, but

remained unfinished for more than thirty years, though various additions and changes have been made since at different times. The buildings occupy a space of thirteen acres, surrounded by a wall with massive towers, and are inclosed within a moat or ditch. In the central part is a massive white tower, the oldest of the structures, and surrounding it are the barracks, chapel, and several other buildings. The Chapel of Saint John is a fine specimen of Norman architecture. The Tower was used as a fortress by the first two Norman kings, and Henry I. made it a state prison. It was enlarged from time to time for prison purposes, being used largely for the confinement of political offenders, but also as a royal palace and as a fortress of defense. Many noted acts of cruelty were committed there, notably the murder of the two young sons of Edward IV., whose lives were taken for political purposes in the so-called Bloody Tower. The Tower of London is now a great military storehouse, containing arms and supplies for a large army. It is equipped with a small military garrison.

TOXICOLOGY (töks-ĭ-köl'ô-jÿ), the science that treats of the nature and properties of poison, including their effects and antidotes, and embraces the legal questions connected with poisoning. Any substance which exercises chemical or vital effects upon the body which are injurious to health or life is termed a *poison*. The term *vital effects* has reference to the influences of poison that are probably due to chemical action, but the means available at present do not enable us to understand them clearly. The effect of a poisonous substance may be local or general, but the quantity is a determining factor, since small doses may be taken without injury to the system. Entrance into the body may take place in a variety of ways, in addition to the more usual way of passage through the mucous membrane of the stomach, after swallowing. These include entrance through open wounds, by subcutaneous inoculation, and through scratches or openings in the skin. Sometimes the system is entered by volatile poisons being inspired with the air. Poisonous substances, to act effectually, must be in the liquid or gaseous state. See **Poison**.

TRACERY (trā'sēr-ÿ), in architecture, the ornamental pattern work traced in the head of a Gothic window or gallery. The tracery is perforated for the purpose of admitting the light, usually to further add to the decorations of the building, whence it is sometimes called *open-work*. Styles known as *flowing* and *flamboyant* were first used in the 13th century, and to these was subsequently added the *geometrical* style.

When work of this character is applied to ceilings or panelings, it represents a pattern carved on a solid surface in the nature of bas-relief.

TRACHEA (trā'kê-à), or **Windpipe**, the tube situated in the middle line of the neck, beginning at the larynx and terminating in two smaller tubes called *bronchi*. Through the larynx it communicates with the nose and mouth, and through the bronchial tubes it has connection with the lungs. It is from three-fourths of an inch to an inch in diameter and is held open by incomplete rings of cartilage. These rings are transverse, from sixteen to twenty in number, and are held together by muscular and elastic fibers. The tube is completed at the back part by a muscular membrane and within is a layer of ciliated epithelium. Secretions from mucus glands moisten the surface of the membrane, and the cilia have a resisting influence that causes anything coming in contact with them to be drawn toward the mouth. The removal of phlegm is explained by this action of the cilia.

TRACHEOTOMY (trā-kê-öt'ô-mÿ), a surgical operation by which the trachea is opened. It is sometimes necessary in certain diseases, such as affect the larynx, or upper portion of the air passages. They include croup, quinsy, diphtheria, and acute laryngitis, and the purpose is to admit air into the lungs to prevent suffocation. Sometimes this operation is resorted to when a foreign body has become so fixed in the air passages as to completely obstruct the transmission of air through the trachea, or when the throat has been cut. The operation does not contribute toward curing the disease or relieving an obstruction, but merely furnishes a means of enabling the patient to breath through the artificial opening thus provided. An incision is first made in the median line of the throat, either below or above the thyroid gland, and the muscles and vessels are pushed aside until the trachea is exposed. A vertical incision is made in the trachea as soon as the bleeding has ceased, and a silver canula is inserted, which sometimes requires the removal of a part of one or more of the rings. The canula is removed when the natural respiration has been restored.

TRACHYTE (trā'kît), an igneous rock, so named from the roughness of its surface. Rocks of this class are composed chiefly of silica, alumina, magnesia, and oxide of sodium. The colors are usually light, but in some cases are shaded with grayish and darker markings. When feldspar, augite, and hornblende predominate; the rock is classed with varieties of trap, such as basalt and greenstone.

TRACT, a brief treatise on any theme of interest, especially one that treats a religious subject. A tract differs from a book mainly in that it is a short treatise upon a subject and resembles a pamphlet in folding and external appearance. Tracts were published extensively in many countries during times of great religious agitations. A series of papers known as *Tracts of the Times* were published in England between 1833 and 1841 and those who promoted the movement were termed *Tractarians*. It was sometimes called the Oxford Movement, since it originated at the University of Oxford, and favored greater ritualism in the Anglican Church.

TRACTION ENGINE, an engine that serves the double purpose of furnishing power and propelling itself. Engines of this kind are used extensively for agricultural purposes, especially in threshing, since they furnish the power to operate the separator as well as to remove all the machinery engaged in threshing from place to place. The first steam engines used for this purpose were not constructed on a plan of self-propulsion; hence it was necessary to remove them from place to place by means of horses. Those in common use have a horizontal boiler and a high-pressure engine and are mounted upon four wheels. The front wheels are comparatively small and are steered by a mechanical apparatus, while the rear wheels are large and have broad and heavy tires. An adjustable gear permits attaching the engine to the rear wheels when the machinery is to be propelled over the road, but it is detached during the time ordinary work is done. Engines of this kind range from ten to twenty horse power. Gasoline engines of smaller size are used to some extent for the same purpose.

TRADE-MARK, a symbol fixed by a merchant or manufacturer to distinguish particular goods from similar products made by others. The principal objects in carrying a trade-mark are to enable purchasers to distinguish certain meritorious commodities in the market, to enable the producers of such articles to profit by their sale, and to guard against imitations being sold for a particular make of goods. Most countries register trade-marks at a nominal fee. In the United States they are registered in the patent office at Washington, D. C. The fee is \$25 for the term of thirty years, after which it may be renewed. In Canada the trade-marks are registered for 25 years with the Secretary of Agriculture at Ottawa, the fee being \$25 for a specific trade-mark and \$30 for a general trade-mark. Labels are used in printing and

other lines for the same purpose, especially to indicate union-made goods. The fee for a label is \$5.

TRADES UNIONS, the associations of workmen organized to promote the general and material welfare of the members. The trades unions embrace usually only laborers of the same trade. These organizations are very numerous in Canada and the United States, scarcely any kind of labor being without some form of organized association for mutual aid and protection. The specific objects of the different unions are to regulate the wages and hours of work, to restrict the number of laborers to the actual needs of a particular trade, and to promote intelligence by lectures and the circulation of literature. These organizations are likewise helpful in that they grant benefits to the sick and disabled, relieve those in distress, and provide certain insurance and burial benefits. As a means of mutual defense and intelligence, they add to the value of a man, especially since they tend to increase production and secure for the laborer a constantly growing proportion of the joint product of labor and capital. However, the tendency to limit the number of laborers, especially if effected extensively, has the economical result of diminishing the product and increasing the price.

That trades unions as a whole are beneficial to the workmen is evidenced by the fact that the best wages and highest intelligence among the working classes are found where they are in a high state of perfection, and, on the other hand, the lowest wages are paid where unions do not exist. The International Typographical Union, organized in 1852, was the first to be formed in the United States. The Machinists' and Blacksmiths' International Union and the Iron Molders' Union of North America were organized in 1859. The Brotherhood of Locomotive Engineers was founded in 1863, the Cigar Makers' International Union in 1870, and the Miners' National Union in 1873. Many others of national and local importance are maintained. In 1894 the power of the American Railway Union became manifest, when its president called out the railroad employees in support of the strike in which the laborers of the Pullman Car Company, Chicago, were interested. This action caused a general derangement of the entire railway system of the United States for a period of three or four weeks, and disturbances were quelled only by the interference of the general government. The American Federation of Labor is an organization formed by an alliance of different national trades unions. The unions in Great Britain have a member-

ship of 1,650,000 and an accumulated fund of \$24,500,000. Similar organizations are maintained in France, Germany, and other countries of Europe. See **Labor**.

TRADE WIND. See **Wind**.

TRADING COMPANY, the name applied to any one of several great associations promoted in Europe for the promotion of trade and to extend the colonial interests. Such organizations were promoted extensively in the 16th and 17th centuries. Those most noted in America are the Hudson's Bay Company, the Virginia Company, and the Massachusetts Bay Company, and through their operations were established the leading British colonies in America. The British East India Company and the Dutch East India Company were two powerful organizations in the exploitation of colonies in Asia. The business was managed by a board of directors, who chose its own officers in most cases, and the members held interests much the same as is the case in a joint-stock company. In most cases they were authorized by the authority of the government as a means of founding colonies and incidentally to promote trade and develop resources. See **Hudson's Bay Company**.

TRAFALGAR (trăf-ăl-găr'), a cape on the southern coast of Spain, projecting into the Atlantic, at the entrance to the Strait of Gibraltar. It is memorable as the scene of a great naval victory by the British fleet under Nelson over the allied fleet of Spain and France under Villeneuve, on Oct. 21, 1805. The allied fleet had 40 vessels and the British had 33, but in the engagement 19 of the former were captured. However, Admiral Nelson was fatally wounded in the encounter.

TRAGACANTH (trăg'ă-kănth), the name of several species of shrubs found in Asia Minor, belonging to the pulse family. These plants yield the tragacanth of the market, a gum valuable in medicine and for calico printing. It is a hard substance, has a slight taste and no smell, and is difficult to pulverize. When placed in water, it absorbs the liquid and forms an adhesive paste. Though similar to gum arabic, it differs from it in a few chemical properties. As a medicine it is used for treating coughs and catarrhs.

TRAGEDY (trăj'ê-dÿ). See **Drama**.

TRAGOPAN (trăg'ô-păn), or **Horned Pheasant**, a species of the crested pheasants, found chiefly in China and India. The bill resembles that of the common fowl, the tail is rounded, and the plumage is variously colored. Instead of a comb, the male has a crest of soft feathers, has two hornlike appendages above the eyes, and is wattled in front on the throat.

The appendages are protractile and retractile at will. In their habits they are generally solitary and dwell in the recesses of their native forests. The food consists of grains, roots, and insects. Five species of these birds have been described.

TRAILING ARBUTUS (trāl'ing är'bütüs), an evergreen trailing plant, sometimes called *ground laurel* and *mayflower*. A number of species have been enumerated, most of which are American. The flowers are white or pinkish, growing usually in clusters, and are noted for their excellent perfume. These plants are admired for their beauty and the fine-scented flowers, but are quite difficult to transplant. The dried leaves of species called the *red bearberry* are used as an astringent and tonic medicine. They possess medicinal value in treating chronic affections of the bladder.

TRAJAN, Arch of, an arch constructed by the Romans at Benevento, Italy. It was erected in 114 A. D. to commemorate the completion of a new road from Rome to Brundisium. The material used is white marble. It is 50 feet in height and has an archway 27 feet high. Trajan's triumphs over the Dacians are represented by elaborate reliefs. This arch is in a good state of preservation.

TRAJAN'S COLUMN, a column erected in ancient Rome to commemorate the reign of Trajan. It was ordered by the senate, completed in 114 A. D., and still stands erect in its ancient beauty. The location is in the midst of the ruins of the Forum of Trajan, a group of public buildings that occupy the space between the Capitoline and Quirinal hills. It is 100 feet high and originally was crowned with the statue of Trajan, but Pope Sixtus V. replaced it with one of Saint Peter. The reliefs are chiefly scenes in the triumphs of Trajan over the Dacians, but in addition include records of ancient costumes and military operations.

TRAJAN'S WALL. See **Trajan**.

TRAMWAY (trăm'wā), a somewhat primitive kind of railway, either for use upon streets or through country districts. In most cases the grading is not as uniform as for electric and steam railways, the rails are made of wooden stringers laid upon ties; and the upper part is protected by straps of iron. Horses and mules are used to move the cars. In the better class of tramways locomotives are employed, though they are usually narrow gauge and of small size. Tramways preceded steam and street railway construction. The first used in the industries were completed in England to transport stone from the quarries to the ports for shipment by water.

TRANCE (tráns), a state resembling sleep, in which the power of volition is suspended and the vital organs are almost inactive. The body, when under the influence of a trance, assumes a ghastly pallor and merges into a state of apparent death. Circulation and respiration cease. Many cases are on record in which persons were actually buried alive, as shown by subsequent exhumations. Trance is associated largely with intense mental exultation and preoccupation, and may simulate death, though patients in most cases recover. *Death trance* is a condition in which neither the heart nor lungs acts and the temperature of the body falls; *trance coma* is characterized by feeble breathing and action of the heart; and *trance sleep* is an abnormally profound and prolonged sleep in which the patient cannot be awakened by external stimuli.

TRANSCENDENTAL (trǎn-sĕn-dĕn'tal), a term applied to ideas and doctrines that are not suggested or limited by experience. Classical writers usually gave the name to anything that rose above or could not be defined by the ten categories of Aristotle. Thus, the state of being was termed transcendental. The name *transcendentalism* is used by Kant in relation to transcendental elements, of which, according to his view, there can be definite knowledge. Among English-speaking peoples the term is applied to a school of thinkers confined chiefly to New England, which flourished from 1830 to 1850. The leading supporters of this movement include George Ripley, who founded a noted transcendental club in 1826. Others that may be mentioned are James Freeman Clarke, Ralph Waldo Emerson, Margaret Fuller, Theodore Parker, and A. Bronson Alcott. The leading tenet of these thinkers is that mind is supreme over matter. They held the view that spiritual truth clearly presented can be perceived by the inborn faculty possessed by every person and that in the soul is an unerring witness to the truth of religion, which they maintained does not depend upon historical facts or tradition. The ideal set up by the leading transcendentalists is "plain living and high thinking."

TRANSFORMER (trǎns-fôrm'ēr), an apparatus for changing the potential of electric currents, so called because it may transform or change the value of the electric motive force in the primary and secondary circuits. A form of the induction coil is commonly used to transform the current from a high to a low potential, as in taking current from the main wires to supply incandescent lights, either individually or in series. Such a transformer consists of a primary and a secondary circuit, in which the primary, or inner, coil has a larger number of turns than

the secondary, or outer, coil. In alternating-current transformers the primary and secondary coils are usually placed parallel to and alongside each other. They are provided with a core of laminated iron and the same material surrounds the coils, which insures the greatest amount of magnetic flux passing through them. Transformers are usually placed outside of buildings or on high poles to insure safety, since alternating currents with high electric motive force are dangerous.

TRANSFUSION OF BLOOD (trǎns-fū'zhŭn), the term applied to the injection of blood into a person as a means of treating disease or invigorating the system. The blood thus used may be drawn from a brute or a human being, and it may be injected directly from the vein of one to that of another, or it may first be defibrinated. In medical science it has been known for more than four centuries, but it was rarely practiced prior to 1824, when Dr. Blundell published his "Physiological and Pathological Researches." Blood drawn from sheep, dogs, and pigeons has been used to a considerable extent, but the results have proved doubtful. Many cases are on record in which the patients appear to have been benefited, while others seem to indicate that the practice does not possess material value. In theory it is certainly useful, since it replenishes the older and partially diseased tissues with new blood that is calculated to build up vitality and restore impaired or dissipated strength. Saline solutions of various kinds are now infused into the veins instead of blood. Such solutions consist essentially of sodium chloride, about 0.6 per cent., which is the proportion in normal animal tissues. It is raised to a temperature of about 110°, the quantity being from one to two pints, and has been found beneficial in sudden losses of blood or where the patient suffers from a severe shock.

TRANSIT (trǎns'it), in astronomy, the passage of one heavenly body over the disc of another, as of Mercury or Venus over the disc of the sun, or of a satellite over the disc of the planet around which it revolves. The term is restricted principally to the passage of the inferior planets, Mercury and Venus, over the disc of the sun. About thirteen transits of Mercury occur every century, the shortest interval between them being about three years and the longest thirteen years. They occur in the early part of May and November, because the earth is then near the nodes of Mercury's orbit. Transits of Venus are of importance in astronomy, since the best means of determining the sun's distance from the earth is afforded by them. They occur at intervals of eight, 10½, eight, and

122 years. Both Mercury and Venus are nearest the earth at transit, and their apparent motion is westerly, hence a transit always begins on the east side of the sun.

The transit of Mercury was observed first by Gassendi, in 1631, and the first of Venus was announced by Jeremiah Horrox in 1639. The dates of Mercury's transits are Nov. 5, 1868; May 6, 1878; Nov. 7, 1881; May 9, 1891; Nov. 10, 1894; Nov. 12, 1907; Nov. 6, 1914; and May 7, 1924. The transits of Venus have the following dates: Dec. 7, 1631; Dec. 4, 1639; June 5, 1761; June 3, 1769; Dec. 9, 1874; Dec. 6, 1882; June 8, 2004; and June 6, 2012. A *transit instrument* is used for observing the exact time or measuring the passage of heavenly bodies across the meridian. This instrument resembles a theodolite and consists principally of a horizontal, graduated circle, with leveling devices, clamping screws, a compass, and a telescope. It ranks as the most important of the technical astronomical instruments.

TRANSMIGRATION (trăns-mĭ-gră'shŭn), or **Metempsychosis**, the doctrine of the passing of the soul at death into another mortal body. Those who support the view that the soul transmigrates at death believe that there is a repeated existence of the soul and that its form in each succeeding state is determined by its merits and demerits in the preceding one. Many ancient civilizations grew out of this faith, especially those of Egypt and Asia. This doctrine regards human life on the earth as only one link in a chain of conditions through which the soul passes in its long career of procession from God until it returns to Him.

Brahmanism represents the migration after death into the body of a higher or lower life as a reward of virtue or penalty for vice. The soul may even deteriorate into the lowest animal forms or the vegetable or mineral world. Before it reaches to human consciousness it accomplishes numerous transmigrations, but if the reason and freedom permitted in this life are not utilized to good advantage, the soul is liable to return and begin the series again. A long period of divine years is assigned for the completion of all transformations and the process of purification, after which it ultimately receives its reward in what is described as a state of blissful adsorption into the divine nature. According to Herodotus, the Egyptians believed that the soul is clothed successively with the forms of all the animals that live on the earth and after a long cycle of years it enters the body of a man, when it begins its eternal pilgrimage. The Buddhists hold to a doctrine of transmigration, but differ from the Brahmans

in that they believe in the ultimate annihilation of the soul, which is said to take place in Nirvana.

The doctrine of transmigration had a prominent place in the philosophy of Pythagoras, hence came to be deeply rooted among the Greeks. He maintained that the soul has a life peculiar to itself, which it enjoys in common with demons and spirits before it descends to the earth, and that there must be a degree of harmony between the faculties of the soul and the form which it assumed. At death the soul becomes freed from the fetters of the body and remains for a time in the realm of spirit, when it returns to the earth to accomplish again the process of purification through a series of animal and human bodies. Plato adopted the doctrine and maintained the preëxistence of the soul before it appears in man, of which condition it retains dim recollections, and after death it chooses another body according to its peculiar qualities. He thought that every soul returns to its original source after a long cycle of years, but certain periods are to be passed in the infernal world. Mention of the doctrine is made by Cicero and Caesar. It is referred to in the Talmud and was supported by heretical sects among the early Christians. While the general belief in transmigration seems to be permanent in the East, it has been defended by a few metaphysical writers in America and Europe.

TRANS-MISSISSIPPI EXPOSITION, an industrial exhibition of the United States, held at Omaha, Neb., in 1898. It was designed to display the progress made in the arts and industries of the section of country lying west of the Mississippi and to extend the general interest in the development of its extensive resources. The tract occupied by the grounds included 200 acres in the northern part of the city, overlooking the Missouri River. Many states had buildings, or made special exhibits, and a fine display was made by the Federal government. The architecture was elaborate and the grounds were ornamented with fine shrubs, trees, and flowering plants. A total attendance of 2,613,508 was registered.

TRANSPORTATION, the industry of carrying persons and goods from one place to another. The means of transportation depend upon the development of trade within a country and are influenced noticeably by the complexity of its economic system. Anciently trade was carried largely by water, at which time internal commerce was necessarily limited. The first steps toward the development of means of inland transportation is found in the construction of canals and highways, and the first important

systems of these avenues were developed in Rome. Modern transportation greatly overshadows that of ancient times, both upon land and sea, owing to the application of steam in navigation and the construction of railway and electric lines.

Transportation has greatly added to the comforts of mankind, chiefly through the fact that modern methods permit rapidity and insure a high degree of safety. Although it must be admitted that losses of considerable extent attend the enterprise of conveying passengers and goods rapidly and at great distances, yet there is greater security than prevailed under the methods of the ancients. Modern steamships are constructed of steel and other durable materials, and their great size and accuracy of movement render them much more secure than the inadequate and wooden structures of former periods. On the other hand, the losses by accidents on railways are comparatively small, especially when considered in the light of dangers that attended the slow-moving caravan that furnished the chief means of transportation in Asiatic countries for long periods. It is now possible to gain the advantage of travel, both within one's own country and abroad, and this factor in civilization is taken advantage of more extensively as the means of travel are extended. Besides, the products of different belts of climate and soil may be enjoyed by the people in a condition as favorable as where they were produced. This has given rise to the use of a larger variety of commodities and has brought the greater benefits of many localities to the homes of those who would otherwise be entirely deprived of them. See **Commerce; Interstate Commerce; Navigation; Railroads.**

TRANS-SIBERIAN RAILWAY. See **Railroads.**

TRANSVAAL (träns-väl'), a British colony in South Africa, lying north of the Vaal River, which separates it from the Orange River Colony. It is bounded on the north by Matabeleland; east by Portuguese East Africa and Swaziland; south by Natal and the Orange River Colony; and west by Bechuanaland and the Bechuanaland Protectorate. It has an area of 117,732 square miles, of which 6,536 square miles are included in Swaziland, a dependency.

DESCRIPTION. Most of the interior is an elevated plateau ranging from 3,500 to 6,000 feet above sea level. It is divided into the two regions known as Grass Veldt and Bush Veldt. The former is an arid tract covered with nutritious grasses. The Bush Veldt is well wooded and comprises the valley of the Oori Limpopo, or Crocodile, River and a narrow strip along

the eastern border. In the east central part are ranges of the Drakenberg Mountains, which extend north and south through the country and reach their highest summits in Mauch Mountain, height 8,975 feet. The Limpopo Mountains form the eastern boundary, separating the country from Portuguese East Africa. A range of highlands extends through the country from east to west, known as the Witwatersrand, with a general elevation of 6,000 feet, which form the watershed between the Vaal and the Oori Limpopo rivers. Ranges extend from the main ridge both north and south.

The northern boundary is formed by the Oori Limpopo River, which furnishes the main drainage. It receives the inflow from the Olifant River after the latter crosses the eastern border into Portuguese East Africa. A large part of the southern boundary is formed by the Vaal, a tributary of the Orange River. Swaziland is drained mainly by the Maputa, which discharges into Delagoa Bay, an inlet from the Atlantic. The Transvaal is an interior country, having no sea coast, and none of its rivers is navigable. The climate is favorable to Europeans, and in the northern part assumes a subtropical character. July is the coldest month and January is the warmest. The mean temperature is 67°. Frosts occur in winter, but chiefly in the highlands. Rainfall is abundant in the valley of the Oori Limpopo and the eastern section, where it averages 28 inches, but it is scant in the western part. Acacias, the eucalyptus, and other trees native to warm climates thrive in the fertile and well-watered parts.

INDUSTRIES. Mining is the principal occupation, and gold, coal, and diamond are the chief minerals. Barberton and the Witwatersrand have the most productive gold fields, and the total output for the colony is about \$125,500,000 per year. Coal is produced for export to other points in Africa and to European countries. The output of diamonds is placed at \$5,500,000 per year. Other minerals include tin, copper, silver, lead, iron, cobalt, platinum, and plumbago, but these have not been developed extensively.

Agriculture is possible only in a limited district without irrigation, and improvements of this character are not extensive at present. The farms are usually of large size, and stock raising is a more important department than the cultivation of the soil. Kaffir corn, wheat, barley, and oats are the principal cereals. Vegetables and fruits are grown successfully. Stock raising is a very important industry, the climate and native grasses being highly favorable to this enterprise. Cattle and sheep are grown extensively and large interests are vested in horses.

swine, and ostriches. Tobacco of a good quality yields well. Much of the farming is in the hands of Europeans, but labor in the mining and manufacturing industries is furnished largely by Chinese and natives.

A large part of the manufacturing is in connection with the mining and is represented by smelters and machine shops. Flour and grist mills, brick and tile works, breweries, and iron and brass foundries make up the chief enterprises. Among the general manufactures are malt liquors, brick and tile, cigars and pipe tobacco, clothing, and machinery.

The railroads in operation include 3,125 miles and are connected with those of the Orange River Colony. A branch extends from Pretoria east to Lourenço Marquez, on Delagoa Bay. The total length of telegraph lines is 3,250 miles. Gold, diamonds, live stock, wool, coal, tobacco, and lumber are the principal exports. The imports consist chiefly of textiles, foodstuffs, chemicals, clothing, and machinery. A large majority of the trade is with Great Britain.

GOVERNMENT. A responsible government was established in 1906 by letters patent. The Governor and Lieutenant Governor are assisted by an executive and a legislative council. Authority to legislate is vested in the legislative council and legislative assembly. Members in the former are appointed by the Governor, while those of the latter are elected for five years. All laws and public documents are printed both in the English and Dutch languages.

A free public school system was established in 1907. The attendance at the schools is obligatory for white children between the ages of eight and fifteen years. Both English and Dutch are taught in the schools. High schools are maintained in the towns and cities. The Transvaal Technical Institute, located at Pretoria, carries courses in mining, engineering, and commerce. The schools and institutions are nondenominational.

INHABITANTS. The people residing in the Transvaal include many races, both native and European. In 1904 Swaziland had a total population of 85,484, of which 898 were whites. The Transvaal in the same year had a population of 1,624,200, which included 300,225 whites. The Europeans include principally British, Russians, Germans, Dutch, and Italians. Several thousand Americans and Australians reside in the colony. A large majority of the Christians belong to the Dutch Reformed Church. Other religious denominations include Anglicans, Roman Catholics, and Jews. Pretoria, in the central part, is the capital. Johannesburg, the center of the Witwatersrand, is the largest city. Other

cities include Barberton, Nylstroom, Heidelberg, and Lichtenburg.

HISTORY. The Transvaal country was first settled by Boers in 1845, these sturdy and industrious people leaving Natal in that year owing to its annexation as a colony by Great Britain. They were direct descendants from the Dutch who established a port of call near the Cape of Good Hope in 1662. When the British annexed the Cape Colony, in 1814, large numbers of Boers settled in Natal, and subsequently in the Orange province and the Transvaal. The British government recognized the independence of the Transvaal in 1852, but in 1877 assumed general sovereignty. In 1880 the Boers made a successful armed effort for independence, the war terminating by a disastrous defeat for the British at Majuba Hill, and in March, 1881, the independence of Transvaal was again recognized. In 1884 the British made another effort to annex the Transvaal and, after conducting complicated diplomatic proceedings, secured a partial sovereignty.

The discovery of gold in the Rand, in 1885, caused the British to seek further influence, leading eventually to the untimely Jameson Raid of 1896, which proved an unsuccessful venture to annex the republic. War was finally declared by the republic on Oct. 11, 1899, and the Orange Free State immediately cast its fortunes with the Transvaal, Great Britain manifesting a disposition to annex both republics as a means of protecting the interests of many subjects who had made settlements within the region. The first battle of importance occurred at Ladysmith on Oct. 30, when the British met a reverse. Subsequently the Boers were defeated in a number of engagements, though they made a stubborn resistance, and on Oct. 25, 1900, the region was annexed by Great Britain. In 1907 the government greatly restricted the immigration of Asiatics, especially Chinese, as a means of protecting the native and European laborers. The mining industry and the financial affairs are on a sound basis.

TRANSYLVANIA (trăn-sil-vă'nî-ă), in German *Siebenbürgen*, a principality in the southeastern part of Austria, belonging to the Austro-Hungarian Empire. The area is 21,518 square miles. It lies between the Carpathian and Transylvanian mountains, the boundary being formed by Galicia, Rumania, and Hungary. The surface is largely mountainous, but it has many fertile valleys and plains. Among the chief rivers are the Maros, Körös, Aluta, and Szamos, all being tributary to the Danube. Gold, silver, copper, quicksilver, coal, lead, iron, salt, alum, tin, limestone, and precious stones are among

the minerals. Fine forests are abundant, especially along the streams and in the mountains. Agriculture is the leading industry, the products being wheat, hemp, maize, rye, barley, flax, tobacco, vegetables, and fruits. Stock raising, silk culture, and manufacturing are likewise important industries. The manufactures include silk and woolen textiles, soap, paper, furniture, jewelry, glass, gunpowder, and machinery. Education is still in a backward condition, but common schools have been established in all parts of the principality. A university is maintained at Klausenburg and secondary schools flourish in a number of the leading cities. Railroad lines have been constructed through most of the regions producing minerals and containing arable lands. The chief cities include Kronstadt, Klausenburg, Hermannstadt, and Bistritz. A large number of the inhabitants are Germans, but the population includes Bulgarians, Jews, Magyars, Rumanians, and Gypsies. Transylvania belonged to Dacia at the time of the Roman Empire, but with the decline of Rome passed successively to the Huns, Lombards, Goths, and other conquerors. It has been a part of Austria since 1713. Population, 1906, 2,516,500.

TRAP, or **Trappean Rock**, the name generally applied to the primary and secondary strata of igneous rocks. The term is derived from the Swedish word *trappa*, meaning a stair, and is given to these rocks because their greater hardness resisted erosion, thus making them stand out on hills and mountains like steps or stairs. They are formed chiefly of hornblende and feldspar. Those in which feldspar predominates are known as *feldspathic trap* and those composed largely of hornblende are called *hornblendic trap*, or *greenstone*. The latter is of a greenish color and is peculiarly crystalline. Feldspathic trap resembles flint in compactness and is of a light bluish or greenish color. Other species of trap rocks include the *clinkstones*, *basalts*, *pitchstones*, *feldspar*, *porphyries*, and *claystones*. Basalt is the heaviest of the trap rocks and is likewise the hardest and most compact. Rich agricultural soil is produced by the decay of trap rock, and districts having these rocks are usually quite fertile. Deposits of hypersthene rocks are abundant in Labrador. Several choice varieties of trap occur in the Isle of Skye.

TRAPANI (trä'pä-nē), a city of Sicily, capital of the province of Trapani, 45 miles west of Palermo, with which it is connected by railway. It is important as a seaport and has a municipal palace and several fine churches. The industries include salt works, shipyards, fisheries, and flouring mills. It has a large trade in wine,

olive oil, marble, shell cameos, and fruits. The Carthaginians fortified the place in the 3d century B. C., but it was soon after captured by the Romans. Anciently it was known as Drepanum. Population, 1906, 59,854.

TRAPDOOR SPIDER, the name of a species of spiders found in warm climate, so called from the manner in which they construct their nests. The body is hairy and quite large. Several species are common to southern California, Mexico, and the warmer parts of Europe. These spiders dig a burrow in sloping ground, usually six to ten inches deep, and cover the same with a trapdoor made of silk. The interior is usually lined with silk, and the door is attached by a hinge so it may be easily opened and closed. When within the burrow or nest, the spider, on the approach of danger, holds the door down with its mandibles and feet. Some species construct two or more of these nests and connect them below the surface with tubes large enough for passage. The young live in the burrow for several weeks, where they are fed on insects and worms, and soon construct nests for themselves.

TRAPPING, the art of catching birds and other animals by means of traps and snares. This mode of taking game is preferred in that the skin and flesh are less liable to injury than by the use of weapons. Traps for catching various animals, such as the mink, beaver, and fox, are usually made of steel and vary in size according to the kind of animal to be taken. The small traps have one steel spring, while those of larger size usually have two. The trap is set near the hole or habitation of the animal and is securely anchored so as to hold the captive. Usually the trapper sets a bait to allure the animal to the place where it may be caught, and usually visits each trap once or twice a day to remove the captives. Snares are commonly used to catch birds and some quadrupeds, and in many cases box traps are employed for the same purpose. In some countries the use of box traps is forbidden, especially in catching such birds as the quail and grouse.

TRAVELER'S TREE, a tree native to Madagascar, classed as a kind of plantain, having a palmlike appearance. The stem is smooth and without branches to a height of twenty to thirty feet, and at the top is a peculiar growth resembling a large fan. The leaves grow on extended stalks, which are on opposite sides of the upper stem of the tree, the lower leaves dropping off as the stem grows. A large tree has from fifteen to thirty leaves, the leaf stalks being ten feet in length. The leaves are five to six feet long and frequently about three feet wide. The

color of the leaves is bright green. They are used for thatching, while the leaf stalks serve in constructing walls and other parts of buildings. A succulent fruit, growing in bunches, is produced amid the leaves, and the seeds yield a flour utilized by the natives as a food. The tree derived its name from the hollow leaf stalk, which contains a wholesome water even in the dry season, and is used by travelers in quenching thirst.

TRAVERSE CITY (trāv'ērs), a city in the northwestern part of Michigan, county seat of Grand Traverse County, at the southern end of the western branch of Grand Traverse Bay. It is on the Grand Rapids and Indiana, the Pèrè Marquette, and the Manistee and Northeastern railroads. The bay is an inlet from Lake Michigan, extending inland about thirty miles. In the southern part it divides, and between the eastern and western arms is a tract of land known as Preogenese Point. Traverse City has fine steamboat facilities and is a favorite summer resort. Cereals, grasses, fruits, and live stock are grown in its vicinity. The chief buildings include the county courthouse, the public library, and the Northern Michigan Insane Asylum. Among the manufactures are lumber, furniture, woodenware, cigars, clothing, and machinery. Electric lights, pavements, waterworks, sewerage, and street railways are among the improvements. It was settled in 1850 and incorporated in 1895. Population, 1904, 11,237; in 1910, 12,115.

TRAVERTINE (trāv'ēr-tīn); a species of limestone. It is usually whitish in color and occurs in masses deposited by the action of rivers and springs. Fossils of leaves and twigs are common in some deposits. Many buildings of Rome are constructed of this class of rock.

TRAWLING (trā'ling), a method of fishing in the deep sea. It consists of dragging a net along the bottom behind a boat, or by attaching the ends to two small steam vessels, which move slowly and pull the net. A trawl or beam trawl is a purse-shaped net from fifty to seventy feet long, and the mouth is held open by a wooden beam. This net is drawn by a single boat, or larger sizes, in which the mouth is forty feet wide, may be pulled by two vessels. Trawling can be done only where the bottom is smooth or sandy, and is usually not permitted near the shore. Much of the fishing in the German ocean is by this method, where large quantities of herring, haddock, and mackerel are taken. The term *trawl* is applied in America to a long line to which short lines with baited hooks are attached.

TREADMILL (trēd'mīl), an appliance used to discipline prisoners, employed formerly in

Great Britain. It consists of a wheel in the form of a long cylinder, furnished with steps around its circumference, and is moved by the tread of the prisoners. A hand rail furnishes support, and the weight of the prisoner causes the wheel to revolve about twice per minute. Formerly it was customary to utilize the motive power of the treadmill for grinding corn and turning machinery, but the labor expended upon it is too large in proportion to the usefulness of this contrivance.

TREASON (trē'z'n), the crime of levying war or committing any act of hostility against a state by one who owes allegiance to it. The punishment for this offense is very severe, since the crime is held to be one of the greatest of which any citizen may be guilty. Those who know of the crime of treason and fail to disclose the fact to the authorities are guilty of concealment of treason, which is punishable by fine and imprisonment. In general, treason consists in levying war upon the country or in adhering to the enemies, giving them aid and support. The punishment depends upon the occasion or circumstances under which the crime was committed, but it usually consists of imprisonment at hard labor for a long term of years. If committed at the time of a great conflict, the guilty party is usually punished by death.

TREASURE-TROVE (trēzh'ūr-trōv), the name applied to coin, bullion, or precious metals found hidden in the earth or any private place, the ownership of which is unknown. Objects of value thus found on land belonging to the finder, under the law of Rome, belonged to the person who discovered the treasure, but if the land belonged to some one else the objects found were divided equally between the finder and the owner of the premises. The common law of England vests the finder of such treasures in the crown, though this is not strictly enforced. In the United States the term treasure-trove is not used extensively. A treasure found belongs to the finder, unless the true owner is known, when the title is vested in him.

TREASURY (trēzh'ūr-ŷ), Department of. See **United States, Departments of.**

TREATY (trē'tŷ), a contract or agreement concluded by two or more nations or sovereigns. It is in the nature of a contract, and the parties to it rely upon the good faith of those concerned to carry out the matters stipulated. Treaties are usually made by commissioners duly appointed by the respective governments, and they are binding upon the nations concerned as soon as they are ratified by the sovereigns or the branch of government duly authorized to approve such agreements. In general the power to ratify is

vested in the crown of a monarchy and in the chief executive and legislative branch of republics. The latter is the case in the United States, whose negotiations are conducted by commissioners and the power to ratify is vested in the President and the Senate. Treaties are known according to the purpose for which they are intended, as *offensive* and *defensive*, *treaties of alliance*, *commercial treaties*, and *treaties of peace*.

TREBBIA (trĕb'bĕ-à); a river in the northern part of Italy, anciently called *Trebia*. It rises 15 miles northeast of Genoa, in the Ligurian Appenines, and, after a course of 58 miles, joins the Po near Piacenza. The Trebbia is famous in history, owing to the defeat of the Romans under Sempronius by Hannibal in 218 B. C. The Austrians and Russians under Suvaroff defeated the French under Macdonald, in 1799, upon its banks.

TREBIZOND (trĕb'ĭ-zōnd), a seaport city of Asiatic Turkey, on the southeastern coast of the Black Sea. It occupies a site surrounded by hills and is inclosed by substantial walls, on the outside of which are numerous suburbs. Trebizond is well paved and drained, but the architecture is inferior in most parts of the city. Several forts defend the city, and toward the interior are a number of well-established highways. The harbor is one of the finest on the Black Sea, thus giving the city excellent facilities to handle a large interior and export trade. Among the principal structures are a number of mosques, several hospitals and government buildings, and ten Greek churches. It has manufactures of fabrics, hardware, copper products, dyestuffs, and clothing, and is the center of a large export trade in wool, wax, oil, raw and manufactured silk, and tobacco products. The city was anciently known as Trapezus and flourished in the time of Xenophon. The Romans conquered it in the Mithridatian War. Trajan constructed extensive harbor improvements at this place. The Crusaders captured it in 1204, when it became the capital of the empire of Trebizond, which included a large region south of the Black Sea, and remained independent from Turkey until 1461. Population, 1909, 38,940.

TREE FROG, or **Tree Toad**, a class of tailless batrachians that form the connection between the toads and the frogs. They live chiefly in trees, which they are able to climb by reason of their claw-shaped toes. The upper jaw and vomers have teeth. They are small, more active, and brighter colored than the true frogs, and utter loud, piping notes. Many species have been enumerated, but the larger number is found in the warmer regions. They differ widely in col-

ors, though the majority take on the hues of the trees they habitate.

TREFOIL (trĕ'foil), or **Bird's-Foot**, a genus of plants of the bean family. Many species are native to the temperate region of the Northern Hemisphere. The common trefoil has a stem from four to fifteen inches long, which usually is spreading and decumbent; and bears from four to ten yellow flowers. Some have associated this flower with the shamrock of Ireland. Several species are native and others have been introduced in Canada and the United States. These plants include a number which are of value as forage and are grown to some extent as fertilizing, being plowed under for that purpose.

TREMOLITE (trĕm'ō-lit), a species of hornblende. It consists chiefly of calcium and magnesia and has a white or grayish color. The forms are usually prismatic and crystalline.

TRENT, a river of Canada, in Ontario. It rises in Rice Lake and discharges into the Bay of Quinté, an inlet from Lake Ontario. The length is 150 miles and it affords good water power. It drains a basin of 4,000 square miles.

TRENT, a river of England, which rises in Staffordshire and 15 miles west of Hull joins the Ouse to form the Humber. The total length is 145 miles and it is navigable for barges about two-thirds of its course. In commercial enterprises it ranks of importance next to the Severn and the Thames. The Trent and Mersey Canal is one of several important artificial waterways of the system in which the Trent is a factor.

TRENT, or **Trient**, a city in western Austria, in the southern part of Tyrol, 48 miles north of Verona, Italy. It is located on the Adige River, has railroad facilities, and is surrounded by limestone hills. The Adige valley is remarkably fertile, containing fine farms, vineyards, and orchards. Trent is celebrated in history as the seat of the Council of Trent, which met here in the pontificate of Paul III., in 1545, but was removed to Bologna the following year. It was dispersed in the latter year as a result of the Protestant rising in Germany, but was again convoked by Pope Julius III., in 1551, and was again dispersed by the Lutherans. Pius VI. called it into session in 1551 and four years later its labors were completed. The Council of Trent issued canons and decrees defining the doctrines of the Roman Catholic Church. They were reprinted innumerable times and have been translated into most modern languages. The city of Trent has considerable trade, numerous schools and churches, and is supplied with public parks, a library, and other municipal facilities. It was a free imperial city at the time of the former

German Empire and in 1802 became a part of Austria. Population, 1908, 25,238.

TRENT AFFAIR, a complication arising between the United States and Great Britain at the beginning of the Civil War in America. The Confederate government sent J. M. Mason and John Slidell as commissioners to Great Britain and France respectively in 1861. They passed the blockade and embarked on the British merchant ship *Trent*, which sailed from Havana, Cuba. Captain Wilkes, of the United States ship *San Jacinto*, stopped the *Trent* near the Bahamas on Nov. 8, 1861, and seized Mason and Slidell as prisoners of war. The Northern States generally approved Wilkes's action, but it involved a violation of the international law and the two prisoners were surrendered to Great Britain because its neutral rights had been transgressed, thus preventing the war that country threatened.

TRENTON (trĕn'tŭn), the capital of New Jersey, county seat of Mercer County, 56 miles southwest of New York City. It is situated on the Delaware River, at the head of navigation, and on the Delaware and Raritan Canal, the Pennsylvania, the Baltimore and Ohio, the Philadelphia and Reading, and other railroads. An extensive system of electric railways furnishes communication to all parts of the city, and with it are connected trolley lines that penetrate many parts of New Jersey and the adjoining states.

The city is finely located on a pleasant site and the streets are well improved with stone, asphalt, and macadam pavements. The improvements include waterworks, sewerage, gas and electric lighting, and a system of public parks. Riverside Park and Cadwalader Park are fine public resorts. The spot where Washington placed his cannon at the Battle of Trenton is marked by a granite shaft surmounted by a bronze statue of Washington. A monument of George B. McClellan is situated in Riverview Cemetery. The State capitol is a fine structure of white marble. Other buildings include the county courthouse, the high school, the Masonic Temple, the State armory, and the post office. It is the seat of the State prison, the New Jersey Home for Girls, a State normal school, the State arsenal, and numerous hospitals and private institutions of learning. The public library contains about 50,000 volumes and in addition there are several other collections of books, including those of the State and the public schools.

Trenton has a large wholesale and jobbing trade. The manufacturing establishments represent a large capital. Among the enterprises are potteries, machine shops, brickyards, iron and brass foundries, and lumber yards. The general

manufactures include clothing, rubber goods, bridges, cotton and woolen textiles, machinery, and malt liquors. It is the seat of the Jordan L. Mott iron works, the American Bridge Plant, the De Laval Steam Turbine Works, and the wire and cable factory of John A. Roebling's Sons Company.

The first settlement at Trenton was established in 1676, when it was generally known as The Falls. It received its name from William Trent in 1720, when the town was platted, and it was incorporated in 1746. Trenton was made the capital of the State in 1790 and two years later received its charter as a city. Population, 1905, 84,180; in 1910, 96,815.

TRENTON, a city in Missouri, county seat of Grundy County, on the Grand River, 102 miles northeast of Kansas City. It is on the Quincy, Omaha and Kansas City and the Chicago, Rock Island and Pacific railroads. The place has a fine trade and is surrounded by a fertile farming and fruit-growing region. Extensive coal mines are worked in its vicinity. Among the principal buildings are the high school, the Jewett Public Library, and Ruskin College. The municipal facilities include systems of waterworks and sanitary sewerage. Among the manufactures are lumber products, brooms, tobacco, flour, and woolen goods. It has a growing trade in farm produce, coal, and merchandise. Trenton was settled in 1840 and incorporated in 1857. Population, 1910, 5,656.

TRENTON, Battle of, an engagement of the Revolutionary War, fought at Trenton, N. J., on Dec. 26, 1776. The British were stationed at Trenton, whence they had pursued Washington, who took a position on the other side of the Delaware River. The garrison consisted of 1,500 Hessians under Colonel Rahl, and Washington planned to cross the river and make the attack while they were engaged in their Christmas festivities. With a part of the American army, Washington crossed the Delaware while that stream was partly covered with floating ice, and at about eight o'clock in the morning surprised the garrison, which had not prepared for a resistance. The Americans lost only two killed and three wounded, while the British lost forty killed and wounded and about 1,000 prisoners. Washington recrossed the Delaware and occupied his former position. This victory and that at Princeton on Jan. 3, 1777, greatly revived the spirit of the Americans.

TRENTON SERIES, a group of rocks deposited during the Lower Silurian period, so named from Trenton, N. Y., where they were first studied. This series of rocks extends over large areas in the United States and the south-

ern part of Canada. It is composed chiefly of limestone and in various places contains valuable minerals, such as natural gas and petroleum in Ohio and Indiana and lead and zinc ores in Iowa and Wisconsin. Outcroppings extend along the northern shores of Lake Ontario as far west as Georgian Bay. In thickness the series ranges from 100 to 2,000 feet, being thickest in Pennsylvania.

TREPANG (trê-päng'), or **Beche de Mer**, the name of a marine animal, the sea slug, commonly called *sea cucumber*. It is found along the eastern coast of Asia, in the West Indies, and the region east of Australia. The body is from eight inches to two feet in length. These animals are caught in large numbers and dried and are popular as food in China. Trepang is the name of the dried product, which is almost tasteless but highly nutritious. It is used chiefly in preparing soups.

TREPHINING (trê-fîn'ing), or **Trepanning**, an operation on the human skull, which consists of cutting an opening or making a perforation with the trephine, or trepan. The cutting edge of this instrument consists of a circular saw-toothed device about half an inch in diameter and is operated by means of a handle, similar to that of an auger. In case of fracture, especially where broken fragments of bone extend across the brain, this instrument is useful in cutting the attached end so it can be removed. Cerebral abscesses are often relieved by trephining, but the openings are made as small as possible, usually one-fourth of an inch, and if necessary are afterward enlarged by the chisel.

TRESPASS (três'pas), in law, an offense committed against a person, the property, or the rights of another, such as an unlawful but peaceable entry upon the property of another. Mere words, without some action, do not constitute a trespass. A suit at law for damages may be maintained in such a case and the intention of the trespasser is immaterial, since the law takes into account the damages and not the intention. A person who aids or incites the perpetration of a trespass is liable as well as the direct perpetrator, and the principal who has given authority to an agent may be liable for trespass committed by the latter. A peaceable entry into a house or upon the land of another, with intention to take possession and oust the true owner, is regarded as a trespass. One who enters the house of another without permission, or walks over his ground, or suffers cattle and other live stock to stray upon it, commits the offense of trespass, and the owner has the right to an action for damages. In cases where a municipality or county places a restraint upon

cattle and other live stock running upon the streets and highways, the owner of such stock is guilty of trespass if he permits it to run at large. In such a case he is subject to a fine and, if such stock enters upon private property, he may be held liable for damages.

TRIANGLE (tri'ăn-g'l), in geometry, a figure bounded by three straight lines, the most simple of geometrical figures. The side upon which it rests is called the *base*; the point of the angle opposite the base is the *vortex*; and the lines extending from the base to form the vortex are termed the *sides*. The angles of the triangle are the angles formed by the sides with each other. Triangles are classed, according to the relative length of their sides—into *equilateral*, or equal-sided; *isosceles*, or with two sides equal; and *scalene*, or unequal-sided. A triangle is *right-angled* if one of its angles is a right angle. It is *obtuse-angled* when one of its angles is greater than a right angle, and it is an *acute angle* when it has no angle so great as a right angle. If all the sides are straight lines, it is termed a *plane*, or *rectilinear*, triangle. A triangle whose three lines are curved is said to be *curvilinear*. A *spherical triangle* is one whose sides are arcs of great circles of the sphere. To find the area of a spherical triangle, it is necessary to multiply the spherical excess by the square of the radius of the sphere; the spherical excess is found by subtracting 180° from the sum of the three angles.

TRIANON (trê-â-nôn'), or **Grand Trianon**, the name of a villa built by Louis XIV. in Versailles, France. This structure was completed in 1685 as a residence for Madame Maintenon and is a handsome building of one story. It was the scene of the trial of Marshal Bazaine in 1873. Another building, known as the Petit Trianon, was built for Madame du Barry by Louis XV. in 1776. Near it are several Swiss cottages and a lake. Marie Antoinette resided here for some time.

TRIASSIC SYSTEM (tri-ăs'sik), a group of rocks belonging to the Mesozoic period, immediately following the Permian and preceding the Jurassic systems. The name originated from the fact that the formations in Germany are grouped in three series, including the local divisions of *Buntersandstein*, or spotted sandstone; *Muschelkalk*, or mussel chalk; and *Keuper* marls, or copper marls. More recently the Rhaetic clays and sandstones overlying those mentioned have been added. The rocks of the Triassic System are widely distributed in Europe and Asia, but are less clearly marked in Australia and Africa. They are represented extensively in Canada and the United States and are

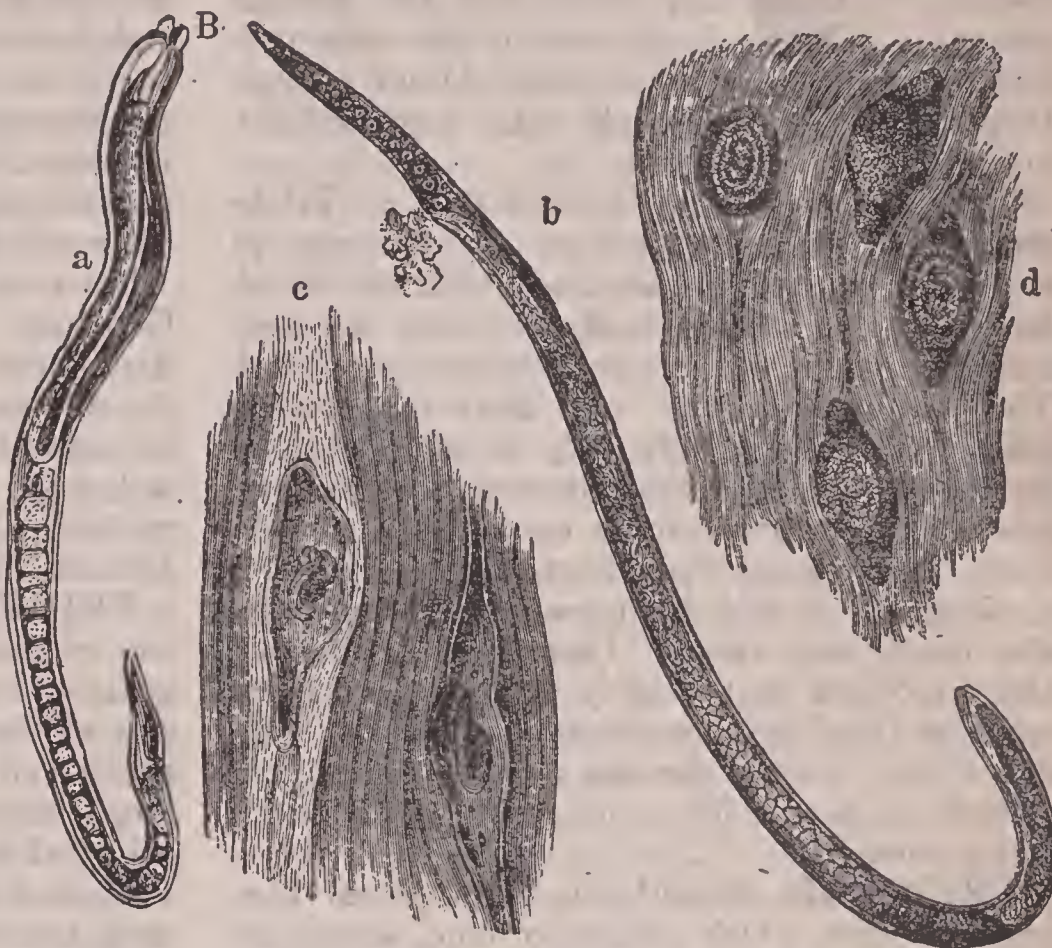
particularly abundant along the Hudson River, where they make up a large part of the Palisades. In the region of the Pacific coast, both in Canada and the United States, they reach a maximum thickness of nearly 5,000 feet. Many fossils are found in this formation, including ferns, conifers, fishes, and gigantic reptiles, such as the dinosaurs and plesiosaurs.

TRIBE, the term applied to a subdivision of a nation or stock that has not been organized as a civil state. The principal divisions of the Roman people were known as tribes. In general, the development of a nation begins with the clan, passes through the tribal state, and finally merges into the larger and more completely organized body known as the nation. Romulus divided the Romans into the three tribes known as the *Ramnenses*, the *Titienses*, and the *Luceres*, who probably represented the Latin, the Sabine, and the Etruscan elements, respectively. Each of these tribes was subdivided into ten *curiae*, and these were required to furnish a given proportion of the military forces for general defense and offense. The ancient people of Greece are frequently mentioned as divided into tribes, which appear to have developed from various clans, and later from territorial or political divisions. Since the Greeks were a nation of different races, the tribes frequently constituted classes distinguished by rights.

Anciently the term tribe was used extensively in reference to the Teutonic peoples, and different divisions of them are mentioned in history as the Germanic tribes. In American history we have characteristic examples of tribal organization. For instance, the Seneca tribe was constituted of eight totem kins. Historians usually term the five tribes of the Iroquois as the Five Nations and refer to any federation of clans under the general term of tribe.

TRIBUNE (trib'ūn), an officer of the ancient Romans, whose duty was to preside over a tribe for the purpose of administration, or to represent it in some official capacity. Originally a tribune represented or stood at the head of each of the three patrician tribes, the *Ramnenses*, the *Titienses*, and the *Luceres*, which originally included the entire body of Roman citizens. Later the term came to have a wider significance. The plebeian tribunes defended their order

against the patrician magistrates, and subsequently from three to six military tribunes with consular powers were elected annually. Another class of officers were the military tribunes, who were above the centurions and directly under the commander in chief. Each legion had six such tribunes. During the time of the kingdom they were appointed by the king, but the consuls exercised this power in the republic.



TRICHINAE.

a, Male trichina; b, Female trichina; B, Heads of the worms; c, d, Trichinae in the flesh.

During the later portion of the republic they were elected by the people in the assembly of the tribes.

TRICHINA (trī-kī'nà), a minute spiral flesh worm discovered in 1835 by Sir James Paget. It is parasitic in the sexually matured stage in the small intestine and in the larval stage in the voluntary muscles of man, swine, and other mammals. The worm in the larval stage measures about one-seventy-eighth of an inch in length and one-two-hundredths in breadth. It is scarcely visible to the naked eye. In the mature stage the male is about one-eighteenth and the female one-eighth of an inch long. The female produces large numbers of embryos in the small intestine, whence they bore their way through the intestinal wall and pass into the muscles of the body, where they surround themselves by a cyst, which afterward becomes calcareous. The larva may remain encysted for ten or more years and undergoes fur-

ther development only when the infected flesh is eaten by a suitable host, when the sexually mature stage is attained in the alimentary canal. Trichinae can enter the human system only by insufficiently cooked flesh, and, being swallowed alive, they soon develop to maturity and multiply in great numbers. Persons infected in this manner have swellings of the face and limbs, which are accompanied by a fever, and death results if aggravated cases are not treated promptly. The flesh of swine is the most prolific source of infection to man. Other animals frequently infected include rats, dogs, rabbits, mice, badgers, and moles.

TRICHINIASIS (trīk-ī-nī'ā-sīs), or **Trichinosis**, the disease caused by the presence of trichinae in the muscles and intestinal canal. In mankind it is due chiefly to eating the flesh of swine in which these small worms are found. They become liberated soon after the meat is swallowed and multiply very rapidly. Among the symptoms are fever, muscular pains, and others that resemble those common to typhoid fever. Since great danger attends the affliction, a physician should be consulted immediately, else death may result. Castor oil or calomel are prescribed in the early stage to expel the embryos from the stomach and intestines. Frequently the disease appears as an epidemic. It sometimes merges into acute fever, rheumatism, or pneumonia.

TRICOLOR (trī'kūl-ēr), the national banner of France, which consists of blue, white, and red colors running in a direction parallel to the flagstaff. The sections are equal in size and the colors are arranged in the order named, the blue being next the staff. Sometimes the name is applied to the national banner of Germany, which is that of the ancient empire, being black, red, and gold.

TRICYCLE (trī'sī-k'l), a velocipede with three wheels, introduced for general use in 1876. Many varieties of this vehicle have been placed on the market, but it has not proved a success, except for use by children as a toy and for invalids and others who are unable to walk. In most tricycles the power is applied by the feet through a crank axle, which is connected by a chain with the driving axle. In most designs the rider sits near the two hind wheels, which are worked by the driving axle, and a smaller front wheel is provided to maintain position.

TRIER (trēr), or **Treves**, a city of Germany, in the Rhine province of Prussia, on the Moselle River, 68 miles southwest of Coblenz. It has extensive steam railroads and electric railway facilities. The surrounding country contains extensive gardens, vineyards, and tracts of

woods. The Porta Nigra, a fortified gate with lofty towers, is an ancient Roman relic. Among the principal buildings are the cathedral, the municipal library of 125,000 volumes, the city hall, and the Gothic Church known as the Liebfrauenkirche. It has a beautiful public square, near which are the ruins of a Roman palace. The library contains the illuminated Codex Egberti and a copy of the Gutenberg Bible, which was published in 1450. Trier is a commercial and manufacturing center of considerable importance. Among the chief products are musical instruments, glass, furniture, leather, soap, ironware, and machinery. It has a large trade in fruit and grain. Lead, tin, and copper mines are worked in the vicinity.

Trier is considered one of the oldest cities of Germany. Anciently it was called *Augusta Trevirorum*, when it was a Roman colony. In the 5th century it was captured by the French, but was permanently united with Germany in the following century. The Congress of Vienna made it a part of Prussia in 1815. Population, 1905, 46,709.

TRIEST (trē-ēst'), or **Trieste**, a seaport city of Austria-Hungary, on the Gulf of Triest, an inlet from the Adriatic Sea, 70 miles northeast of Venice. The city has a fine harbor and ample railroad facilities. It is the center of a large interior and foreign trade. Among the principal buildings is an ancient cathedral in the Byzantine style. Others of note include the municipal buildings, the museum of antiquities, the Cathedral of San Giusto, the public library, the Capuchin convent, and the university. The streets of the newer part of the city are broad and handsome, but some of the older streets are narrow and poorly paved. It has gas and electric lighting, street railways, waterworks, public parks, and municipal baths. Among the leading manufactures are leather, white lead, ships, soap, cordage, cotton and woolen goods, clothing, and machinery. It has a large trade in wine, fruit, grain, coal, tobacco, and merchandise. The offices of the Austrian Lloyd's shipping company are the most extensive establishments of the kind in Europe. Tergeste was the ancient name and in the time of the Romans the city rose to commercial importance. It has belonged to Austria since 1832. A large proportion of the people are Germans, but the inhabitants include numerous Greeks, Jews, Italians, and Dalmatians. Population, 1907, 205,136.

TRIGONOMETRY (trīg-ō-nōm'ē-trŷ), the science which treats of the relations between the six parts of a plane triangle, these being the three sides and the three angles, so that when three of these parts are known the other three

may be computed. Although geometry treats of this subject, the geometrical methods are purely graphical and cannot be used to obtain accurate numerical results. In nearly all applications of trigonometry the practical object is to measure indirectly some height or some distance of which the direct measurement would be inconvenient or impossible. The principles of trigonometry are employed very extensively by the astronomer and the civil engineer, hence most treatises on the subject include a consideration of navigation, surveying, and spherical astronomy. Trigonometry is divided into plane trigonometry, spherical trigonometry, and analytical trigonometry. *Plane trigonometry* treats of plane angles; *spherical trigonometry*, of spherical triangles; and *analytical trigonometry*, of trigonometric functions.

TRINIDAD (trīn-ī-dād'), a city in Colorado, county seat of Las Animas County, on the Las Animas River, ninety miles south of Pueblo. Communication is furnished by the Colorado and Southern, the Denver and Rio Grande, and the Atchison, Topeka and Santa Fé railroads. It is surrounded by a farming and grazing country, which contains large deposits of bituminous coal. Its principal buildings include the county courthouse, the high school, the public library, the Saint Raphael's Hospital, and the Saint Joseph's Academy. Among the industries are coking ovens, brickyards, and railroad machine shops. It has public waterworks, sanitary sewerage, and a large trade in coal and merchandise. Population, 1900, 5,345; in 1910, 10,204.

TRINIDAD, an island off the northern coast of South America, forming with Tobago a possession of Great Britain. Trinidad is separated from Venezuela by the Gulf of Paria and is the most southern of the Windward Islands. It is 54 miles long and 40 miles wide. The area is 1,754 square miles. Tobago is situated northeast of Trinidad. The climate is healthful, especially in the more elevated regions. The soil is mostly fertile, though in the northern part of Trinidad are a number of mountain groups. Fine forests prevail in both the islands. Among the chief productions are sugar, molasses, rum, timber, tobacco, pitch, coffee, cotton, and many varieties of fruits. Fish and aquatic birds are abundant. Horses, cattle, sheep, and poultry are reared. A lake of Trinidad is remarkable for its extensive supply of pitch, the annual product of asphalt from this lake being about 190,000 tons. The Caroni River is the principal stream of Trinidad. Port of Spain is the chief town and capital. The colony has about 100 miles of railroads, 1,000 miles of telegraph lines, and about 800 miles of telephones. It has annual exports valued at \$10,-

100,000 and imports estimated at \$11,125,000. The island was discovered by Columbus, in 1498, and Trinidad was so named because he saw from the masts of his ship three mountain summits. It became a British possession in 1783. Population, 1906, 261,418.

TRINITY (trīn'ī-tŷ), a river of Texas, formed near Dallas by two forks, known as the East Fork and the West Fork, which rise in the northern part of the State. It has a general course toward the southeast and flows into Galveston Bay, 40 miles north of the city of Galveston. The total length is 550 miles. It is navigable for large boats to Liberty, about 22 miles, and for small craft for 300 miles. The Trinity flows through a fertile section of country.

TRINITY, Doctrine of the, the Christian doctrine that three persons constitute the divine nature, the Father, the Son, and the Holy Ghost. See **God**.

TRINITY SUNDAY, the eighth Sunday after Easter, immediately following Whitsunday. It is celebrated as a festival in honor of the Trinity, hence the name. Pope John XXII. established the festival in 1320 and it is celebrated as such by both the Roman Catholic and the Protestant churches, but not by the Greek Church. All the Sundays between Trinity and Advent are termed Sundays after Trinity, while most of the festivals occur in the half year between Advent Sunday and Trinity. No such festival as Trinity Sunday was known to the early Christians.

TRIO (trī'ō), in music, a composition for three voices or instruments, one of the parts of which must make the third with the bass and the other with the fifth octave. The name *piano trio* is applied to a composition written for the piano, 'cello, and violin, and the term *string trio* has reference to one written for the violin, viola, and 'cello, or two violins and a 'cello. In a minuet the term trio signifies the passage, formerly called the *menuetto*, which alternates with the minuet proper.

TRIPLE ALLIANCE, the name applied to several treaties of European nations. Among these may be mentioned the league formed in 1668 by Sweden, England, and the Netherlands as a means of protecting the Spanish Netherlands against Louis XIV. of France. A triple alliance was concluded by England, France, and the Netherlands in 1717 against Spain and the Pretenders. The *Dreibund*, a league of Germany, Austria, and Italy, was formed in 1882 as a successor to the Dual Alliance between Austria and Germany. It had for its purpose mutual protection in case of attack by other powers.

TRIPOLI (trīp'ō-lī), or **Tarabulus**, a sea-

port of Asiatic Turkey, on the eastern shore of the Mediterranean, 45 miles northeast of Beyrout and 70 miles northwest of Damascus. It is situated in a fertile plain of Syria and most of the structures are of stone. The chief buildings include several mosques, a hospital, and a number of schools. It has a large export trade in silk, oil, cereals, sponges, and tobacco. Off the coast are valuable fisheries of sponges. Tripoli was known as Tripolis in ancient times. In its vicinity are ruins dating from the time of the Crusaders. Population, 1909, 31,500.

TRIPOLI, a seaport city of North Africa, capital of the vilayet of Tripoli, almost due south of the Island of Sicily. It occupies a rocky prominence projecting into the Mediterranean. Surrounding it are fine orchards of lemons, oranges, apricots, and other fruits. The city is defended by high walls and several fortresses. It contains numerous synagogues, mosques, churches, and several government buildings. The manufactures include carpets, leather, silk and woolen textiles, jewelry, and utensils. Numerous caravans start at Tripoli, penetrating through the Sahara and Soudan as far as Timbuctoo, Lake Tchad and Bornu. Most of the business interests are in the hands of Jews and Christians, though a majority of the people are Arabic and Turkish Mohammedans. Tripoli has a triumphal arch erected in 164 A. D. in honor of Marcus Aurelius. Population, 1908, 38,480.

TRIPOLI, a country of North Africa, lying south of the Mediterranean Sea, between Tunis and Egypt, and extending into the Sahara Desert. The coast line is 900 miles long, and the principal indentation is the Gulf of Sidra. Tripoli is a vilayet, or province, of Turkey. It is divided into the four governments of Fezzan, Khoms, Barca (the mutessarriflik of Bengazi), and Jabel-el-Sharb, with a total area of 410,000 square miles. The coast region is the most fertile, especially a belt about twenty miles wide. Parallel to the coast are ranges of the Atlas Mountains, which reach a height of 2,500 to 4,025 feet above sea level, thus preventing copious rains in the interior, which is largely arid. The southern part is a vast desert tract in which rain seldom falls, vegetation depending wholly upon heavy dews that prevail.

Agriculture and stock raising are the principal industries. The productions in the coast region include cotton, wine, grain, grasses, ostrich feathers, and many varieties of tropical fruits. Those of the interior embrace ivory, skins, and various minerals. It has considerable interests in fruit culture. Off the coast are productive fisheries of sponges, pearls, stur-

geon, and haddock. Sheep and cattle are reared in large numbers on the interior grazing land, and horses of excellent quality are grown by Bedouin herders. The culture of silk and the mulberry tree engages many people. The principal exports include grain, fruit, and live stock, and the leading imports embrace wines, tea, and manufactured articles.

The government of Tripoli is administered under a governor general, who receives his appointment from the Sultan of Turkey. It may be classed as a despotic government, although it has had a form of constitution since 1909. The people pay as tribute a tenth of all the products of the soil, though there is a special tax on cattle, camels, sheep, and olive trees. However, formerly the revenues were derived principally from prizes captured by the corsairs and the ransoms secured for captives. Anciently Tripoli belonged to Cyrenaica and it still has some ruins at Cyrene, Leptis, and Ptolemais which date from the time of ancient prosperity. Subsequently the Carthaginians came in possession of the country and later it was occupied by the Romans. It became Mohammedan under the Arabs after the decline of Rome. Since 1552 it has been a Turkish possession. Tripoli is the capital and principal city. Other cities include Derna, Grenna, Bengazi, and Mesurata. Population, 1906, 782,500.

TRIPOLITE (trĭp'ō-lĭt), or **Tripoli**, the name of an earthy substance, arising from the decay of schists and impure limestone, so called from being procured originally from Tripoli in Africa. It consists almost entirely of silica and is composed largely of the mineral remains of infusoria. The color is white or yellowish-gray and it is granular but not compact. This product is widely distributed, but is procured chiefly from Missouri, France, and Germany. It is used in polishing metal and glass and in constructing water filters.

TRIEME (trĭ'rēm), a vessel or galley used by the ancients, especially the Greeks, Carthaginians, and Romans. It was the largest vessel employed, containing three benches of oars on each side and carrying large square sails to be raised in a fair wind, though sails were not employed while the vessel was in action. A trierarch commanded the vessel, which was often manned by 200 men, who were able to move it with considerable swiftness. In engagements it was made an object to run up suddenly against the vessels of the enemy to disable a large number of oars, or to crush in one of the sides. Where two vessels were unequally equipped, the stronger made it an object to sail alongside the opponent and over-

come the crew by personal contact. In later years galleys with five benches of oars took the place of the trireme.

TRITON, a genus of water salamanders, which are widely distributed in temperate and subtropical regions. They are found in large numbers, both as water and land animals, in the warmer sections of North America. The front feet have four toes and the hind feet have five, and the body is covered with warty tubercles. The *spotted triton* is a familiar species in the Atlantic states. It is about five inches long, has a brownish-green color, and is more or less spotted with various markings. It is a water animal, but can live on the land for a short period. The feet serve to creep on land and to balance itself while submerged, the forward movement in water being effected by means of the tail. It occurs from New Brunswick to Georgia, and is a favorite and interesting animal for the fresh-water aquarium. The *water newt*, or *crested triton*, of Western Europe is somewhat larger, being nearly seven inches long, but is closely allied. The *great triton*, or *conch*, belongs to this order of animals. It is a gasteropod mollusk of the *Murex* family. Its shell is used by Australian and Polynesian natives as a trumpet. About 100 more or less closely allied species of tritons are now living. Fully 45 fossil species have been described.

TRIUMPH (trī'ūmf), the name of a solemn procession in ancient Rome, constituting the highest public honor bestowed upon a commander who achieved great successes in warfare. The pageant was led by the senate and the spoils and prisoners, after which came the victorious general or naval commander in a vehicle drawn by four horses, and the rear was brought up by the army of the victor. The procession extended along the Sacred Way to the Temple of Capitoline Jove, where sacrifices were solemnly offered to Jupiter. A naval triumph was usually smaller than one celebrated for a military commander and the festivities were characterized by nautical trophies. The triumph was concluded by an extended season of banquets and entertainments. It was customary to bring captives, especially hostile chiefs, to the pageant, and they were usually put to death during the triumphal march. The last triumph was celebrated in 302 A. D. by Diocletian.

TRIUMVIRATE (trī-ūm'vī-rāt), a Latin word meaning composed of three, applied among the Romans to an office filled by three men. Officials belonging to the triumvirate were called *triumvirs*, and their duties were to jointly

execute the obligations incumbent upon public officers. The two great coalitions formed of the three most powerful individuals in the Roman Empire included the triumvirate of Julius Caesar, Crassus, and Pompey, in 60 B. C., and that of Octavius, Antony, and Lepidus, in 43 B. C. The former was never formally recognized. It was broken by the defeat of Crassus in Mesopotamia and the Civil War soon after caused the death of Pompey, resulting in the succession of Julius Caesar as perpetual dictator. The triumvirate formed in 43 B. C., though usually called the second, was in reality the first to receive official recognition. Under it the empire was divided, Lepidus receiving Italy, Octavius the West, and Antony the East. In 1849 Saffi, Mazzini, and Armellini formed a triumvirate at Rome, assuming entire executive power.

TROGLODYTE (trōg'lō-dīt), the name given to a race of cave dwellers in ancient Greece, and later the term was applied similarly in other countries. These people were uncivilized and their dwellings were constructed in natural caverns or in caves dug in bluffs or hillsides. Strabo mentions people of this class in connection with the history of the Caucasus and the southern part of Egypt. It is asserted that they did not possess the art of speech, but uttered shrieks and screams similar to those of the lower animals. They were pastoral, practiced polygamy, and put the aged and infirm to death.

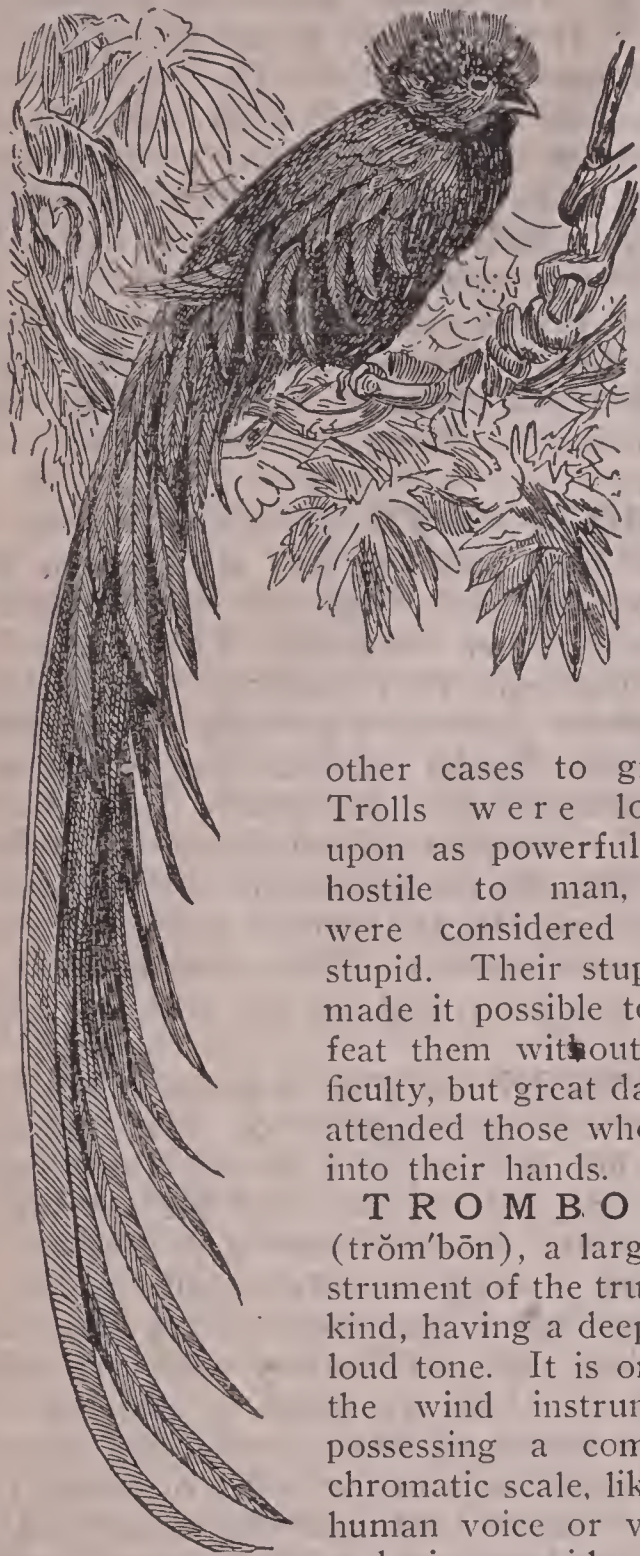
TROGON (trō'gōn), a genus of birds found in the warmer climates of both hemispheres. The bill is short and strong, the wings are moderate and rounded, and the legs and feet are rather weak. These birds have a richly colored plumage, usually metallic green above and red below, and some species have remarkably long tails. Of the fifty species enumerated, more than half are found in America. They subsist largely on fruits, berries, and insects and build their nests in the cavity of decayed trees. The voice is loud and unpleasant, and some utter clucking and whistling notes. See illustration on following page.

TROJAN WAR (trō'jan). See **Troy**.

TROLLING (trōl'ling), a favorite method of angling to catch various kinds of fish. The lure is in the form of a spoon bait and is so attached to a line that it spins as it is drawn through the water, which is made possible by the use of a swivel. The bluefish and several other fish are taken from a boat in motion, and some species are caught by throwing the lines so as to be carried by the current of tides or

the flowing water in streams. Among the fish caught successfully by trolling are the pickerel, mackerel, tarpon, tuna, bass, and bluefish.

TROLLS, the name applied in Scandinavian mythology to various supernatural beings. It sometimes refers to misshapen dwarfs and in



TROGON.

other cases to giants. Trolls were looked upon as powerful and hostile to man, but were considered very stupid. Their stupidity made it possible to defeat them without difficulty, but great danger attended those who fell into their hands.

TROMBONE (trōm'bōn), a large instrument of the trumpet kind, having a deep and loud tone. It is one of the wind instruments possessing a complete chromatic scale, like the human voice or violin, and is considered a very valuable addition

to the orchestra. The form generally used has a long tube bent twice upon itself and fitted at the outer bend with a U-shaped slide, by the motion of which the length of the vibrating air column may be adjusted so as to form any note within its compass. Three kinds of trombones are in general use, called after their pitch the *alto*, *tenor*, and *bass* trombones. Some instruments are fitted with pistons, when they are known as *valve trombones*.

TRONDHJEM (trōn'yēm), a city of Nor-

way, at the mouth of the Nid River, 240 miles north of Christiania. It is situated on the south shore of Trondhjem Fjord, which is open for navigation the entire year, and has railroad facilities to points in Norway and Sweden. The streets are well improved and regularly platted. It has systems of waterworks, sewerage, and electric lighting. The chief buildings include the public library, the Lutheran Cathedral, and several institutions of learning. The public library has 110,000 volumes and with it is connected a museum of natural history. Among the manufactures are paper, sugar, machinery, snuff and cigars, canned and cured fish, and sailing vessels. It has a large export trade in timber, minerals, and fish. The city was founded in 996 and was long known as Nidaros. Population, 1906, 38,954.

TROPHY (trō'fĭ), a memorial erected on a field of battle to commemorate the deeds of valor of the victorious party. Trophies were erected by the Greeks and Romans. They consisted largely of the arms of slain enemies, placed either upon a stone or metal pillar. The Romans, to make their trophies inviolable, consecrated them to Jupiter or some other deity. Trophies were allowed to perish by natural causes, since it was desired that hostile feelings should not be perpetuated, and any attempt to repair them when decayed was regarded as sacrilegious. Trophies have been erected in many modern churches and other buildings. These are usually carved in stone or bronze, are placed upon the walls, and commemorate heroism and valued service.

TROPIC BIRD, a class of sea birds of the pelican family, having webbed feet, two elongated tail feathers, and a strong bill. They are able to fly with considerable facility and are seen quite frequently on the wing, being birds of powerful flight. Two well-known species are common to the Atlantic, Indian, and Pacific oceans. The *common tropic bird* is about thirty inches long, with an alar extent of forty inches. In size it resembles the partridge. The color is white with black markings on the head, back, and wings. These birds breed on high cliffs and are hunted by natives for their flesh and ornamental feathers. A species common to the tropical Pacific is bright red. The long tail feathers are used by the natives for ornaments.

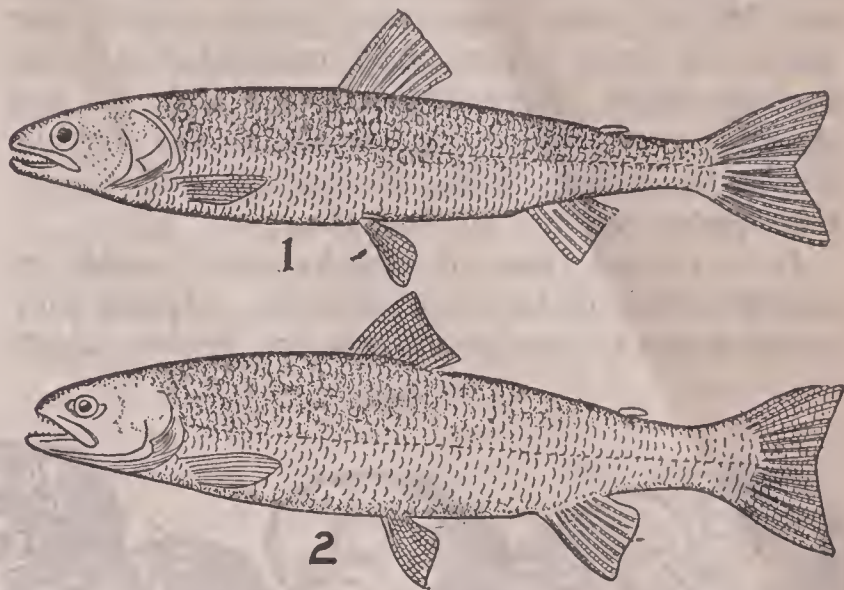
TROPICS (trōp'iks), two small circles imagined drawn parallel to the Equator, situated about 23° 27' north and south of it. They serve to indicate the region at which the sun is seen in the zenith on the days of its greatest declination, and between them are included all the points on which the sun's rays fall verti-

cally at any season of the year. The tropic north of the Equator is called the *Tropic of Cancer*, since the sun is in the constellation of Cancer when shining directly upon it, and the one south of the Equator is called the *Tropic of Capricorn*, because the sun, when shining directly upon it, is in the constellation of Capricorn. Between the two trōpics lies the Torrid, or Hot, Zone, the climate of which is said to be *tropical*. The width of the Torrid Zone is 47° and north and south of it are the North and South Temperate zones, respectively. Animals and plants are larger and include more species than in any other zone, birds are more numerous and of gayer plumage, and the sea shells are brighter than in lands where the sun shines with less power.

TROUBADOUR (trōō'ba-dōōr), the name given to a class of poets which appeared in Provence, in the south of France, near the close of the 11th century, but later spread to Spain and Italy. They engaged in the production of lyrical poetry, chiefly of the kind complicated in meter and rhymes, and devoted themselves to the musical art rather for the love of it than to secure monetary profit. The art of the troubadours came to be called the *gay science*. It is supposed to have been brought from the East by the Spaniards, of whom the French of Provence learned it and afterward gave it higher development. They became popular at the courts of kings and nobles, whose deeds they praised or censured in songs, though they more frequently sang of fancy and love on subjects selected by some lady. In many cases the poems were devoted to the evils of the times, subjects of gallantry, conditions of society, and skill in military arts. The period in which they flourished was from 1085 until 1290, about 200 years.

TROUT, the name of many species of fish belonging to the salmon family, abundant in almost all the rivers and lakes of the temperate and colder zones. They are excellent food fishes, but differ from the salmon proper in that they frequent only bodies of fresh water. The *brook*, or *speckled trout* is common to the Northern States and Canada and is one of the favorite food fishes. It weighs one to two pounds, is six to twenty-six inches long, and has a brown or yellowish color with spots of red and black. Other American species include the *lake trout*, *mountain trout*, *Dolly Varden trout*, *blue-black trout*, *golden trout*, *salmon trout*, and *Mackinaw trout*. Several American species have been introduced to Europe, and the *common river trout* of Europe has been successfully planted in Canada and the United

States. Trout fishing is a favorite sport, since they are very voracious and readily take any kind of animal bait, especially worms and flies. The color of the trout varies somewhat according to the condition of the water and the flesh



1, Speckled Trout; 2, Dolly Varden Trout.

ranges from white to pink, the latter being most highly prized. Several species attain a large size. Specimens weighing from 25 to 40 pounds are not rare.

TROUVÈRE (trōō-vâr'), the name given to a class of ancient poets in France, corresponding to the Provençal troubadour. They composed a large part of the courtly lyrics of medieval France. The trouvères are distinct from the *jongleurs*, who were the class that performed the works composed by the trouvères, but some of the jongleurs aspired to composition. Most of the trouvères were men of rank and standing, such as priests or knights, and their compositions were largely epic or narrative in character.

TROY, or *Ilium*, a famous city of Asia Minor. It is celebrated as the seat of the Trojan War, the chief events of which are recounted in the *Iliad*, written by Homer. The ancient city is supposed to have occupied an imposing site in the northwestern part of Asia Minor, near the Aegean Sea and the western extremity of the Hellespont. We learn from the *Iliad* that the city was situated at the foot of Mount Ida and that between it and the sea was the plain of Troy, a stretch of land about nine miles wide. It is believed that the plain referred to is a scope of land lying near the mouth of the Mendereh River, now supposed to be the Scamander of Homer. Schliemann made excavations in this vicinity and discovered remains of a prehistoric city, believed to be ruins dating from the ancient Troy.

Homer relates that Troy reached its greatest splendor in the reign of King Priam, but its

destruction was caused by Paris, a son of Priam, abducting Helen, wife of Menelaus, King of Sparta, and carrying her to the Trojan capital. The Greeks spent ten years in collecting an army to avenge this outrage, and, under the leadership of Agamemnon, who had 1,186 ships and 100,000 men, drove the Trojans within the walls of Troy, where they conducted a siege for ten years. A quarrel between Achilles and Agamemnon proved disastrous to the Greeks in the beginning of the tenth year, and this is the special subject of the *Iliad*.

It is related that the Greeks were unable to capture the city by direct assault. Hence, they constructed a huge wooden horse, within which

event occurred in 1184 B. C. Among the bravest Grecians who took part in the memorable siege were Achilles, Agamemnon, Ajax, Ulysses, Menelaus, Diomedes, Nestor, and Patroclus. The celebrated Trojans included Hector, Sarpedon, and Aeneas. It is supposed that Achaean Greeks founded a city on the site of Troy in 700 B. C., known as Ilium, though this, as well as the Homeric account of the fall of Troy, is doubtful.

TROY, a city of Alabama, county seat of Pike County, 52 miles southeast of Montgomery. It is on the Central of Georgia and the Plant System railroads and has a large shipping trade in cotton and produce. The public utilities include



MENELAUS.

PARIS.

DIOMEDES.

ULYSSES. NESTOR.

ACHILLES.

AGAMEMNON.

they concealed a band of the bravest Greek heroes. The Greeks left this structure before the gates of Troy, withdrew from the city, and the army and navy sailed to an island near the coast called Tenedos. Much rejoicing was occasioned in the city at the departure of the Greeks, and it was proposed that the wooden horse be drawn within the walls. However, Laocoön warned the Trojans not to bring any device made by the Greeks into the city and while speaking cast his spear against the wooden horse. Soon a monstrous serpent rose from the sea and devoured Laocoön and his sons, thus leading the people to believe that destruction had visited his home because he had cast his spear against an object sacred to Minerva. They accordingly brought the horse within the gates by means of ropes and rollers, but at night a secret door was opened and the brave band of Greeks concealed within, aided by the Greek army, returned from the island, captured and destroyed the city. It is thought that this

waterworks and electric lighting. Among the noteworthy buildings are the county courthouse, the high school, and the State normal school. It has manufactures of earthenware, tobacco products, and machinery. The first settlement on its site was made in 1843, in which year it was incorporated. Population, 1900, 4,097.

TROY, a city of New York, county seat of Rensselaer County, on the Hudson River, six miles north of Albany. It is at the head of steam navigation, on the Boston and Maine, the New York Central, and the Delaware and Hudson railroads. Communication is likewise furnished by the Erie and Champlain canals. The river is crossed by a number of substantial railway and wagon bridges. Transportation within the city is provided by a system of electric railways, which are connected with lines that extend to Albany and other cities. Many of the streets are substantially paved with stone and macadam. They are well drained by a system of sewers and lighted with gas and elec-

tricity. The waterworks are owned by the municipality.

Troy is finely located on a rolling site, being level near the river and rising over a range of hills toward the east. Mount Ida is the highest elevation within the limits. Beman Park is one of many public resorts. Other public grounds include Lagoon Island, in the Hudson south of the city, and Warren's Hill Park, which overlooks the river. Washington Square contains the soldiers' and sailors' monument and a number of fine memorials are in Oakwood Cemetery, a burial ground of great beauty. This cemetery contains the remains of Gen. George H. Thomas and the Earl Memorial Chapel, a modern crematory. The residential section is beautifully improved with lawns and avenues of trees.

Troy has many substantial buildings of modern construction. These include the county courthouse, the post office, the city hall, the Hart Memorial building, the Union Passenger Station, the Rensselaer Hotel, the Row Memorial building, and the Savings Bank building. The system of public schools is well organized and culminates in an advanced high school course. Among the educational institutions are the Emma Willard Seminary and the Rensselaer Polytechnic Institute, an important institution. It is the seat of the Troy Hospital, the La Salle Institute, and many charitable and benevolent institutions. The ecclesiastical buildings include the First Presbyterian, the Saint Paul's, the Saint Peter's, the Second Presbyterian, the Saint Mary's, the Saint John's, and a number of other churches. Several fine libraries are maintained, including the collections in the public library and in the Rensselaer Polytechnic Institute.

The city ranks fifth as a manufacturing center in the State. It has extensive water power facilities on the Hudson, owing to the extensive dam maintained by the State. The chief manufacturing enterprises include iron and steel works, paper and pulp mills, breweries, brick and tile yards, and flouring and grist mills. Among the general manufactures are clothing, hosiery and knit goods, scientific instruments, stoves, bells, and laundry machinery. A large wholesaling and jobbing trade is carried on with points in New York and New England. It has an extensive trade in cereals, manufactures, live stock, dairy products, and fruits.

The region with which Troy is included was a part of the grant of land to Van Rensselaer in 1629. Settlements began to be made soon after, but the town was not platted until 1787. It was first called Van der Heyden's Ferry,

from an owner of the immediate tract upon which the town was built, and the present name was adopted in 1789. Its charter as a city dates from 1816. At the time of the War of 1812 it contained the large packing establishment of Samuel Wilson, who furnished the army with packed meat in barrels. He was familiarly called "Uncle Sam," which circumstance gave rise to the popular national nickname applied to the United States. Lansingburg, a village with a population of 12,597, was annexed to Troy in 1901. Population, 1905, 76,861; in 1910, 76,813.

TROY, a city of Ohio, county seat of Miami County, twenty miles north of Dayton. It is on the Cleveland, Cincinnati, Chicago and Saint Louis and the Cincinnati, Hamilton and Dayton railways. Transportation facilities are provided by several electric railway lines. The surrounding country is devoted to agriculture and stock raising. Among the chief buildings are the high school, the county courthouse, and many churches. The manufactures include wagons and carriages, flour, earthenware, and machinery. It has waterworks and an electric lighting and power plant. Population, 1900, 5,831; in 1910, 6,122.

TROYES (trwä), a city in France, capital of the department of Aube, 98 miles southeast of Paris. It is on the Seine River and is connected by a number of important railroads with other trade centers. Among the manufactures are cotton and woolen goods, hardware, pottery, soap, paper, and machinery. The surrounding country is fertile, producing fruit, raw silk, and cereals. A Gothic cathedral, dedicated to Saint Peter in 872, occupies an imposing site. It has a public library of 112,000 volumes, numerous churches, a fine museum, and various educational and scientific institutions. Gas and electric lighting, waterworks, pavements, and street railways are among the public improvements. Troyes was long a Roman possession, when it was known as Augustobona. It was the scene of a battle between Napoleon and the allies in 1814. The Germans occupied it in 1870. Population, 1906, 53,447.

TROY WEIGHT, a scale of weights used for weighing silver, gold, and jewelry, so named from Troyes in France. The troy pound is equal to 22.79 cubic inches of distilled water. It contains 12 ounces of 20 pennyweights each, and the pennyweight contains 24 grains. A pound troy is identical with the pound of apothecary's weight, and the ounce and grain of these two weights are correspondingly the same. The weight of the pound compared with the avoirdupois pound is as 144 to 175, and the

troy ounce is to the avoirdupois ounce as 192 to 175.

TRUFFLE (tru'f'l), a genus of plants belonging to the fungi, several species of which are cultivated as food plants. These plants are subterranean, without visible roots or stems, and grow to the size of a large potato. They are cultivated to a considerable extent in Europe, especially in the southern part, and form an ingredient in many dishes, both for the flavor and their nutritious qualities. Since no stem or other visible growth appears above the surface, the plants are found through the agency of dogs that are trained to hunt them by means of the scent. While truffles may be grown in Canada and the United States, they are little known in this country as an edible food.

TRUMPET (trump'ët), a wind musical instrument which dates from remote antiquity, distinguished for its clear and penetrating tone. It is formed of a single tube of brass or silver curved into a convenient shape, having a mouth-piece at one end and a bell at the other. Most modern instruments of this class are provided with crooks and slides, thus raising or lowering the pitch as the tube is shortened or lengthened respectively. The sounds are modified by the action of the player's lips and may be varied by the addition of slides, valves, and keys. It is a popular instrument in military bands, and is used to a considerable extent in war. For ear and speaking trumpet, see **Sound**.

TRUMPET FLOWER, the popular name of several flowering vines, which have a woody stem and bear flowers formed like a trumpet. They are native to the Southern United States, but are now cultivated extensively in gardens and house yards throughout the Northern States and the southern part of Canada, where they are popular as vines designed to climb trellis work and porches. About fifty American species have been enumerated. The trumpet flower is a woody vine. It has an abundance of rootlets and climbs to a great height. The flowers are in clusters, usually of a reddish color, and the leaves are pinnate, with ovate leaflets. A species known as the *Tacoma Australis* is an ornamental Australian climber. The *great-flowered trumpet flower* is native to China. Other species are found in Eastern Asia, South America, the West Indies, and Australia.

TRURO (tru'rō), a city of Nova Scotia, capital of Colchester County, on the Salmon River, sixty miles northeast of Halifax. It is near the head of Cobequid Bay, on the Intercolonial Railroad, and is surrounded by a fertile agricultural region. The chief buildings in-

clude the county courthouse, the high school, the Truro Academy, the Stanley Hotel, and the Nova Scotia Agricultural College. Among the manufactures are clothing, boots and shoes, flour, leather goods, machinery, and musical instruments. The place was founded in 1761 by loyal settlers from New Hampshire. Population, 1908, 6,145.

TRUSTEE (trūs-tē'), the term applied to a person to whom is intrusted the right to hold in trust certain property, either real or per-



TRUMPET FLOWER.

sonal, for the benefit of another, or for some special purpose. Any one who has an interest in property so held, whether the interest be exclusive or limited, is termed a beneficiary. It is not obligatory upon any one to assume the responsibility of a trust, but if he undertakes such a duty it must be discharged until a full settlement is made, or he is released upon the order of a court or an agreement of the beneficiaries. Declarations or creations of trusts or powers in relation to real estate are executed in the same manner as those of conveyance, but this provision does not apply to trusts resulting from the operation or construction of law. Most states make breach of trusts a crime punishable by law, and in all cases the trustee is liable for the misapplication of funds or the consequences of a breach of trust. If several trustees act conjointly in the administration of a trust, each is liable only for his own acts. See **Trusts**.

TRUSTS, the combinations of corporations or of individuals which are maintained to fix

the prices of their products, in part at least, on the principle of monopoly. The term *corporation* is applied to the combination of individuals which are maintained for productive and commercial purposes, but trusts are by no means confined to corporations. However, it may be said that trusts are an outgrowth of associations which seek to control large interests in promoting commerce and industry. Besides the primary object of trusts to diminish the cost of production, they seek to affect the market by limiting the output as well as to make the prices as favorable to the parties who constitute the combination. Those who promote the organization and maintenance of trusts defend them from the industrial point of view that free and open competition is ruinous in its nature, especially where intercourse between persons in different localities is easily carried on and where a large amount of capital is invested in fixed plants. They also argue that there is a material saving industrially where combinations are maintained, and claim that the competitive system tends to lessen the quality of the product as well as to require the investment of larger sums of money to produce a reasonably fair output.

In 1900 the government published a census bulletin in which it was shown that 183 corporations controlled 118 idle and 29,029 active plants. Formerly the greater number of plants involved, such as mills and factories, were operated as independent properties, but the combinations brought these industries under the control of a very few men. As a whole the effect was not beneficial to laboring men and, on the other hand, the public was obliged to pay a somewhat higher price for products turned out by these institutions. In many places were manufacturing establishments that had received aid by local capitalists, some of which were operated by the trusts, but a majority of these remained idle or were converted into plants producing commodities different from those they were established to manufacture. Investigation also developed the fact that prices of products were not dependent so much upon the cost of manufacture as they were upon whether independent plants still continued to operate. As a whole the prices were higher and uniform where the trusts controlled the market, and they were in a few cases below the actual cost of production where competition was maintained, the promoters being desirous of disorganizing or ruining the business of competitive industries.

The Department of Commerce and Labor, established in 1903, includes the Bureau of Corporations. This branch of the government has

investigated many of the so-called trusts, such as seek to control the output and price of paper, tobacco, beef, steel and iron, flour, and mineral oil. Oscar L. Straus, in 1908, then Secretary of Commerce and Labor, published the view that reforms and the control of trusts must come through some general system of publicity. In line with this view, the government and many of the states prosecuted many violaters of the anti-trust laws. The prosecutions include those against the International Harvester Company, the American Sugar Refining Company, the American Cigar Company, and the International Paper Company. Many states imposed heavy fines upon trusts, especially Texas, where the Waters-Pierce Oil Company was fined \$1,623,900.

A strong tendency to overcapitalize many of the larger trusts has been observed in many instances. This has resulted in the issuance of a large amount of stock which has been sold to the public in prosperous times, but which afterward proved comparatively of little value. The 183 corporations referred to above had an actual capital of \$1,458,522,573, but their authorized capitalization was \$3,607,539,200, and in addition they issued bonds amounting to \$3,085,200,868. Thomas W. Lawson, of Boston, contributed a series of articles to *Everybody's Magazine* in 1905 in which he showed the enormity of overcapitalization of the Standard Oil Company, the Amalgamated Copper Company, the United States Steel Corporation, and other similar organizations doing business on a very large scale, both in the production and sale of commodities and in selling stock of questionable value upon the public. The United States Steel Corporation was incorporated under the laws of New Jersey in 1901 with a capital of \$1,100,000,000, absorbing at the time eleven of the largest steel, iron, tin, bridge, wire, and tube companies of the United States. Other great combinations include the following:

	CAPITALIZATION.
National Bread Company.....	\$ 3,000,000,000
National Witch Hazel Company.....	3,000,000,000
Hartford Carpet Company.....	5,000,000,000
International Harvester Company.....	10,000,000,000
American Hydraulic Brick Company.....	15,000,000,000
Photographic Dry Plate Company.....	30,000,000,000
United Box Board and Paper Company.....	30,000,010,000
United States Cotton Duck Company.....	50,000,000,000
American Shipbuilding Company.....	65,000,000,000
American Can Company.....	88,000,000,000
American Plow Company.....	100,000,000,000
American Smelting and Refining Company...	100,000,000,000
Amalgamated Copper Company.....	155,000,000,000

TSAD, Tchad, or Chad (chäd), a fresh-water lake of Central Africa, in the Sudan, immediately north of Kamerun and east of the Royal Niger Territories. It is 150 miles long, 118 wide, and 900 feet above sea level. The area depends upon the season and rainfall, rang-

ing from 10,000 to 20,000 square miles. Several large rivers flow into it, including the Shari and Yaobe. The shores are low and swampy and surrounding it are vast regions that are covered with reeds and papyrus. The general depth ranges from ten to eighteen feet in ordinary seasons, but some years the water is much deeper and covers many of the islands and large tracts of adjacent marshes. The fact that it is a fresh-water lake, although it has no outlet to the sea, is ascribed by some to the circumstance that it sometimes overflows and covers a region lying about 300 miles toward the northeast. The vicinity of Lake Tsad is inhabited by native pagans, who are of an unusually dark color and find employment in cultivating cotton, corn, and vegetables. They rear stock, such as cattle, horses, and sheep. Large numbers of crocodiles, hippopotami, fish, and water fowl are abundant. Several thriving commercial towns are in its vicinity, including Mawo, Kuka, and Massena. Nachtigal (q. v.) explored the lake in 1871 and 1872.

TSARITSYN (tsá-rě'tsín), a port city of Russia, in the government of Saratov, on the Volga River. It has transportation facilities by railways and navigation on the Volga and is surrounded by a fertile farming and grazing country. The principal buildings include the townhall, grain elevators, the public library, and a large Lutheran Church. Salt, mustard, machinery, and clothing are the principal manufactures. The city has an extensive trade in farm produce, petroleum, fish, and lumber. Population, 1906, 59,678.

TSARSKOYE SELO. See **Tzarskoje.**

TSETSE (tsět'sě), a small blood-sucking fly of South Africa, slightly larger than the gadfly. The color is brown with yellow transverse bars on the abdomen, beyond which the wings project considerably. It is an active insect, especially in the warmer part of the day, and can scarcely be caught by the hand. The bite is as harmless to man as it is to the mule and the wild animals native to the country, but it is decidedly poisonous to oxen, horses, and dogs. No harmful effect is perceived at first, but in a few days the nose and eyes begin to run. This symptom is followed by swelling of the lower jaw, staggering, relaxation of the muscles, and finally death. Some of the animals bitten linger in an affected condition for several months, often recovering when the cases are extended. Livingstone lost 43 oxen by the attack of this pest on one of his journeys. These insects are very numerous in some regions, often attacking horses and cattle in swarms.

TUAREGS (tōō-ä'rěgz), a nomadic people

of the Sahara Desert, closely allied to the Berbers. They inhabit the Sahara from Fezzan west to the Atlantic. The hair is straight, the physique is well developed, and the features resemble those of the Caucasian rather than the African. In religion they are Mohammedan and they are fanatic and warlike. Formerly they were monogamists, but became polygamists after adopting the Moslem faith. The women go unveiled and take part in public affairs. These people number about 300,000.

TUBERCULOSIS (tû-běr-kû-lō'sis), a disease due to the presence or formation of tubercles within some organ or tissue, as pulmonary tuberculosis and renal tuberculosis. Tubercles are small granular tumors, or nodules, which may be developed in different organs or parts of the body, and range in size from a mere point to an eighth of an inch in diameter. If only a few prevail in any organ, they may remain harmless, but when numerous they form a tubercular mass that tends to spread and destroy the surrounding structure. Dr. Koch (q. v.), in 1882, discovered that they are due to a microscopic organism called the *tubercle bacillus*, which produces a cheesy degeneration of the normal tissue, resulting eventually in tuberculosis. Formerly the disease was considered hereditary, but now it is known to spread only by infection. However, some individuals have a predisposition toward the disease, in which case the system is unable to throw off the infection. Ordinarily it may be produced by any cause which lowers the vital conditions, such as dampness of soil and atmosphere, impure air, bad ventilation, overcrowded rooms, and filthy habits. The chief seat of the disease is in the lungs, brain, kidneys, liver, bronchial tubes, serous membranes, and intestines. It affects the lower animals as well as man. The disease may be transmitted to man by the milk and flesh of tuberculous cattle. However, the sputum of patients affected by the disease is the greatest source of danger, since the bacilli are thrown off in this way in very large numbers. The germ is not killed by drying or ordinary exposure, hence may be taken up in the dust and carried to the lungs of some person by inspiration of air.

Much anxiety has been occasioned by the remarkable prevalence of tuberculosis in large cities, and it is thought that many cases are due to the consumption of affected meat and to overcrowded tenements. A report published in 1900 shows that 15,417 deaths occurred in 14,480 tenement houses in New York City, and that the deaths due to tuberculosis in Great Britain average annually 70,212. The International

Tuberculosis Congress, promoted for the establishment of sanitariums to guard against and treat pulmonary and other forms of tuberculosis, held an important session at Berlin, Germany, May 24-27, 1899. It was attended by delegates from most countries, including Canada and the United States, and did much to call attention to the widespread prevalence of the disease and to the most feasible means to cope with it. Swine, chickens, rabbits, cattle, and other domestic animals are subject to various forms of the disease. In 1888 Albert Landerer, of Stuttgart, Germany, recommended sodium cinnamate as a cure, but it cannot be said to be more than a preventive in some cases. Hospitals for the care of persons affected with tuberculosis have been established in many countries. Dr. Koch originated the specific treatment with tuberculin, which is now used in the examination of individuals, both man and lower animals, that are supposed to be affected. Other treatments include those which employ antitoxins, antitubercle serums, cod-liver oil, and the X-ray. However, every curative method requires an abundance of exercise and life in the open air.

TUBEROSE (tüb'rōz), an ornamental bulbous plant, native to tropical America and Asia, cultivated in gardens for its fragrant white

flowers. The branchless stem grows from a bulbous root, usually two to four feet high, and bears sword-shaped leaves. The flowers are beautiful and their pure white color and enduring fragrance make them highly esteemed. Perfumers cultivate tuberose in Italy, France and Switzerland. The plant is propagated by tubers, which appear at the bottom of the scape. Numerous species have been obtained by propagation. They are left outdoors in mild climates, but in cold countries the tuberous root-stalks are taken up and stored in a dry and frost-proof place. In most species the stem



TUBEROSE.

grows to a height of two to three feet, the flowers appearing at the upper part, while clusters of leaves are borne at the lower part.

TÜBINGEN (tü'bīng-ən), a celebrated university city of Germany, in Württemberg, twenty miles southwest of Stuttgart. It is on the Neckar River, at the border of the Black Forest (Schwarz Wald), and may be reached by railway. Duke Eberhard founded the famous university in 1477, when it had four faculties, and it soon became a distinguished seat of learning. In 1534 the university adopted the reformed faith, added a Protestant theological seminary in 1536, and provided a Roman Catholic theological faculty in 1817. A powerful influence has been exercised by the University of Tübingen on the religious and scientific thought of Europe. Among its eminent teachers are Melanchthon, Reuchlin, and Baur. At present the university has ninety professors and teachers. It has excellent botanical gardens, laboratories, a gymnasium, and collections in zoölogy, mineralogy, and comparative anatomy. The library has 395,000 volumes. The attendance is about 1,600 students, of whom about 300 are foreigners. Tübingen is beautifully situated and improved, thus making it a favorable place for study. It has telephones, electric lights, pavements, and rapid transit. Population, 1905, 16,809.

TUCKAHOE (tük'ä-hō), the common name of a peculiar vegetable growth found in the southern part of the United States, called also Indian leaf or Indian bread. Its development is not well understood. It usually forms large masses upon old roots and has been classed as a spurious fungus growth. The exterior is bark-like and the interior is of a whitish compact formation. Like the European truffle, it grows only under the surface, often several inches in diameter. The interior is bitter and unfit to eat, but it is used to some extent as a medicine.

TUCSON (tū-sōn'), a city in Arizona, county seat of Pima County, on the Santa Cruz River, sixty miles north of the Mexican boundary. It is on the Southern Pacific Railroad and is surrounded by a productive mining and agricultural country. Among its principal buildings are the county courthouse, the public library, the high school, the Saint Joseph's Academy, a Presbyterian school for Indians, the Desert Botanical Laboratory, the Church of Saint Xavier, and the University of Arizona. The streets are lighted by gas and electricity and have numerous other modern improvements. It has a large trade in live stock, wool, hides, and copper, gold, and silver ores. A short distance south of the city is the Papago Indian Reservation. Tucson was founded by Jesuits in 1660 and became a possession of the United

States in 1853 as a part of the Gadsden purchase. It was the capital of Arizona from 1867 to 1877. Population, 1910, 13,193.

TUCUMÁN (tōō-kōō-mán'), a city of Argentina, capital of the province of Tucumán, on the Tala River. It is situated in a fertile farming and stock-raising country, which is rich in timber. The principal buildings include a Jesuit college, several convents, a cathedral, and a number of government buildings. Among the manufactures are leather, sugar, furniture, lumber products, brandy, clothing, and machinery. Gas and electric lights, rapid transit, and a number of other modern improvements have been introduced. The city has a large trade in live stock, lumber, and merchandise. A congress met in Tucumán in 1816 and declared the La Plata states independent of Spain. Population, 1908, 51,046.

TUDOR (tū'dēr), a dynasty of England. It was of Welsh extraction and occupied the throne of England from 1485 until 1603. Tudor is the Welsh equivalent of Theodore. Owen Tudor was the first of the family and was first known as a brewer in Anglesey, but subsequently took part in the Battle of Agincourt. His military record commended him to Catharine, widow of Henry V., who made him clerk of the household and afterward entered into a marriage contract with him. Public indignation at this marriage ran so high that the queen was forced to seek refuge in a convent, while Tudor was imprisoned. He escaped soon after and found protection under Henry VI., who afterward made him lieutenant of Denbigh. Two sons resulted from this marriage, named Edmond and Jasper. The king bestowed the earldom of Richmond on Edmond and the earldom of Pembroke on Jasper. The Earl of Richmond married Margaret Beaufort, a descendant of John of Gaunt, and their son became Henry VII. of England, who, by marrying the daughter of Edward IV., united the houses of Lancaster and York, thus ending the War of the Roses. The five Tudor sovereigns are Henry VII., Henry VIII., Edward VI., Mary, and Elizabeth. Among the noted events of the period including the reigns of these sovereigns are the Reformation and the establishment of the Anglican Church. See **England**.

TUESDAY (tūz'dā), the third day of the week, so named from Tiw, or Tyr, the son of Odin, the Scandinavian god of war. In the Roman calendar it is called *Dies Martis*, from Mars. Shrove Tuesday occurs immediately before Lent.

TUFA (tū'fá), the name applied to any

coarse rock whose particles are held together by lime or silicate. The term is of Italian origin, meaning calcareous rock. *Volcanic tufa* is the name applied to rock of this class which emanates from volcanoes.

TUFTS COLLEGE, a coeducational institution of higher learning, at Medford, Mass., under the control of the Universalists. It was founded in 1852 and was so named from Charles Tufts, who made a number of gifts to the institution. The departments include those of medicine, dentistry, divinity, liberal arts, and engineering. A biological laboratory is maintained at South Harpswell, Me. The Barnum Museum of Natural History, the gift of P. T. Barnum, has a fine zoölogical collection. The value of the property is \$2,250,000 and the library contains 52,000 volumes. It has a faculty of 175 and an attendance of 1,150 students.

TUILERIES (twêl-rê'), the name of a splendid palace and gardens of France, situated in Paris, on the right bank of the Seine River. The site was originally outside the city and was occupied by tile works, hence the name. The property was purchased by Francis I., who bestowed it as a present on his queen mother, Catherine de' Medici. In 1564 the latter began to build the palace after plans by Philibert Delorme. Henry IV. enlarged it in 1600 and it was subsequently modified and improved by Louis XIII., who was the first to make it a royal residence. Later additions were made by Louis XIV., Napoleon I., and Napoleon III. Louis XVI. was forced by the people to make it his abode in the memorable Revolution of 1789 and from that time it continued to be the royal and imperial residence until 1871, when it was destroyed by the Commune. The ruins were removed in 1883 and extensive improvements were made on the grounds, converting the fifty-acre tract into a beautiful park.

TULA (tōō'là), a city in Russia, capital of the government of Tula, on the Upa River, 118 miles south of Moscow. It has connection with other trade emporiums by several railroads and canals and is surrounded by a fertile grain and dairying country. Among the manufactures are cutlery, bell metal, edged tools, brushes, cordage, soap, leather, clothing, firearms, and machinery. The large cannon factory was founded by Peter the Great, which has continued to be the source of large supplies for the Russian army. Tula occupies a low site but has considerable street and general improvements. It is lighted by gas and electricity. The streets are improved by waterworks, pavements, and means for rapid transit. It has a

large trade in farm produce and manufactures. Population, 1906, 116,486.

TULANE UNIVERSITY, an institution of higher learning at New Orleans, La., established by the State Legislature in 1847. It was known as the University of Louisiana until 1884, when it received a bequest of \$1,050,000 from Paul Tulane (1801-1887), and at that time the name was changed to Tulane University of Louisiana. About the same time Josephine Louisa Newcomb of New York made a gift of \$100,000 for the education of white girls and young women, with which fund the H. Sophie Newcomb Memorial College was erected. It has a productive endowment fund of over \$3,000,000. The university property has a value of \$2,275,000 and as a whole is one of the largest and best equipped institutions of the South. The courses include medicine, arts, sciences, pharmacy, law, philosophy, and engineering. It has a library of 50,000 volumes and a beautiful campus. Near the grounds is the celebrated Audubon Park. The faculty includes 115 professors and instructors and the attendance is 1,500 students.

TULIP (tū'lip), a genus of bulbous plants of the lily family, including several hundred



SWEET-SCENTED TULIP.

species. Most of the cultivated varieties are native to Asia Minor and Southern Europe. The *common garden tulip* is indigenous to the Levant and is now cultivated on a large scale in flower gardens. The *sweet-scented tulip* is highly fragrant, bearing large leaves and a single flower. Many varieties of colors have been obtained by cultivation. Large prices were paid in the 17th century for new species, the tulip being greatly in fashion at that time, and even now special bulbs have considerable value in the market. Tulips are cultivated most extensively in Holland, both for the

flowers and the bulbs, which are exported in large quantities. A large and showy species, the *Turkestan tulip*, is prized for its deeply colored scarlet flowers. Among the species grown extensively are the *parrot*, *florist's*, *garden*, *show*,

and *sweet-scented tulips*. These species may be readily forced in greenhouse culture.

TULIP TREE, a large tree closely allied to the magnolias. It is native to the forest of North America, extending from the Gulf of Mexico to Canada, and is so called from the resemblance of its flower to the tulip. In some sections it is known as *whitewood*, *canoe wood*, or *poplar*. It is one of the largest native trees, attaining a height of 90 to 150 feet and a diameter of eight to nine feet. The trunk is covered with ash-colored bark and the leaves are about four inches long, smooth, and peculiarly truncated, giving them an appearance as if cut off at the end. Its wood is light, straight-grained, and easily worked, and is employed extensively for carpentry and cabinetwork. The bark and roots have an aromatic smell and bitter taste and yield medicinal properties useful as a tonic. Tulip trees are favorites for planting in parks, but they are most beautiful when young.

TUMOR (tū'mēr), an abnormal swelling on any part of the body, not caused by inflammation. The term is limited to growths that are apparently without purpose and usually without a well-understood cause. In structure, the tumors are a reproduction of the normal tissue, but they differ from it in being less fully developed and for the additional reason that there is a tendency to undergo degenerative changes. In some cases they are malignant, that is, they are liable to spread throughout the system after being removed, appearing to spread through the agency of the blood and lymphatic current. A benign or simple tumor does not reappear when removed by artificial means. Tumors are classified variously according to their shape and structure, and embrace principally those known as fatty, bony, fibrous, lymphatic, and cartilaginous.

Malignant tumors have attracted marked attention for many centuries. They are divided into the two groups known as cancers and sarcomata. Since *cancers* are composed of epithelial cells, they occur in the parts of the body where there is normally epithelium, as in the breast or stomach. *Sarcomata* appears mainly in the tendons and about the bones, and their composition is mainly connected tissue. Theories differ vastly as to the cause of tumors. Among them are the views that they result from a general disorder of the blood, that they are due to local injury and irritation, that some derangement during the period of foetal life subsequently causes abnormal growths, and that they may be generally assigned to the action of microbes.

TUNDRA (tōon'drā), the name applied to the plains bordering on the Arctic Ocean, both in Siberia and North America, so called from the Finish word *tentur*, meaning marshy plain. These regions are characterized by swamps of bog moss and lichens, but the surface is quite level or gently undulating. Some tundras have numerous small lakes, where small species of ferns and rushes grow, and in many places flowering plants are numerous. In the summer they are frequented by wild birds, which nest in the inaccessible morasses, and during the winter the region is extremely cold. During the summer the soil melts to a depth of one or two feet below the surface, but beyond that depth the earth remains frozen throughout the year. Vegetable growth causes the surface to rise slowly, hence extensive peat bogs are formed. Much silt and great layers of ice are carried from the warmer regions by means of rivers on the approach of spring, which accounts in part for the bones of extinct animals, such as the mammoth and the rhinoceros, being found securely protected from the atmosphere.

TUNGSTEN (tūng'stēn), a metallic element closely related to uranium. It is found chiefly in the mineral wolframite, a tungstate of iron and manganese. It occurs native with oxide of tin. The color is steel-gray and it can be melted only at white heat. It is hard, brittle, and crystalline. The chief use of this metal formerly was as a material for increasing the hardness and tenacity of steel. Since 1907 it has entered largely into electric lighting, mainly as a filament in lamps, in which it has displaced the ordinary carbon incandescent lamps to some extent. Although it is more expensive and fragile than the carbon lamp, the normal life is longer and the efficiency is greater. See **Chemistry**.

TUNGUS (tōon'gōōs), a native race of Asia, found chiefly in the eastern part of Siberia. They inhabit the northern part of Saghalien, whence they extend westward to the Yenesei River, and scattering settlements are found as far south as the country of the Manchus. They engage chiefly in hunting and a pastoral life and may be classed among the nomadic races of Asia.

TUNIC (tū'nīk), an under-garment worn by the ancient Greeks and Romans. It reached to or below the knees, was confined to the waist by a girdle, and was made either with or without sleeves. In Rome the tunic was a common garment of both sexes and was worn under the *palla* and the *toga*. The poorer classes made it of linen, but the wealthy used silk of an inferior grade.

TUNING FORK, an instrument made of

steel and used to regulate the pitch of the voice or of a musical instrument. It has two prongs that spring from a handle of the same material, and the latter serves as a sound post to transmit the vibrations of the fork. To set the fork in vibrations, one of the prongs may be struck against any hard substance, or the prongs may be pressed together and then released quickly. By filing the ends of the prongs, or between them near the ends, a tuning fork may be made sharper, and it may be made flatter by filing at or near the bend. The tuning fork is generally tuned to C in the treble C clef, because organ builders start their tuning from that note.

TUNIS (tū'nīs), a city of North Africa, capital of the state of Tunis, on the Gulf of Tunis, an inlet from the Mediterranean. It occupies a fine site near the mouth of the Mejerdah River, about three miles from the ruins of ancient Carthage. The older streets are narrow and unpaved, but the newer parts of the city have a European appearance, being clean, paved, and lighted by gas and electricity. Two walls surround the city and it is defended by several forts and a castle. The most important structures include the palace of the bey, several public offices, the cathedral, the Moorish college, and a number of Greek, Roman, and other Christian houses of worship. Many of the older buildings are low and have no windows toward the streets, but the newer part of the city contains substantial blocks of business houses and residences in the French style. It has several fine parks and fountains. Water for city use is supplied by an aqueduct built in ancient times from Jebel Zaghwan, which is spoken of in the history written by Strabo. Telephones, telegraph connections, and rapid transit have been constructed within recent years. The harbor is safe and commodious. It has extensive railroad connections with the interior, making the city an important export and import market. Among the manufactures are olive oil, silk and woolen textiles, soap, leather, turbans, tapestry, shawls, clothing, and native machinery. The exports embrace manufactures, gold dust, fish, ivory, cattle, coral, grain, and fruits. About one-third of the inhabitants are Europeans. Population, 1906, 177,582.

TUNIS, a country of North Africa, one of the Barbary States, forming a dependency of France. It is bounded on the north and east by the Mediterranean, on the southeast by Tripoli, and on the west and southwest by Algeria. It has an area of 64,240 square miles. The coast line is irregular. It is indented by a number of extensive inlets, the most important being the Gulf of Gabes. Cape Blanco, on the northern

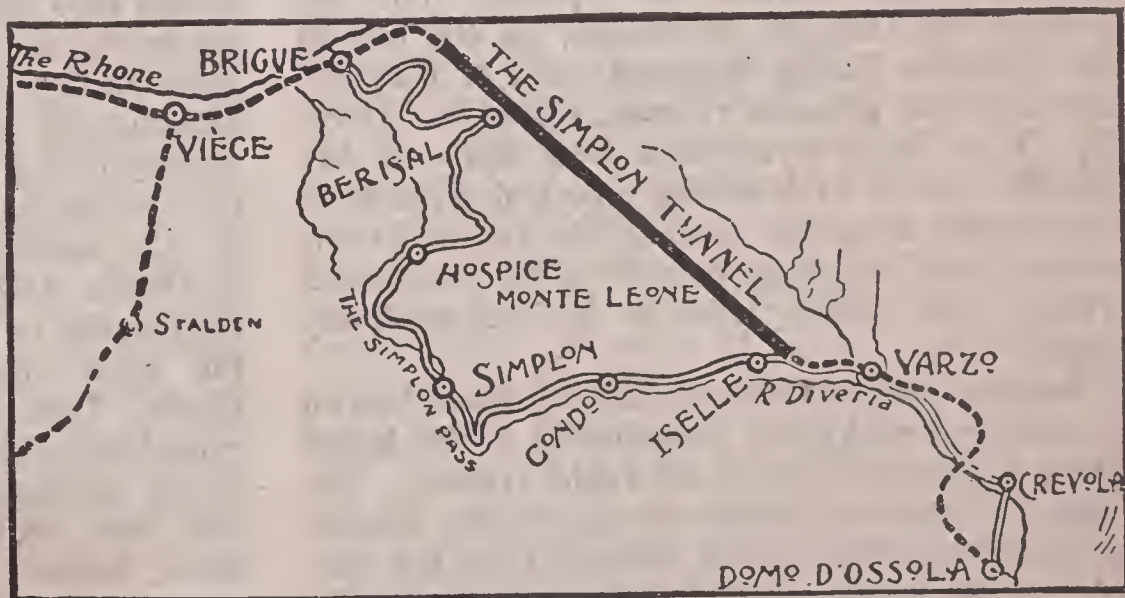
shore, is the most northerly point of Africa, and east of it is Cape Bon. The northern coast is precipitous and rocky, but the eastern shore region is generally low and sandy, and the coastal plain is quite fertile. Ranges of the Atlas Mountains traverse the central part, rising not more than 6,500 feet above the sea. In the interior are a number of extensive lakes, among them Lake Faroun. The Mejerdah, rising in the Atlas Mountains and flowing into the Mediterranean near Tunis, is the principal river. The northern part of Tunis is generally fertile, and the southern part merges into the Sahara Desert. In the region toward the south are numerous mineral springs and flowing wells serviceable in irrigating the more arid portions. Salt, galena, lead, saltpeter, quicksilver, phosphate, and mineral oil are among the chief minerals. The sponge and tunny fisheries are important. Tunis has extensive and valuable forests, especially in the mountains, and large tracts are cultivated as olive plantations.

Agriculture is the chief occupation. The principal farm products are wheat, barley, oats, cotton, grasses, and tobacco. Buffaloes, cattle, camels, horses, and sheep are reared in abundance. The fruit cultivated includes dates, olives, grapes, oranges, lemons, bananas, and other varieties. The wild animals are largely extinct, but the chase still offers opportunities to secure the wild boar, quail, partridge, wolf, and many aquatic birds. Fully 375,000 acres are covered by the valuable cork trees, which supply large quantities of marketable cork. Among the manufactures are woolen and silk textiles, cochineal, olive oil, soap, sponges, leather, metalware, wine, and machinery. The exports include phosphate, wheat, cattle, barley, olive oil, alfalfa, sponges, fish, cork, and tanning bark. Caravans carry on a large trade with the Sahara and other regions toward the south. In 1909 the country had 1,275 miles of railway in operation, most of which belong to the state. A large part of the trade is with France, Great Britain, Germany, and Italy. The government is administered under the native bey, who is assisted by nine ministers as heads of departments. Tunis is the capital and largest city. Other cities of importance include Sousa, Bizerta, Kairwan, and Sfax.

The inhabitants are principally Berbers, Moors, Kabyles, and Arabs, who are chiefly

Mohammedans. A number of Christian missionaries and public schools are maintained, and several secondary and higher institutions of learning have been established under French supervision. The Jews have attained a considerable foothold in commercial enterprises and maintain a number of synagogues and schools. A high per cent. of illiteracy prevails. The region occupied by Tunis corresponds nearly to that of ancient Carthage, and on it were fought many of the famous battles of Hannibal, Scipio, Hamilcar, and the Jugurthine leaders. It was overrun by the Vandals in 429. Subsequently it passed to the Greeks and later to the Mohammedans. In the 13th century it became independent of European influence, but Charles V. soon made it tributary to Spain. The Spaniards were driven from Tunis under Sultan Selim in 1574, when it was made a Turkish province. It was essentially a pirate state until 1816, when piracy and the slave trade were suppressed. In 1882 it was annexed as a French province and since then it has advanced materially in prosperity. Population, 1906, 1,982,050.

TUNNEL (tūn'nel), a passage cut through an eminence, such as a hill, rock, or mountain, to afford passage for railways, highways, canals, or aqueducts. Tunnels are constructed for similar purposes under towns and rivers, both classes dating from remote antiquity. In the early history of tunnels the work was done exclusively by hand, the rocks being broken either by sledges or by the agency of fire, but in modern times powerful explosives and elaborate machinery are



THE SIMPLON TUNNEL.

utilized. The method of proceeding in tunneling depends chiefly upon the kind of materials to be excavated. To ascertain the character of such materials, borings are made and trial shafts are sunk from the surface. The trial shafts are afterward utilized in most of the works for ven-

tilation purposes, air pumps being provided to facilitate circulation. Tunnels pierced through solid rock have a sufficiently strong roof, but others have an arched roof lined with brickwork or stone masonry. Herodotus mentioned a tunnel on the island of Samos, having a length of 4,250 feet, which was utilized to provide passage through a mountain. Alexandria had tunnels to supply water from the Nile, while the Romans, Peruvians, and Mexicans carried supplies of water for long distances by aqueducts and through underground passages.

Among the most noted European tunnels of modern times may be mentioned those of Simplon, Saint Gothard, Arlberg, and Mont Cenis. The Mont Cenis tunnel is seven miles long and the Saint Gothard tunnel is over nine miles, both piercing the European Alps. The American tunnels include one at Port Huron, Mich., passing under the Saint Clair River; the Pennsylvania Railroad tunnel under the Hudson River, connecting New Jersey with New York City; one in Chicago under Lake Michigan, serving to secure a supply of city water from a distance of several miles; and one under Saint Louis, affording connection between the union depot and the Eads's Bridge across the Mississippi. The Great Divide tunnel at Hagerman Pass, Colo., was opened for traffic in 1893. It pierces the Rocky Mountains through solid gray granite. The length is 9,393 feet; height above sea level, 10,800 feet; and cost, \$1,125,000. It is so called because the water falling on the east side of the mountain flows toward the Atlantic and that of the west side, toward the Pacific. The cut through the Cascade Mountains, on the line of the Northern Pacific Railroad, west of Kalispel, Mont., is the greatest railroad tunnel in America. It is about three miles long and cost \$4,250,000. Aside from saving time and distance in passing the mountain system, the tunnel avoids keeping open for seven months in the year passes where snow often falls to an extraordinary depth.

Another class of tunnels includes those known as *subways*, which are constructed in the larger cities to furnish means of rapid transit. The largest of these in North America is the subway of New York City, which extends from the Battery to the Bronx, furnishing communication by a system of double tracks, and an extension is operated to Brooklyn by a tunnel under the East River. Boston and Philadelphia likewise have subways. The most noted subways of Europe are in London, Berlin, and Paris. See **New York**, Subhead BRIDGES; **Simplon Tunnel**.

TUNNY (tŭn'nŷ), a class of fish belonging to the mackerel family, including a number of

important species. The *American tunny* ranges from New Jersey to Nova Scotia. It is four to twelve feet long, is dark brown above and lighter below, and is valuable for its flesh and the oil it yields. An allied species is common to the vicinity of the West Indies, which is also a valuable food fish. The most important species of tunny, known as the *long-finned albacore*, is found in the Mediterranean and off the coast of Western Europe. It ranges in length from eight to twenty feet, large specimens weighing from 800 to 1,200 pounds. The upper part has a dark blue color and the lower side has a silky color with dusky spots. The flesh, which is of a pink hue, is highly esteemed, both fresh and preserved. The tunny fisheries of the Mediterranean have been important since the early history of man, and the most extensive catches are on the coasts of Sicily, Sardinia, Italy, Spain, and Turkey.

TURANIAN (tŭ-rā'nĭ-ān), a term applied by some writers to an extensive branch of the Eurasian languages. It was first used by the Persians, who called their own country Iran and the countries lying toward the north Turan; hence, the people of the latter became known as Turanians. Originally the term included all speech of Asiatic origin that is neither Aryan nor Semitic, but in later use it is practically synonymous with Ural-Altai. In this wider sense it embraces the speech of the Bulgarians, Hungarians, Finns, and Lapps of Europe and the Turks or Tartars, Samoyeds, Manchus, and Mongols of Asia or Asiatic origin. These widely separated peoples speak dialects less closely connected than the Aryan and Semitic groups. This circumstance has led many writers to classify some as distinct languages, as, for instance, the Manchurian and Mongol tongues. It is noteworthy that a wide difference exists in the state of civilization, customs, and industries pursued by the several branches. The Samoyeds of Northern Asia are the lowest in the scale and the peoples in Europe belonging to this class are the most advanced, as the Hungarians and Finns. Both of the latter have a language of considerable culture, with a literature embracing songs, theology, history, poetry, law, geography, and other writings. The term Turanian, in its more limited application, is confined to those peoples who inhabit the Ural and Altai Mountain ranges and the neighboring country.

TURBAN (tŭr'bān), the name of a covering for the head, worn extensively in Asia and North Africa. In most countries it is in the form of a roll of cloth twisted around a cap. The turban worn by a sultan is ornamented with gems and it is looked after by an officer called the *dulbend aga*. Green turbans are usually

worn by emirs and the grand vizier has decorations of heron feathers in his turban. More recently the Turks generally abandoned it for the fez or red skullcap.

TURBINE (tûr'bin), a water wheel in which advantage is taken of the reaction of the escaping jet. Turbines are constructed in a great variety of forms and their axis of rotation may be either vertical or horizontal. In most cases the turbine wheel is on a vertical shaft and moves within a close-fitting box. Such a turbine is called an *inside wheel*, but if it is on the outside of the curved guide it is termed an *outside wheel*. A vertical or oblique pipe or chute, called the *penstock*, admits the water to the wheel, which is provided with bucket floats that point in the same direction. The water enters through openings between fixed curved guides, so inclined to the buckets that on leaving the guides it strikes the buckets in the most advantageous direction. The wheel is driven partly by the momentum of the moving water and partly by the weight of the water in the buckets. In addition to this, on running out of the buckets, the reaction of the escaping stream aids in turning the wheel. Turbines of the highest capacity are operated at Niagara Falls, both in Canada and the United States, and the construction is such that the weight of the wheel is supported by the upward pressure of the water against a disk in the top of the case inclosing the wheel.

TURBOT (tûr'büt), a species of the flatfishes, the most valuable of the genus. It is broad and scaleless and has conical tubercles on the upper side. The dorsal fin extends from the upper lip to the tail. Its eyes are on the left side, which has a brownish color, and the right or lower side is white. The *spotted turbot* found off the Atlantic coast of North America, sometimes called the plaice and the water flounder, weighs 15 to 25 pounds. It is about twice as long as it is wide. The *common turbot* found in the North Sea and other waters of Western Europe attains a weight of 60 to 90 pounds, but specimens weighing 180 pounds have been caught. Like other flatfishes, it swims near the bottom, the best turbot fisheries being near deep shores. The flesh is white and delicate and has been in high esteem from antiquity.

TURIN (tû'rîn), a city of northern Italy, in Piedmont, on the Po River, 76 miles southwest of Milan. The surrounding region is noted for its fertility and toward the west are the foothills of the Alps, which include Mont La Superga, height 2,407 feet. Turin is a city of great beauty, having broad and regular streets and large squares and public gardens. The Cathedral of

Saint John the Baptist dates from the 15th century and is a fine specimen of cruciform renaissance architecture. It has many other churches of fine structure, numerous hospitals, schools, convents, and government buildings. The Madama Palace, erected by William of Montferrat in the 13th century, is an interesting building, and the extensive royal palace dating from the 17th century is likewise remarkable for its beauty. The University of Turin, founded by Lodovico di Acaja in 1400, is one of the largest educational institutions of Southern Europe. It has departments of medicine, literature, surgery, jurisprudence, philosophy, physics, mathematics, and sciences. In connection with it is a fine botanical garden, an observatory, a museum, and an extensive library. It is attended by 2,375 students.

The city has numerous pleasant promenades, several fine monuments and statues, and modern municipal facilities. Most of the streets are well lighted with gas and electricity. It has stone and asphalt pavements, waterworks, sewerage, and an extensive system of rapid transit. Among the manufactures are jewelry, silk and woolen goods, pianos, paper, pottery, porcelain, earthenware, machinery, ironware, vehicles, clothing, scientific instruments, and spirituous liquors. This is the center of a large trade in grain, fruit, wine, and merchandise. The central offices of the North Italy Railway are at Turin, which has a fine central depot and extensive machine shops.

Turin was so named from the Taurini, a Ligurian tribe which lived there at an early period. Its first mention in history is in connection with Hannibal, by whom it was captured at the time he crossed the Alps into Italy. The Romans made it a colony in 166 B. C., but at the decline of the empire it became a Lombard city, and long served as the capital of a Lombard duchy. It became the seat of the Duke of Susa in the time of Charlemagne, and the descendants from that line ruled it until 1032, when it became a possession of the house of Savoy. Subsequently it passed to the French, who held it until 1815, when it was restored to the house of Savoy. It was the capital of Italy from 1859 to 1865, yielding that distinction to Rome in the latter year. Turin has grown with remarkable rapidity within the last fifty years, which is due largely to its extensive railroad and manufacturing enterprises. Population, 1906, 338,985.

TURKESTAN (tōor-kēs-tān'), meaning the country of the Turks, an extensive scope of territory of Western Asia. It is bounded on the north by Siberia, east by China, south by Tibet, India, Afghanistan, and Persia, and west by the Caspian Sea. The region is divided into two

portions by the tableland of Pamir, an elevated ridge about 15,000 feet high, thus forming Eastern Turkestan and Western Turkestan. It is inhabited by a mixture of Asiatic peoples, though the population includes chiefly Aryans and Turanians. The slopes of the Pamir are occupied by a purely Aryan population. On the slopes of the Thian Shan Mountains are extensive settlements of Kirghiz, while the northwestern part is occupied by Kalmucks, the central part by Turks and Persians, and the northeastern part by Mongols. The language is largely a Turkish dialect, but is mixed to a considerable extent with Chinese and Persian words.

Much of the history of Asia is connected with Turkestan. A large part of the western region belonged to Persia in the early historic period and many of the principal cities were founded while it was under Persian control. Alexander the Great annexed it along with Persia to Macedonia, but it was conquered by the Arabs in the 8th century. With the decline of the Arab caliphs, it became divided into small possessions and was finally overrun by Genghis Khan and his Mongol forces, but on his death came under the government of his son, Jagatai. Timour succeeded the latter and in his reign of 35 years Turkestan developed marked influence as the center of an immense empire, which extended from Burma to the Danube and from Siberia to the Persian Gulf. The period of Timour's reign may be called the golden age of Turkestan, since he brought skilled artisans and learned men to its cities, constructed internal improvements, and enriched the country by vast spoils of war. His death was followed by a division of the empire into various independent states, which, in the latter part of the 15th century, began to war against each other. Its subsequent history is that of petty wars and internal dissensions until the eastern portion became a part of China and the western portion was annexed to Russia.

Eastern Turkestan, or Chinese Turkestan, is bounded on the north by the Thian Shan Mountains, east by China, south by Tibet and India, and west by the Pamir tableland. The eastern part merges into the Desert of Gobi and in the central part is the Tarim Desert. Practically all of the region lies within the basin of the Tarim River, which rises in the Kakakorum Mountains and flows into the inland Lake Lob-nor. Its principal tributary from the south is the Khotan River. Much of the surface is of a desolate and unattractive character, including numerous salt marshes and desert wastes, but along the streams are considerable belts of fertile land. The mountain districts are rich in minerals, including gold, silver, copper, lead, agate, iron, sulphur, jasper,

and asbestos. Extensive deposits of salt prevail in the vicinity of Lob-nor.

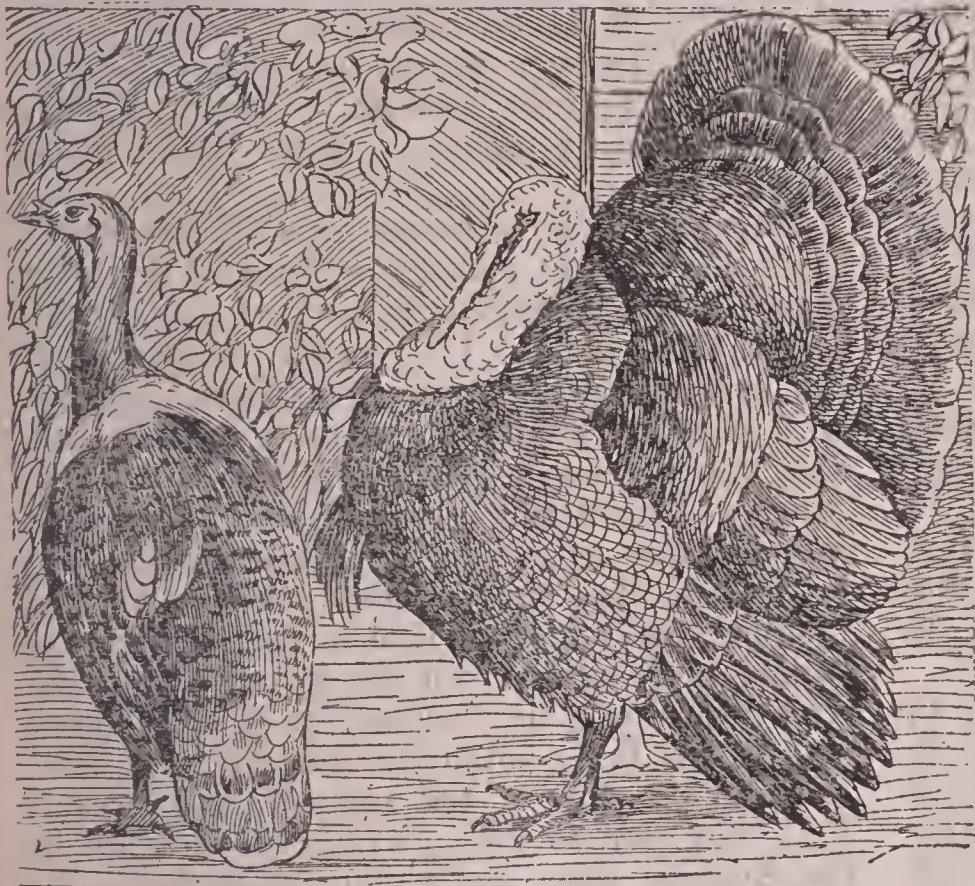
Rice, cotton, wheat, barley, corn, flax, tobacco, and fruits comprise the chief soil products. Large tracts have been redeemed for cultivation by irrigating the lands from streams and mountain snows. Pastoral life is followed by many of the people, the live stock including horses, buffaloes, camels, sheep, and cattle. It has manufactures of carpets, linens, cotton and silk goods, jewelry, silver and gold wares, clothing, and utensils. Most of the unproductive regions are frequented by nomadic tribes, who find pasturage for their herds in the valleys. The country exports cereals, fruits, live stock, minerals, and merchandise. Mohammedanism is the chief religion. Numerous schools and colleges are maintained in the larger towns. Russia claimed a protectorate over a large part of the region in 1871, but ceded its claims to China in 1879. Turkish is the common language of the people. Kashgar and Yarkand are the chief towns. Population, 615,500.

Western Turkestan, or Russian Turkestan, is bounded on the north by Siberia, east by the Pamir tableland, south by Afghanistan and Persia, and west by the Caspian Sea. It comprises the Turkoman Steppes, the Trans-Caspian districts, the khanates of Khiva and Bokhara, and the oasis of Merv. The Oxus and Daria (Jaxartes) are the chief rivers, both rising in the southeastern part and flowing toward the northwest into the Aral Sea. A great variety of aspects is presented by the surface and climatic conditions, ranging from desert wastes to regions of remarkable fertility and productiveness. It has deposits of coal, petroleum, marble, gypsum, iron, lead, and kaolin, and considerable wealth in silver, gold, and graphite. The manufacturing enterprises yield considerable wealth in the form of linens, machinery, hardware, woolen and silk textiles, furniture, soap, spirituous liquors, leather, carpets, and firearms. Agriculture, fruit growing, mining, stock raising, and commerce are equally important industries. It has a large caravan and railroad trade.

The Trans-Caspian Railroad penetrates from Krasnovodsk, on the Caspian, through the heart of Western Turkestan, thus providing excellent transportation facilities. It has many thriving cities, among them Merv, Bokhara, Samarkand, and Tashkend. Western Turkestan is a possession of Russia. A Russian invasion occurred in 1850, when they took Khulm and Balkh, and in 1859 annexed Kunduz. Subsequently they annexed Tashkend, Bokhara, and Merv, and since 1881 the entire region has been under Muscovite control. Russian occupation has been of

immense value in that it has fostered railroad building, developed the material resources, and given to the country a more stable and beneficent government. Schools and colleges have been established in all the towns of importance. Turkish is the chief language and Mohammedan is the principal religion, but many of the inhabitants belong to the Greek, Roman, and Protestant churches. The region of Turkestan now under

ing on seeds, insects, berries, frogs, lizards, and tender plants. They nest under a bush or in tall grass, line the nest with leaves or feathers, and usually have about twelve cream-colored eggs. The plumage is a golden bronze, banded with black, and diversified by violet and greenish markings. In the domestic state the turkey is highly useful for its flesh and eggs and is reared extensively along with other poultry. It is now an important domestic fowl in Europe and other countries as well as in North America. The hen lays from ten to fifteen eggs twice a year, but the eggs are mostly incubated by female chickens, though also by the turkey hen. Young turkeys are quite tender, being easily overcome by the hot sun or cold rains, although the adult is quite hardy. The *Honduras turkey*, an allied species, is native to tropical America and the West Indies. It is somewhat smaller than the common turkey, but has more beautiful plumage. The neck is less wattled and it has eyelike spots on the tail feathers.



TURKEY HEN.

TURKEY COCK.

Russian control has an area of 1,750,000 square miles and a population of 8,525,000. Tashkend and Bokhara are the principal seats of governmental influence.

TURKEY (tûr'kÿ), a large bird native to North America. It was first brought to Europe when Hernando Cortez returned to Spain from his expedition of discovery in the 16th century. Only two species are known, the common turkey and the Honduras turkey. The *common turkey* was distributed formerly in a wild state from the Atlantic to the Rocky Mountains, extending southward to the Isthmus of Panama, but at present is found only in some sections of the southern and western parts of the continent. The bare head and neck are peculiarly marked by a number of fleshy tubercles, and the male has a tuft of hair hanging from the breast. The weight of a full-grown wild gobbler is 15 to 22 pounds, the hen being somewhat smaller, but the domestic turkey is not so large and its flesh is less finely flavored.

Turkeys in the wild state frequent only the timber districts, where they live in flocks; feed-

TURKEY, or Ottoman Empire, a country in Southeastern Europe and Western Asia, lying north and east of the Mediterranean Sea. In addition it has extensive possessions in Africa and receives tribute from a number of dependencies in Europe. The latter are practically independent in their government and their dependence upon Turkey is merely nominal, including only the payment of a tribute annually to the Sultan. Some of the boundaries are not definitely fixed and as a whole they are very irregular, owing to natural barriers, such as extensive ranges of mountains and numerous inlets from the Mediterranean and the Black Sea. The following table contains an exhibit of the territorial possessions, together with the area and population:

NATIONAL DOMAIN.	SQUARE MILES.	POPULATION.
Europe.....	65,325	6,330,200
Africa.....	405,800	1,000,000
Asia.....	682,200	16,898,700
DEPENDENCIES.		
Samos.....	180	54,440
Crete.....	3,330	310,400
Cyprus.....	3,710	237,000
Egypt.....	400,000	9,821,100
Total.....	1,560,545	34,651,840

EUROPEAN TURKEY. Turkey in Europe extends from the Adriatic to the Black Sea and embraces fully one-third of the Balkan Peninsula. It is bounded on the north by Montenegro, Austria-Hungary, Servia, and Bulgaria; east by the Black Sea and the Bosphorus; south by the Sea of Marmora, the Strait of Dardanelles, the Aegean Sea, Greece, and the Ionian Sea; and

west by the Adriatic Sea and Montenegro. The Dardanelles, the Sea of Marmora, and the Bosphorus separate it from Asiatic Turkey. The Pindus Mountains extend through the western part, the chain running almost parallel to the Asiatic, while in the east central part are the Rhodope Mountains, and along the northern boundary are ranges of the Balkans. Transverse ranges extend from the principal groups and valleys of considerable fertility characterize many parts of the country. Most of the surface water flows into the Aegean Sea, which receives the Maritza, Vardar, and Struma rivers. The Drin, Ergent, and Vojutza rivers flow into the Adriatic. Among the many gulfs that indent the southern shore are the Salonica, Contessa, Lagos, and Saros, while the western shore is indented by the gulfs of Drin and Valona. These gulfs furnish good harbors and navigation facilities, and the Maritza is navigable in its lower course. The coastal plain of the Aegean Sea is a level region, and extensive valleys and interior plains characterize many parts of the country. Lake Scutri, which extends into Montenegro, is a fine sheet of water. Other lakes include Ochrida, in Albania, and Takinos, in Salonica.

ASIATIC TURKEY. Turkey in Asia includes all of Asia Minor and Palestine, extending east to Persia. It is bounded on the north by the Black Sea and Transcaucasia, east by Persia and Arabia, south by Arabia and the Mediterranean, and west by the Mediterranean and the Aegean seas. A narrow strip of land belonging to Turkey extends between Arabia and the Persian Gulf, and another strip is surrounded by Arabia, the Gulf of Aden, the Red Sea, Egypt, and the Mediterranean. The latter is about 160 miles wide and 1,600 miles long. It includes the provinces of Yemen and Hadjaz. The country as a whole has an extended coast line, which is broken by many gulfs and bays, and off its shores are numerous islands, most of which lie in the Aegean Sea.

The surface of Asiatic Turkey is greatly diversified. A large part of Asia Minor is a mountainous plateau, including the Taurus and the Anti-Taurus mountains, the Lebanon and Anti-Lebanon mountains, and numerous articulated spurs and ranges. Barren deserts, elevated highlands, fertile plains, and productive valleys make up the region lying toward the East. In the eastern part is the famous valley of the Euphrates, which receives the Tigris, and the drainage is carried through the Shat-el-Arab into the Persian Gulf. The Kizil Irmak and the Sakaria drain a large portion of the northern section into the Black Sea. Palestine is drained chiefly by

the Jordan and the El Araba into the Dead Sea, which has no visible outlet. Many lakes with salty water are distributed throughout the central and eastern parts, of which Lake Van, near the border of Persia, is the most important.

AFRICAN TURKEY. The distinctly Turkish possessions in Africa are confined to Tripoli, which includes Fezzan and Barca. It is governed from the city of Tripoli, on the Mediterranean, while Bengazi, on the Gulf of Sidra, is the capital of the vilayet of Barca. Egypt is nominally a possession of Turkey, but the government is exercised largely under British influence. This is true likewise of Cyprus, a large island in the Mediterranean.

CLIMATE. Few countries have climatic conditions that vary as greatly as those of the Ottoman Empire, although no part of the country is extremely cold. The regions bordering on the Aegean Sea have a subtropical climate, with pleasant summers and mild winters, suitable for the cultivation of cotton and fruits. Much of the interior is cut off from the tempering influences of the sea by lofty mountains, and in these sections the extremes are very marked, ranging from excessive heat in the summer to a temperature below zero in the winter. The mean temperature at Constantinople is 43° in January and 73° in July; but in the eastern part, especially in the deserts, the summer heat rises to 108°, and even to 120°. Rainfall is heaviest on the Adriatic coast and gradually decreases toward the east, where it is very scant. The drier sections are in the east central part, in the region of the saline lakes, and in the southern extension along the Red Sea and the Persian Gulf. Another dry belt extends throughout the southern part of the African possessions, especially in Fezzan and the Libyan Desert.

MINING. Few countries have mineral resources more extensive or diversified than Turkey, but the mining industry has not been developed materially. The vilayet of Salonica, on the northern shore of the Aegean Sea, is especially rich in manganese. Asia Minor has valuable deposits of lead, silver, coal, copper, antimony, and chrome. Meerschau is obtained in large quantities at Eski-Shehr, in Asia Minor. The valley of the Tigris has an extensive field of natural gas and petroleum. Vast quantities of salt are found in the east central part, but they are worked to a very limited extent. Kaolin is obtained in the island of Rhodes. The government gives encouragement to the exportation of minerals by paying a small royalty to native operators, but the mines worked are chiefly in the hands of foreigners.

AGRICULTURE. Farming and cattle raising are

the chief industries, but both are in a primitive condition. In all sections of the empire the people are oppressed by taxation, land monopoly, poorly improved roads, and a low standard of civilization. Practically all of the land is owned by the church or the crown, making it necessary for the peasants to pay rent, many of whom are overwhelmed with poverty. However, the country has a comparatively large area of fertile lands suitable for the cultivation of rice, cotton, maize, barley, millet, rye, wheat, and fruits. Other crops include tobacco, buckwheat, madder, flax, opium, and hemp. Much attention is given to the culture of silk, both in the possessions of Europe and Asia, but more particularly in Asia Minor. The cultivation of beet roots has been introduced through the establishment of stations by Germans, who likewise promote the cultivation of hops, asparagus, and other plants. Attar of roses is obtained in large quantities in Asia Minor and Palestine, coffee is produced in Yemen, and the vine is important in many parts of the empire. Mesopotamia, once highly fertile, is now largely a barren waste on account of the irrigation works having been neglected. However, the government has restored some of the dams and is promoting interest in the cultivation of rice, dates, and other crops.

Stock raising is comparatively insignificant when considered in the light of development in America and Western Europe. Swine are grown to a very limited extent, owing to the fact that both the Jews and the Mohammedans are adverse to the use of pork. Sheep and goats are reared in large numbers and both are important as meat-producing animals, while the milk of goats is used extensively for household purposes. Large interests are vested in stock raising in the western and central parts, where a good grade of cattle is grown. Other domestic animals include horses, poultry, and camels, the last mentioned being used chiefly in the possessions of Africa and Asia.

MANUFACTURES. It is estimated that Turkey has woodland aggregating 21,000,000 acres, about one-seventh of which is in European Turkey. These woodlands supply considerable material for export and construction purposes. Most of the manufacturing is of a primitive character, such as hand-loom weaving and the transforming of brass and copper into household utensils by artisans. Steam machinery is employed to a considerable extent in the manufacture of cotton and silk textiles, especially at Salonica and Constantinople. Among the general manufactures are carpets, attar of roses, silk goods, cotton and woolen textiles, tobacco products, furniture, glassware, cured fish, and leather products. For-

merly fez caps were made in sufficient quantity to supply the home demand, but in this product, as well as in carpets and Turkish leather and yarns, there is considerable competition with the products imported. Mother-of-pearl and sponges of excellent quality are obtained in large quantities and enter to a considerable extent into the manufacturing enterprises.

COMMERCE AND TRANSPORTATION. Internal trade is burdened by taxes that are imposed in transporting from one province to another. The government charges both export and import duties as a means of raising revenue. According to the official reports, the imports greatly exceed the exports, but it is likely that the value of both is considerably underestimated for the purpose of benefiting the shippers. A large share of the internal trade is in the hands of Armenians, Greeks, and Jews. Among the exports are raisins, opium, coffee, carpets and rugs, woolen and silk textiles, tobacco, grain, hides, nuts, drugs, and fruits. The imports include textiles, sugar, petroleum, cereals, hats and fez caps, and machinery. The larger share of the foreign trade is with Great Britain, Austria-Hungary, Italy, Germany, and Russia, in the order named. The native Turks are unfriendly to the arts of conducting business and developing enterprises of the kind met with in Western Europe, and for this reason ancient methods are employed in practically every avenue of public and private business. Few highways have been improved, and the railroads do not exceed 3,950 miles. German and Russian capitalists have franchises for the construction and operation of most of the railroads and telegraph lines. The country has 18,900 miles of telephone and 30,375 miles of telegraph wires. Much of the interior trade across the deserts and highlands is carried by caravans, though there is considerable traffic by navigation on the Euphrates and Tigris and on the adjacent seas. The mercantile marine embraces only 110 steamers and 925 sailing vessels. Most of the foreign trade is carried by vessels belonging to the countries of Western Europe.

GOVERNMENT. Turkey is governed on the basis of a theocratic monarchy, with absolute executive and religious authority vested in the Sultan, who claims succession from the caliphs. A constitution was granted in 1908, but it retains so many features of the former absolute government that it cannot be compared with the fundamental laws upon which limited monarchies are based. Though legislative and executive authority is vested largely in the sovereign, it is exercised mainly by two high dignitaries, one the Grand Vizier, representing the temporal govern-

ment, and the other, the Sheikh ul-Islam, being the head of the church. Both receive their appointment from the Sultan with the nominal concurrence of the *Ulema*, a body comprising the clergy and high functionaries of the law. The empire is divided into governments or vilayets, which are subdivided into provinces or sanjaks, and these are again divided into districts or kazas. The Koran remains the chief inspiration. In the administration of affairs the Sultan is assisted by the Grand Vizier, who is appointed by the Sultan, and this officer is aided by a cabinet of ten ministers. Accounts are kept in the lira and the pound, the former having a value of 36 cents and the latter, of \$4.40.

Military service is compulsory on all Mohammedans who have reached the age of twenty years, and all others are exempt under the payment of a small annual exemption tax. The army includes 700,625 men and officers, and the war footing is estimated at 950,000. Turkey has no powerful navy, most of the vessels being of remote construction and intended for local defense. Mauser rifles are used in the army, and the organization and discipline are largely on the plan adopted by German officials. Land and property taxes; excises on spirits, salt, and tobacco; and customs are the chief sources of revenue. Foreign affairs are administered very inefficiently, frequently without regard to international law, and the country is held together largely through the jealousy of foreign powers that seek to attain the preëminence of influence. "The Sick Man of Europe" is the term commonly used in referring to the Sultan, owing to the instability of his government.

EDUCATION. Scarcely any progress has been made in education, and comparatively few of the adult population are able to read and write. Those who enjoy educational advantages belong to the wealthy class. No reliable statistics upon the state of education have been published. Since the Koran commends the instruction of youth, free public schools are maintained under government grants, though the courses and the methods of teaching are primitive. The number of elementary schools is placed at 2,180. A number of colleges for higher education are connected with the mosques. Many missionary schools are maintained, and the parochial schools and Christian seminaries are quite numerous. The number of mosques in the empire is placed at 2,125, of which about one-sixth are in Constantinople.

INHABITANTS. The population of European Turkey is made up largely of Greeks, Bulgars, Turks, and Albanians, though other races are represented. In Asiatic Turkey the Turks are in a great majority, but the inhabitants include

many Arabs, Armenians, Circassians, Greeks, Kurds, and Jews. Not more than one-half of the people are Mohammedans, the remainder being Armenians, Jews, Orthodox Greeks, Roman Catholics, and Protestant Christians. Mohammedanism is the national religion, but all faiths are tolerated, though not with the spirit of liberality.

Constantinople, on the Bosphorus, in Europe, is the capital and largest city of the Ottoman Empire. Adrianople, Monastir, Salonica, and Janiva are other important cities in European Turkey. Among the chief cities of Asiatic Turkey are Damascus, Jerusalem, Beyrout, Rhodes, Tokat, Balikesri, Smyrna, Bagdad, Aleppo, and Scutari. Tripoli, Alexandria, Cairo, Bengazi, and Port Said are the leading cities of African Turkey.

LANGUAGE AND LITERATURE. The Turkish language is a branch of the Turanian family of tongues and is allied to the dialect spoken by the Finns and the Hungarians. Geographically it belongs to a strip of country about 300 miles wide, which extends from the Adriatic Sea eastward to the western border of Manchuria. The western branch is generally known as *Osmanli*, and is enriched by words taken from the poetry and history of Persia. It has been influenced to a considerable extent by the Arabic. During the Christian era it came to be modified by the introduction of Greek and European words and modes of expression. Eastern Turkish is the name applied to the language spoken by the Turkish tribes that form a large element in the region lying east of Asia Minor. While the Turks have a considerable literature, many of their works have been translated from the Arabic, Persian, and European languages. A majority of the original writings are devoted largely to comments on the Koran, Turkish law, history, geography, astronomy, and Turanian philology. Ahmed Vefik Pasha (died in 1893) published a dictionary of the Turkish language, and may be said to have thus rendered a service of great value to his race. While the modern writers are not numerous, they include the historian Javdet Pasha, the poet Jevad Pasha, the literary critic Ebuzzia Tefvik, and the essayist Muallim Naji.

HISTORY. The Turkish Empire was founded by the Ottoman Turks, who occupied a region of the Altai Mountains and in the 6th century A. D. began to move westward. They were subdued by the Saracens in the 8th century and reduced to slavery, but learned from their conquerors better arts of war and embraced the Mohammedan religion. In the 13th century they formed an alliance with the Seljuk Turks in a

war against the Mongols, receiving in return for their services a grant of land in Asia Minor. Othman or Osman, an Oghuzian Turkoman, became Emir of Iconium in Asia Minor after the death of the Seljuk Sultan, and proclaimed himself Sultan in 1300. He conquered Nicaea and other districts, thus founding the empire of the Ottoman Turks in the region formerly occupied by the Saracens, Mongols, and Seljuks, and at his death, in 1326, was succeeded by his son, Orkhan.

The second son of Orkhan succeeded to the throne as Amurath I. in 1360, and the following year captured Adrianople and made it the capital of European Turkey. His successors added considerable territory in Europe, and Mohammed II. finally conquered the Byzantine Empire by capturing Constantinople on May 29, 1453. The city has since been the seat of the Sublime Porte or Turkish government. Later Mohammed added Bosnia, Albania, Servia, and Greece to the Turkish Empire, and his grandson, Selim I., succeeded to the throne in 1517 and conquered Syria and Egypt. Turkey reached its greatest power and military importance under Solyman II., who reigned from 1519 to 1566. He captured Rhodes in 1523, conquered half of Hungary in 1526, and made Mesopotamia, Bagdad, Georgia and Moldavia tributary. His march into Europe was unimpeded by formidable resistance until he came in contact with Charles V. of Germany, who defeated him with great loss at Vienna in 1529. Since then there has been a continuous decline in Turkish power.

The allied fleets of Venice and Spain defeated the Ottoman fleet in the Battle of Lepanto, in 1571, thus destroying its naval importance, and a second defeat was administered to the Turks at Vienna in 1683 by the German army under Montecuccoli. Subsequently they were defeated by Sobieski at Vienna and by Prince Eugene at Zenta, in 1697. In the reign of Catherine II. of Russia, the Russian army under Romanzoff defeated the Turks in various battles in the Crimea, and by the peace treaty of 1774 Turkey lost the Crimea and a large region now included as territory of southern Russia. Napoleon deprived the Turks of Egypt in 1799, but that region was restored to the Sultan by English intervention in 1800. Russia, demanding a more distinct protectorate over the Christians in Turkey, soon after made consecutive additions of Turkish territory by annexing Moldavia, Bessarabia, and the mouth of the Danube.

In 1821 the Greeks began a war for independence, and the cruelties perpetrated by the Turks upon Greek Christians finally induced Russia, France, and Great Britain to intervene. The

allied fleets of the three nations defeated the Turks in a naval battle at Navarino on Oct. 20, 1827, and two years later the independence of Greece was recognized. In the meantime the Janizaries had revolted and were massacred without mercy at Constantinople in 1826. Mehemet Ali, Pasha of Egypt, revolted against the Sultan in 1831, but the overthrow of Turkey was averted by the intervention of Russia in 1833, and in 1840 Turkey was admitted among the European states as a treaty power. In 1853 the Crimean War broke out, in which Russia was pitted against Turkey, but the latter was assisted by France and England. It terminated favorably to the allied armies and by the treaty at Paris on March 30, 1856, Russia lost Wallachia, Moldavia, and other frontier territories.

Bosnia and Herzegovina rebelled against Turkish misrule in 1875 and Bulgaria did likewise in 1876. In the armed contests that followed, Turkish soldiers massacred Christians without mercy, which caused all of Europe to become aroused. Russia declared war in April, 1877, granting at the same time permission to Austria to occupy Bosnia and Herzegovina. All the European nations manifested a willingness for Russian success, owing to the oppressive measures inflicted by Turkey upon the Christians, and Rumania joined Russia by declaring its independence on May 22, 1877. The Russians were successful at Kars, and completely annihilated the Turks at Plevna, compelling them soon after to accept the Treaty of San Stefano. The Treaty of Berlin, concluded on July 13, 1878, erected Bulgaria into a principality, annexed Bessarabia to Russia, empowered Austria to occupy Bosnia and Herzegovina, and declared the independence of Servia, Rumania, and Montenegro. In 1881 the French established a protectorate over Tunis, and in the same year Turkey ceded all of Thessaly and a part of Epirus to Greece. A revolution in Eastern Rumelia overthrew the government at Philippopolis, in 1885, and that province was annexed to Bulgaria. In 1897 a war broke out between Greece and Turkey, which proved disastrous to the former.

Abdul-Hamid II., born Sept. 22, 1842, succeeded to the throne on Aug. 31, 1876. His reign of 33 years was a disastrous period to the country, since it lost much in territory and prestige among the nations. Besides the Russo-Turkish War of 1877 and the Greco-Turkish War of 1897, many insurrections and massacres of Christians disturbed the peace of the country. In 1900 the relations between Turkey and the United States became somewhat unfriendly, owing to the former refusing to pay an indemnity of \$90,000 due American subjects, but the

matter was adjusted after the United States warship *Kearsarge* and the training ship *Dixie* were sent to Smyrna. The Sultan sought to pacify his constituents and the dependencies in 1908 by restoring the constitution of 1876, but Bulgaria declared its independence and Austria officially annexed Bosnia and Herzegovina. In 1909 an element known as the *Young Turks* revolted, captured Constantinople, and deposed the ruling sovereign. His brother, Mohammed Rechad Effendi, was proclaimed Sultan by the parliament as Mehmed V. He accordingly took the oath to support and defend the constitution and inaugurated a limited policy of reform in civic affairs.

TURKEY BUZZARD. See **Vulture.**

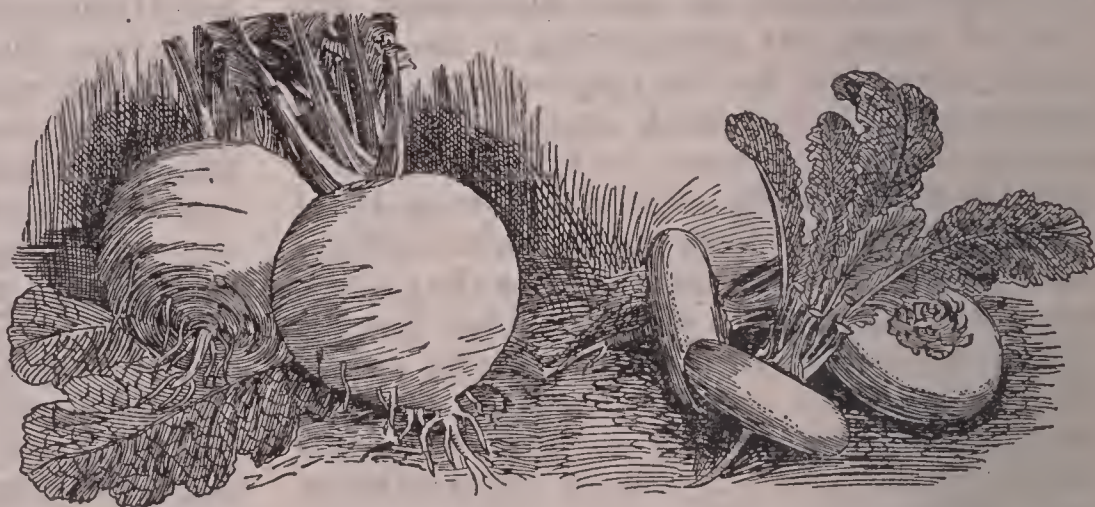
TURKOMANS (tûr'kõ-mans), a nomadic Tartar people of Asia, occupying the region bounded by the Caspian Sea and the Sea of Aral, Persia, Afghanistan, and the khanates of Bokhara and Khiva. They include numerous tribes or clans, each speaking a slightly different dialect, and may be said to constitute no single nation. Most of the nomadic tribes are warlike. They engage chiefly in agriculture and stock raising, but manufacture shawls, clothing, firearms, earthenware, and utensils. Most of the Turkomans are Mohammedans.

TURKS, a numerous race of people of the Turanian family, supposed to have had their original seat in Turkestan. They were finally driven westward by the Mongolians, with whom they warred many centuries. Their possessions in Central Asia were entirely overrun by Genghis Khan in the 13th century. A portion of the Oghuzian Turkomans had been enslaved by the Seljuks, also a Turkish tribe, and, by allying themselves with the latter in a defensive war against the Mongols, they secured a foothold in Asia Minor, whence they spread over Persia and Syria. Othman or Osman founded the Ottoman Empire at the close of the 13th century, and his descendants are known as the Osmanli Turks. Other divisions of the Turks include the Turkomans, the Turkish nomads, the Tartars, and the Yakuts of the Lena River. The Turks are variously estimated, statisticians placing their numerical strength between 15,000,000 and 20,000,000. The Ottoman Turks, most of whom are in Europe, show a closer resemblance to European people than to the Asiatic Turkish tribes, who more nearly resemble the Mongolians in the color of the skin and the contour of the face. Most Turks pro-

fess the Mohammedan faith, but those in Siberia are largely members of the Greek Catholic Church, and those in or near China are Buddhists. The Yakuts of Siberia profess Shamanism, which is closely related to fetichism. Though the dialects are somewhat different, they speak a language generally understood by the different classes. The Turkish tribes include the Bashkirs between the Irtish and the Volga and the Kalmucks resident in the region of the Don.

TURKS ISLANDS, an island group belonging to the Bahama chain. It is situated southeast of the Caicos Islands, about 90 miles north of Hayti. Both groups of islands are under the governor of Jamaica. The principal settlement is on the island of Grand Turk, which is about seven miles long and two miles wide. The two groups have an area of 224 square miles and a population of 4,740. Salt, sponges, and fruits are the principal products. Much of the surface is barren.

TURMERIC (tûr'mër-ik), the tuberous root of a herbaceous, perennial plant belonging to the ginger family. The plant is native to Southern Asia and is cultivated extensively in that region and on the islands of the Indian Ocean. Turmeric is used as a condiment, in medicine, and as a dyestuff. It produces a yellow stain of great brightness, thus making it valuable in coloring varnishes and in preparing curry powder. Turmeric is cultivated in a light and well-watered soil and the plant is propagated by offsets. An acre of fertile ground yields about 200 pounds of the product. The root is prepared for the market by cleaning and drying it in an



WHITE TURNIPS.

FLAT DUTCH TURNIPS.

oven. *Long turmeric* is a species that yields a root two or three inches long, and *round turmeric* has roots somewhat shorter but more bulky. The roots have a yellowish color.

TURNIP (tûr'nîp), a biennial plant of the mustard family, which is cultivated for its fleshy, globular, edible root. It is a common vegetable

in gardens and fields, being alike wholesome for culinary use and as a food for cattle. The seed is sown in temperate regions in June, usually broadcast, and the roots mature in ample time before the appearance of frost. In field culture the seeds are drilled by a machine in rows, thus facilitating cultivation by machinery. Many choice species have been obtained by propagation. Some are oblong rooted and others are globular, the latter being chiefly favored for table use. Among the chief species are the early Milan, white egg, early snow, flat Dutch, red-top, long white French, monarch Swede, and sweet German turnips. The *Swedish turnip*, or *ruta-baga*, is an allied plant and is cultivated mostly for cattle food. It has about 86 per cent. of water, while the common turnips have 90 per cent. Turnips were a favorite vegetable in the times of the Greeks and Romans, but the species have been greatly increased in size and fleshiness by careful culture.

TURPENTINE (tûr'pën-tîn), an oleoresin exuding from several species of coniferous trees. The commercial product is secured chiefly from the pine tree. Crude turpentine flows naturally or from incisions made about five to six inches from the root of the tree to a height of about six feet. The several kinds of oil differ according to the species of trees from which they are derived. Turpentine has a density of about .87 and boils at about 162°. It is produced in large quantities in North Carolina, where it is obtained from the sap of the long-leaved pine. The larch tree yields the so-called *Venice turpentine*, a superior product. *Strassburg turpentine* is derived from the silver fir, *German turpentine* from the Scotch fir, and *Canada turpentine* from the balsam and several other species of fir. The trees yield the largest flow of sap in the spring, when the best grade is obtained, and the inferior quality comes from the hardened gum forming at the sides of the cut made by the hacker. *Oil of turpentine* is made by distilling the sap in a copper vat, which is connected with the worm of the still. The volatile parts rise and are condensed into *spirits of turpentine*, while the hard part remaining forms the resin of commerce employed in making soap. The oil, or spirits, of turpentine is used in medicine, in making varnishes and paints, and for dissolving resins.

TURQUOISE (tûr-koiz'), a precious stone, having a blue or bluish-green color. It is composed essentially of a hydrated phosphate of alumina, with small proportion of oxide of iron and sulphate of copper, to which it owes its color. Turquoise is found in several regions of Persia, where it is used for ornamenting arms,

charms, and girdles. The best grades sold in the market are obtained in the mountains near Nishapur, Persia, but turquoise of a good quality is found in Mexico. It is so called because the mineral was first brought to Western Europe by way of Turkey. The finest turquoise gems are owned by the Shah of Persia, as only those of an inferior quality and less value are exported.

TURTLE (tûr't'l), the name applied commonly to a class of reptiles that frequent both land and water, but more properly to the large marine forms. In many instances it is used interchangeably with the word tortoise. In fact, turtle is the common name of both genera, and the term turtle has particular reference to the *green turtle*. This animal, when fully developed, is six to eight feet long and weighs from 700 to 850 pounds. The shell is usually smooth and colored greenish or olive. This reptile is highly valued for the delicacy of its flesh, which is used chiefly for turtle soup. It feeds on a marine plant known as turtle grass, but also on seaweed. Two species are well known, one of which inhabits the warm part of the Atlantic, and the other, the warmer waters of the Pacific. See **Tortoise**.

TURTLEDOVE, a class of birds that are allied to the domestic pigeons. They are somewhat smaller and more elegantly formed than the common doves. The *Carolina turtledove* is an American species. Its length is thirteen inches, with an alar extent of eighteen inches. It has the upper mandible slightly bent down, the tail is rounded, and it has a grayish color tinged with red. The *common turtledove* is distributed in many countries of Europe, Asia, and Africa. It is slightly smaller than the Carolina turtledove, being about ten inches long. It migrates to the warmer parts on the approach of winter, but returns to nest early in the spring. The nests are built of twigs, in which two cream-white eggs are deposited in May. Both male and female alternate to sit on the nest. They are noted for their beautiful color of grayish-brown, for their cooing, and for the affection to their mate and the young. They pair for life. The *collared turtledove* is native to Palestine and North Africa. It is about ten inches in length. The general color is gray tinted with red and greenish-brown, the tail is short, and it has a black collar on the back of the neck. These birds are hunted for their flesh, for which large numbers are killed in autumn.

TUSCALOOSA (tüs-kä-lōō'sä), a city in Alabama, county seat of Tuscaloosa County, on the Black Warrior River, 50 miles southwest of Birmingham. Communication is furnished by

the Mobile and Ohio and the Queen and Crescent railroads. The surrounding country is fertile, producing tobacco, cotton, and cereals. In its vicinity are productive deposits of coal, iron ore, and fire clay. It has steamboat navigation on the Black Warrior River, which is navigable to Tuscaloosa. The city was formerly the State capital, and is now the seat of a number of fine educational institutions, including the Tuscaloosa Female College, the Central Female College, and the Institute for Training Colored Ministers. It is the seat of the University of Alabama. The Alabama Insane Hospital, several fine public schools, and a number of churches are among the other important buildings. Among the manufactures are flour, leather, boots and shoes, cotton textiles, clothing, and machinery. Electric lighting, waterworks, and telephones are among the facilities. It was settled in 1812 and incorporated in 1816. Population, 1910, 8,407.

TUSCANY (tūs'kà-nī), formerly a grand duchy, but now one of the sixteen departments of Italy. The area is 9,304 square miles. It is situated on the Mediterranean, southwest of the Apennines, and embraces a productive part of Italy. It is divided into the provinces of Leghorn, Arezzo, Florence, Grosseto, Siena, Lucca, Pisa, and Massa e Carrara. The coast regions are level, the interior is undulating, and the western part is mountainous. Practically all the drainage is toward the southwest, the principal rivers being the Arno, Ombrone, and Cecina. It has fine vineyards and orchards and a large production of raw and manufactured silk. The chief cereals include wheat, corn, barley, and rye; the live stock, cattle, horses, mules, and sheep; and the fruits, grapes, olives, oranges, and dates. Among the manufactures are wine, straw goods, olive oil, silk textiles, porcelain, pottery, furniture, and marble products.

Tuscany formed a part of ancient Etruria, which was annexed to Rome in 351 B. C. After the fall of the Western Empire, it passed successively to the Ostrogoths, Greeks, and Lombards. Charlemagne and other Germanic emperors governed it until in the 12th century, when it became divided into several minor principalities. In 1567 the title of Grand Duke of Tuscany was conferred by Pope Pius V. on Cosmo de' Medici, whose authority was confirmed some time after by Maximilian II. A French army invaded it in 1799. The kingdom of Etruria was formed by Napoleon in 1801, but was annexed to the French Empire in 1808 as a grand duchy, Elisa, sister of Napoleon, becoming grand duchess. In 1860 it was made a part of United Italy under Victor Emmanuel. Since then extensive railroad building has been promoted and industrial and com-

mercial enterprises have been fostered. Florence is the capital and largest city. Other cities of note include Pisa and Leghorn, the latter being the chief seaport. Population, 1907, 2,656,382.

TUSCARORAS (tūs-kà-rō'rās), an Indian tribe of North America, originally one of the Six Nations of the Iroquois. The name means *shirt-wearer* and is thought to have been assumed after the settlement of America by Europeans. They occupied the region now included in North Carolina at the time of its settlement, when they had fifteen towns on the Tar and Neuse rivers and had 1,250 warriors. In 1711 they united to massacre the whites, but were defeated in the Battle of the Neuse on Jan. 28, 1712. Subsequently the hostile portion fled to New York, where they still occupy a reservation on Lake Oneida, but a small part remained friendly and continued to occupy their lands. The government purchased the land held by those remaining in 1829. Most of the Tuscaroras favored the English in the early settlements, but subsequently joined the American Revolutionary forces.

TUSCULUM, a city of ancient Latium, on the Alban range of hills, 15 miles south of Rome. Its citizens received the Roman franchise as early as 378 B. C., and it was long a favorite residence of the wealthy Romans. Cicero maintained a villa at Tusculum, and in its vicinity are the remains of a citadel, a theater, and a Forum. It was the birthplace of the elder Cato and many other prominent Romans.

TUSKEGEE (tūs-kē'gē), a city of Alabama, county seat of Macon County, on the Tuskegee Railroad, about 40 miles east of Montgomery. It is surrounded by a rich cotton-growing region and has a growing trade in farm produce and merchandise. The manufactures include flour, cotton-seed oil, furniture, carriages, earthenware, and machinery. It is celebrated as the seat of the Tuskegee Normal and Industrial Institute. Other educational institutions include the Alabama Military Institute, the Alabama Normal School, and the Alabama Conference Female College. Population, 1900, 2,170.

TUSKEGEE NORMAL AND INDUSTRIAL INSTITUTE, an institution established at Tuskegee, Ala., in 1881, for the training of colored persons of both sexes. Instruction is given in sciences, agriculture, carpentry, blacksmithing, brick masonry, domestic economy, shoemaking, engineering, dressmaking and millinery, printing and publishing, nursing, and many other arts and trades. The purpose is to give its students a careful training in the industrial arts, as well as the elements of an education, and to elevate them in their moral and material condi-

tions. This institution has about 70 buildings, 2,650 acres of land, and 1,250 head of live stock. The library contains 15,500 volumes, and the value of all property is placed at \$1,750,000. Tuition is free and many students can work a large part of their way through the institution. Students representing about thirty of the states are in attendance, and others enrolled come from Cuba, Porto Rico, Jamaica, and Africa. The faculty of professors and instructors numbers about 150, and the attendance is 1,500 students.

TUSSOCK MOTH (tūs'sūk möth), the name given to a large family of caterpillars, so called from the presence of tufts of hairs upon the body. These insects have a dull color and in some species the female is wingless. It lays its eggs soon after leaving the cocoon, but dies shortly after. In about three weeks the larvae make their appearance, when they feed voraciously upon leaves, especially such fruits as the apple and pear. They drop to the ground when disturbed, or suspend themselves by a silken thread. Spraying the affected trees with arsenites often rids them of these pests.

TUTUILA. See **Samoa.**

TWEED, a river in the southern part of Scotland, rising in Peebleshire, and, after a general course of 97 miles toward the east, flows into the North Sea at Berwick. It is famed for its beautiful scenery and for its connection with the history and literature of Scotland. The chief tributaries include the Eden, Gala, Teviot, Leader, and Till. It forms that part of the boundary between Scotland and England which lies between the Cheviot Hills and the North Sea, where its course is toward the northeast. Steamboats ascend it only a few miles from the mouth. The salmon and trout fisheries are important.

TWEEDS, a kind of twilled fabric, so named from the Tweed River, in Scotland, where it was first manufactured. It is made entirely of wool, or partly of cotton and shoddy. This product has an unfinished surface and is used largely for making men's clothing.

TWELFTH-DAY, the name given to the twelfth day after Christmas, known as the festival of Epiphany. The evening of this day is called *Twelfth-Night* and is observed in many countries by social rites and ceremonies. Usually a cake containing a bean is made, known as a *twelfth-cake*, and the person who receives the piece containing the bean is known as the king of the festival. Shakespeare named a comic play from this night.

TWELVE TABLES, Law of the, a written code of law promulgated in ancient Rome. It was the earliest systematic statement of the

Roman law and was prepared on a demand made by the plebeians. This class demanded a written code for the reason that the judges belonged exclusively to the patrician class, hence they were able to interpret the unwritten law as might best suit their convenience. Accordingly, ten magistrates were elected to write the laws, in 452 B. C., and before the end of the following year ten tables were approved by the popular assembly. Soon after two other tables were completed. The Twelve Tables were regarded as a guarantee of personal liberty. They did not constitute new legislation, but comprised a compilation of the unwritten law that had existed for some centuries.

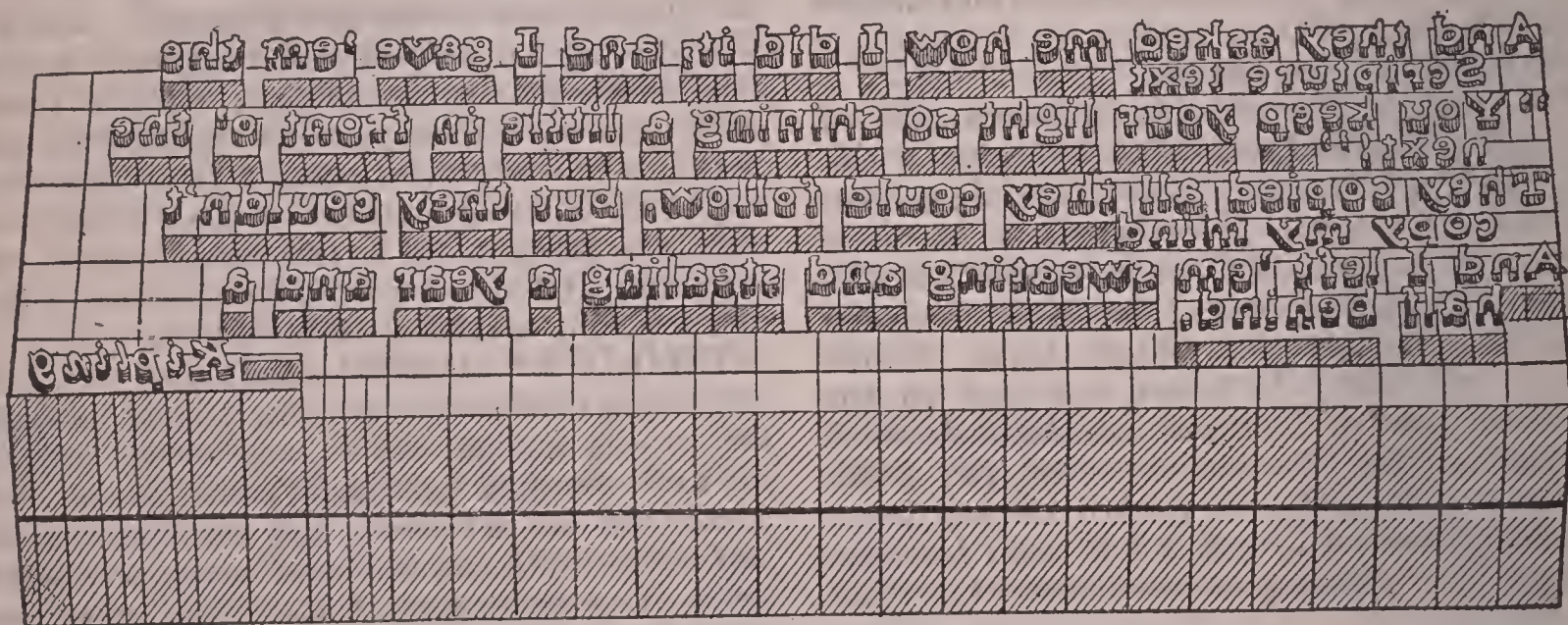
TWICKENHAM (twik'en-am), a town of England, on the Thames River, 11 miles southwest of London, with which it is connected by railway. It abounds in fine scenery and numerous suburban villas, and the surrounding district is noted for its sylvan beauty. Twickenham is famous as the home of Pope, whose monument occupies a place in the parish church. The fine Church of Saint Stephen was completed in 1874. It contains the Orleans House, used as a residence by Louis Philippe while in England, and near by the town is Strawberry Hill, which was the home of Walpole. Twickenham is built irregularly, some of its streets being narrow and tortuous. It has some manufactures and a limited trade. Population, 1908, 23,406.

TWILIGHT (twi'lit), the glow of light after sunset and before sunrise, though popularly the term is applied only to the evening twilight, the early morning light being called *dawn*. It is caused by the refraction and reflection of the sun's rays by the atmosphere; hence, in the absence of an atmosphere, there would be no twilight, but light would begin abruptly at sunrise and cease immediately at sunset. The refracted rays continue to reach the earth after the sun has truly set, and, when these rays cease, the sunlight continues to illuminate the clouds and upper strata of air, which is exemplified by the sun shining on the summits of lofty mountains long after the direct rays have disappeared from the view of inhabitants of the plains below. Night ensues only after the sun has sunk so low that reflected and refracted light ceases to reach us, the same phenomenon occurring before sunrise, though in a reverse order. Twilight occurs only when the sun is less than 18° below the horizon, from which it is evident that its duration in ordinary latitudes varies considerably with the season of the year. No true night occurs in the latitude of Greenwich for a month before and after the summer solstice, but twilight characterizes the period constantly from

sunset to sunrise. This is due to the circumstance that the sun is near the Tropic of Cancer and does not descend so much as 18° below the horizon. The twilight is longest toward the poles, where the night of six months is shortened by an evening twilight of about fifty days and a morning twilight of equal length. Twilight is shortest at the Equator. In the latitude of Toronto and New York City the average length of twilight is about one and a half hours, the duration being greatest in midsummer, when it is more than two hours.

TYLER (tī'lēr), a city in Texas, county seat of Smith County, 98 miles southeast of Dallas, on the Saint Louis Southwestern and the International and Great Northern railroads. It is surrounded by a fertile farming, stock-raising, and fruit-growing region. The principal buildings include the county courthouse, the United States government building, the Cotton Belt Hospital, the Texas College, the Tyler College, and a railroad hospital. Among the manufac-

TYPE (tīp), a piece of metal or wood, bearing on its upper surface a cast of engraved character for use in printing. Types were first made of wood, the letters being cut in various styles of writing, such as the Gothic, Roman, and Italic. Gutenberg overcame the objections to wooden types by using brass, but since his time movable types have been vastly improved and cheapened and printing has been lessened correspondingly in price. An alloy composed of lead, tin, and antimony is now used in type making. The larger types contain the largest proportion of lead, while the smaller need to be harder to resist wear and are formed with a greater proportion of antimony. Copper and nickel are used to cover the face of types designed for various purposes, the copper rendering them harder and the nickel serving to overcome the action of chemicals in the ink. An electrotyping process is employed in the larger printing offices to make copies of the type for printing, which is described in the article treating of electrotyping.



TYPE CAST ON THE MONOTYPE AND READY TO BE PUT IN THE FORM FOR PRINTING.

tures are canned fruits, leather, tile, furniture, brooms, cigars, clothing, coffins, pottery, iron-ware, and machinery. The city has electric and gas lighting, street pavements, waterworks, tele-phones, and street railways. It was settled in 1844 and incorporated as a city in 1875. Popu-lation, 1900, 8,069; in 1910, 10,400.

TYNE (tīn), a river in the northern part of England, formed by the North and the South Tyne. The general course is toward the east, forming part of the boundary between Durham and Northumberland, and it discharges into the North Sea at Tynmouth. The length of the river from the junction is only 35 miles, but it is an important highway of commerce and is navi-gable to Blaydon, about 18 miles. The Derwent and the Team flow into it.

Formerly types were made by hand, and later a hand-casting process came into use, but now types are cast largely by machinery. It is pos-sible to make 1,500 to 3,000 types by the hand-casting method in a day, though by the machine process fully four times that number can be made. In type making a mold is employed, into which the molten metal is cast. Different sizes of molds are used, according to the type desired. They have the form for a letter sunk into a copper plate, the impression being made by a well-tempered steel punch, containing the design of the letter in relief. The plate of copper hav-ing the impression is placed at the end of the mold, into which the molten metal is forced by an air pump, and the type is afterward thrown out by the mold being opened. Imperfect types

are remelted and those having perfect form and a well-cast letter are finished by polishing on a marble slab. Types are cast according to a point system now generally adopted. They have a uniform height of .981 of an inch, and are usually nicked on the lower side for the convenience of the compositor.

Below is a table of comparison giving the type and the measurement by points and names:

POINT SIZES	OLD NAMES
3½-point.....	Brilliant
4 or 4½-point.....	Diamond
5-point.....	Pearl
5½-point.....	Agate
6-point.....	Nonpareil
7-point.....	Minion
8-point.....	Brevier
9-point.....	Bourgeois
10-point.....	Long Primer
11-point.....	Small Pica
12-point.....	Pica
14-point.....	English
18-point.....	Great Primer

Types differ in width according to the letter, but the letter M, which is the nearest square, is used as the standard in measuring the amount of composition in any form. Formerly the sizes were described altogether by name, but now the point system above referred to is used in place of the name. The twelve-point, or pica type, is the unit, a point being equal to a seventy-second of an inch.

The following is the relative proportion of the different letters:

LETTER.	NUMBER.	LETTER.	NUMBER.
a.....	4,500	n.....	4,000
b.....	1,000	o.....	4,000
c.....	2,000	p.....	1,200
d.....	2,500	q.....	300
e.....	7,000	r.....	3,500
f.....	1,500	s.....	4,000
g.....	1,000	t.....	5,000
h.....	3,000	u.....	2,250
i.....	4,500	v.....	750
j.....	250	w.....	1,250
k.....	400	x.....	225
l.....	2,500	y.....	1,250
m.....	1,500	z.....	150

The em of eight-point is a square eight points each way. In an inch are nine ems, hence a square inch has 81 ems. To compute the number of ems, find the size of a page of any printed matter in square inches and multiply by 81; the product equals the total number of ems in eight-point or brevier type. Other sizes of types may be measured by the same rule. A font or fount of type is a full set for printing. The quantity of different types in a font corresponds to the frequency of their occurrence in printed matters. A complete font of type consists of 226 different characters and includes capitals, small capitals, lower-case letters, capital italics, lower-case italics, punctuation marks, figures, and signs. The proportion of letters varies according to the

characters of various languages, some using relatively more or less vowel or consonant sounds. There is likewise a difference of writers of the same language, as, for instance, Dickens's works contain relatively more vowel sounds than are used by Macaulay.

Type is set exclusively by hand only in the smaller offices and for special purposes, such as headlines in newspapers and books, and advertisements using the large bold-faced type. All the larger publishing houses issuing books and periodicals use typesetting machines, or machines in which individual type is dispensed with and the line becomes the movable unit. The first typesetting machine was patented in England in 1822. It was operated by manipulating a keyboard similar to that of a typewriter, the pressure of each key releasing a type at the upper part of the machine. The types were received in a holder below and formed a continuous line, which was then divided into the proper lengths by a second operator, and, after being used in printing, they were distributed by a mechanical device guided by the nicks on the sides. This form is still employed to a considerable extent, but the machines have been vastly improved. To this class belong the Thorne, Empire, and Simplex typesetters. The typesetting and casting machines employ matrices, which are stored at the top of the machine and fall into a holder as the operator presses the keys. When sufficient matrices to form a line have been received in the holder, molten metal is carried by the machine to cast a complete line. The slugs or lines are afterward set up in the form and used in printing, after which they are again melted, to be recast. The Mergenthaler, or linotype, is of this class, and is the invention of Ottmar Mergenthaler (q. v.), a German inventor. It is capable of doing the work of eight to ten men and is used very extensively in American and Canadian printing offices. Other machines of this class include the Lanston monotype, the McMillan typesetter, the German plectrotype, and the French calendoli. See **Linotype; Monotype; Printing**. Also see illustration on following page.

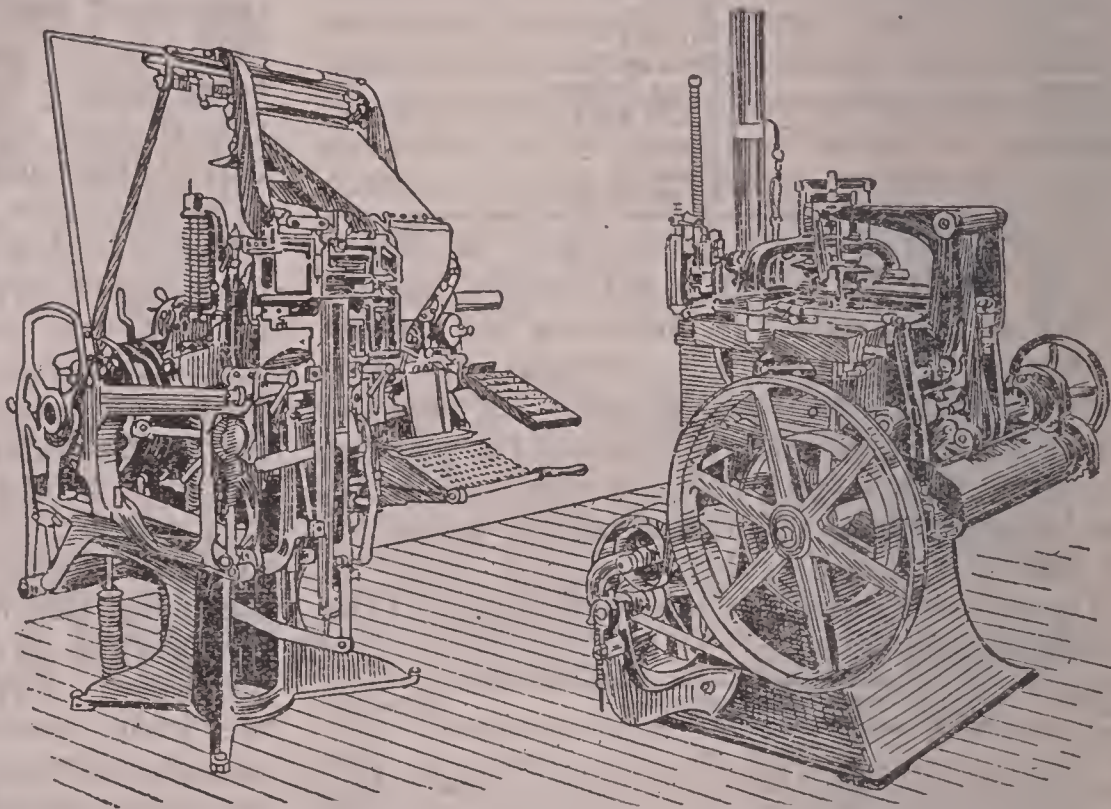
TYPEWRITER (tīp'ri-tēr), a machine for producing printed characters as a substitute for writing, now employed very extensively in all countries of the world. A large variety of typewriters are in successful use, but all agree in having a keyboard and metal keys serving to impress the letters or symbols upon the paper, through the medium of an inked ribbon or inked types. The first patent issued to an inventor of a typewriter was granted in 1714 to Henry Mill, though his invention was soon superseded by

more practical devices for writing. Pierre Foucalt, a blind Frenchman, received a patent for a typewriter in France in 1841, which was used to a considerable extent in various countries of Europe. In 1843, Charles Thurber, of Worcester, Mass., invented the first really practical machine, but it did not possess sufficient speed to bring it into general use. A. E. Beach, of New York City, received a patent for a machine in 1856 which did good work, but it was not possible to write with sufficient speed.

The modern typewriter dates from 1867, when C. L. Sholes, Carlos Glidden, and S. W. Soulé, three inventors of Milwaukee, Wis., constructed a machine that developed into the now famous Remington. Most of the credit in completing this machine belongs to Sholes, who took it to Ilion, N. Y., in 1873, where he interested the firm of E. Remington & Sons in its manufacture. This machine has been improved successively and is sold to a great extent in the markets of the world. The Remington is a bar machine, the bars being arranged in a circle, around a common center. It has a shift mechanism for printing capitals, and the necessary ink is supplied by means of a ribbon. In the Smith-Premier, Jewett, and Yost typewriters the bars have one type and are not operated by a capital shift. Machines of this class have a double keyboard, that is, a separate key for each character printed. However, the Yost has a compound bar motion and inks the type by coming in contact with a moist pad, instead of striking against a ribbon. The Hammond, Munson, Crandall, Blickensderfer, and several others have a type wheel instead of bars, and the manufacturers claim uniform impressions and perfect alignment. Another type of machines is on the Oliver style, having U-shaped type bars, and, like the Hammond and several others, keeps the work always in plain sight of the writer. Typewriting is taught in many public schools and other institutions of learning. A skilled operator is able to write at the rate of 90 to 125 words a minute, thus exceeding the speed of a skilled handwriter by more than doubling the product.

TYPHOID FEVER (tī'foïd), an infectious disease marked by great prostration. It is now known to be due to a specific germ, the *typhoid bacillus*, which is taken into the system chiefly by swallowing. Some have held that typhoid is

essentially the same disease as typhus, though others hold that these diseases are characterized by marked differences. Typhus more specifically affects the cerebral organization and nerve centers, while typhoid is essentially an abdominal affection, characterized by serious disorder of the bowels. Typhus is a continued fever marked by a peculiar rash or spots of a dark mulberry color, the muscular and nerve affection being at first accompanied by delirium and later by stupor. It is most prevalent among those ill fed and dwelling in badly ventilated and neglected houses. Typhoid fever, on the other hand, is spread chiefly by infected milk, leakage of sewers



THE LINOTYPE.

THE MONOTYPE.

from closets of typhoid fever patients into buildings, polluted soil or street dust, and an infected water supply. Formerly 14 per cent. of the cases proved fatal, but under more efficient treatment it has been possible to reduce the mortality to about 9 per cent.

TYPHOON (tī-fōōn'). See Storms.

TYPHUS FEVER (tī'fūs), a contagious disease, known locally as spotted fever and jail fever. It is attended with great prostration of the vital powers, and the patient often has a rash that resembles the appearance of measles. The disease is caused by destitution, overcrowding, and want of proper sanitation. Anciently it was a common scourge in the great seaports, but the precautions of modern times have counteracted its occurrence and greatly reduced its harmful effects. The specific cause is not definitely known, but it is thought to be a micro-organism. It is attended in the early stage by nervousness, headache, and rheumatic pains, fol-

lowed later with nervous prostration, delirium, and the development of slightly elevated spots. The crisis occurs at the end of the second week. Since typhus is highly contagious, the patient should be promptly isolated and given careful medical attention.

TYR (tīr), in Scandinavian mythology, a son of Odin and a brother of Balder. He was the god of war and fame, corresponding to the Mars of the Roman, and was prayed to by the heroes for victory. See **Tuesday**.

TYRANT (tī'rānt), the name of a ruler in ancient Greece. Such an official was not necessarily despotic and cruel as the term implies in modern times. Tyrants usually were highly respected and powerful citizens, but who, by stratagem or by force of necessity, assumed the government of a city or a state. In many cases they were men of wisdom and their government was highly beneficial from social and commercial standpoints. These rulers appear in nearly all periods of Greek history, but they were most numerous in the 7th and 6th centuries B. C. Later the tendency of the times induced powerful families to assume authority and rule over the people in an unjust and oppressive manner. From this circumstance came the modern word tyrant, which designates a cruel and unjust executive, no matter whether he is a usurper or a legally constituted king or potentate.

TYRE (tīr), a celebrated city of ancient Phoenicia, on the Mediterranean Sea, about 90 miles north of Jerusalem. It consisted of two parts, one on the mainland and the other on an island near the shore. The region surrounding it was in a high state of cultivation, yielding grain, fruits, and vegetables, and toward the inland were fine forests of fir and cedar. King Hiram of Tyre supplied Solomon with a quantity of timber and gold for the construction of the temple at Jerusalem. At that time it had excellent fortifications, the harbor was among the most secure of that period, and in commercial importance it took high rank. Its greatest prosperity is supposed to have been attained in the period ranging between 980 and 800 B. C. A colony of Tyre under Dido founded Carthage in 813 B. C. With the use of the newer city considerable trade was detracted from Tyre, thus causing it to lose prestige with its sister city, Sidon, which was situated about 25 miles toward the north.

Tyre withstood a siege by Sargon, King of Syria, but was partially reduced to submission after being besieged by Nebuchadnezzar for thirteen years, though its independence and prestige were not destroyed. Alexander the Great, in 322 B. C., besieged and conquered the city. He an-

nexed it as a Grecian colony, constructed a mole or causeway between the island and the mainland, traces of which still remain, and restored much of its former commercial importance. Cleopatra and Antony came into possession of Tyre in the Roman period, when it still ranked as an important commercial city. It was taken by the Saracens in the 7th century, and afterward by the Crusaders, who held it until 1192. Selim I. conquered it in 1516 and since then it has been a Turkish possession. It was long famous as the chief seat of the manufacture of Tyrian purple dye, obtained from the shellfish murex. The sea has covered many of its ancient ruins, though it still has remains of tombs and walls and a Christian cathedral dating from 324. The site is partly occupied by a town called Sur, which has a population of 6,140.

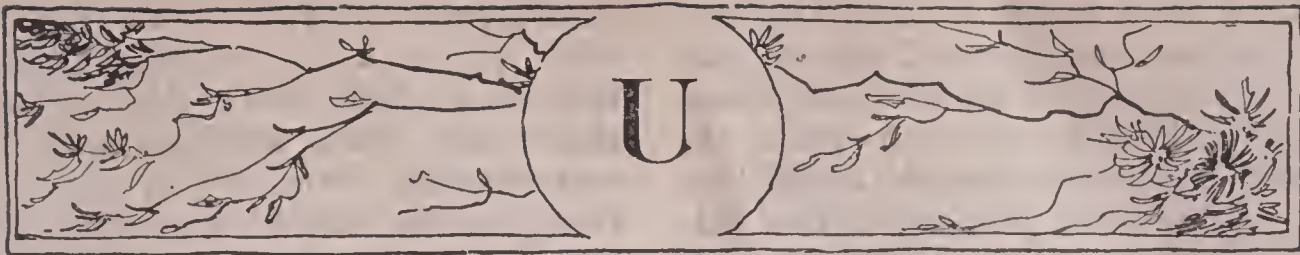
TYROL (tīr'ōl), a crownland in western Austria, lying east of Switzerland and north of Italy. It has an area of 11,325 square miles, and may be regarded an eastern continuation of Switzerland, the scenery being equal in grandeur to that of the Swiss highlands. The Alps enter it from Switzerland in three chains, thus dividing the region into three large valleys. The central mountain chain, called the Tyrol or Oetzthaler Alps, are the loftiest elevations of Austria and include a number of peaks covered perpetually with snow. The northern range is known as the Tyrolean or German Alps, and the southern, as the Trent Alps. About one-third of the region has valuable forests, one-third is mountainous, and the remainder is cultivated. It has productions of corn, wheat, rye, barley, fruits, and vegetables. Cattle, horses, sheep, swine, and poultry are reared in abundance. The mines yield coal, gold, silver, copper, iron, salt, marble, and building stone. Wine, ironware, silk textiles, embroidery, furniture, lace, machinery, and implements are among the manufactures. The language spoken is German, but a number of Italians reside in the southern part. The Romans conquered Tyrol in the year 15 B. C. and annexed it to Rhaetia. After the decline of Rome it constituted a part of Germany. The French invaded it in 1809 and conquered the region in spite of heroic resistance by the Tyrolean under Andreas Hofer, but it was restored to Austria in 1814. Garibaldi attempted to annex it to Italy in 1866, but his efforts proved abortive. Population, 1908, 962,678.

TYRONE (tī-rōn'), a borough of Pennsylvania, in Blair County, 15 miles northeast of Altoona, on the Little Juniata River and the Pennsylvania Railroad. It is surrounded by productive coal fields. The chief buildings include several public schools and a number of fine

churches. About three miles distant is the Birmingham Seminary. It has electric lighting, sewerage, and waterworks. The manufactures include shoes, ironware, leather, clothing, and machinery. The region was settled in 1811 and Tyrone was incorporated as a borough in 1857. Population, 1900, 5,847; in 1910, 7,176.

TZARSKOYE (tzär'skō-yē), or **Sofia**, a town of Russia, located 15 miles south of Saint Petersburg, noted as the summer residence of the czars. It was first made the country residence

of Peter the Great. The palace was built in 1744, but since then many extensive improvements have been made. Near the palace is a castle of Gothic architecture, a smaller palace building dating from the time of Alexander I., and a triumphal arch to commemorate the expulsion of Napoleon from Russia after the burning of Moscow. The town has an arsenal and railroad facilities, and is beautifully improved by parks, gardens, and numerous public buildings. Population, 1909, 26,532.



U

U, the fifth vowel and the 21st letter of the English alphabet. The Phoenician alphabet did not have this letter and, to supply the deficiency, it was originated by the Greeks. Originally *V* was the capital form of the letter *u*, but the two were differentiated in the 15th century, although they were used interchangeably for some time afterward. The true sound of *u* is that of *oo* in *cool*, *tool*, *wood* and *woo*. This sound is still retained in most European languages. It corresponds to the French *ou* in *tour*. The letter has a *short* sound, as in *fun*, *tun*, and *cut*, and a *long* sound, as in *due*, *sue*, and *mute*.

UBANGI (ū-băn'gī), a river of Africa, in the central part of that continent, known near its mouth as the Mobangi. It has a course of about 1,500 miles and is a northern tributary of the Congo River, which it joins near Equatorville. The Ubangi forms the northwestern boundary of the Congo Free State, which it separates from French Congo. It was discovered by Schweinfurth in 1870 and was explored by several Europeans about ten years later. The valley of the Ubangi is fertile. A large part of the country through which it passes is densely populated by natives.

UCAYALI, or **Ucayale** (ōō-kā-yä'lê), a river of Peru, the longest headstream of the Amazon, regarded by many as the true source of that river. It is formed by a number of branches in the western slopes of the Andes. The general course is toward the north, joining the Amazon near Nanta. The portion under its own name has a length of 1,000 miles and its main branch, the Apurimac, added to it makes its course equal to about 1,500 miles. The Ucayali River is the chief outlet of Peru toward the northeast, being navigable for small steamships a considerable distance. The valley is rich in fine forests and fertile soil.

UFFIZI, a celebrated palace of Italy, in Florence. It was erected in 1560, under the direction of the Medici family, and contains one of the most valuable art collections in the world. The treasures within the palace include paintings and sculptures from the leading artists of

UINTA MOUNTAINS

Italy and other countries. Among the great masters represented are Michael Angelo, Titian, Raphael, Fra Bartholomeo, Correggio, Rembrandt, Holbein, and many others. The celebrated statues within the palace are "The Dancing Fawn," "The Wrestlers," "Dying Alexander," and "Venus d'Medici."

UGANDA (ōō-găn'dà), a British protectorate in the interior of East Africa, having an area of about 220,000 square miles. It is situated northwest of Lake Victoria Nyanza and east of the Congo Free State. The region is drained by the streams forming the headwaters of the Nile. A railway line provides connection with Mombasa, a seaport on the Indian Ocean. The Equator crosses the southern part, thus giving it a tropical climate, but some of the regions are sufficiently elevated to make the temperature moderately favorable to Europeans. Some of the peaks tower 15,500 to 18,000 feet above sea level, and there are eighteen glaciers on Mount Kenia, the highest summit. The soil is fertile in the valleys and plains and it has an abundance of timber. Ivory, rubber, coffee, fruits, and cattle are the chief exports. The government is administered under a British commissioner at Mengo, the capital. A large majority of the inhabitants are Bantus and Bagandas, who engage chiefly in agriculture and stock raising. The so-called sleeping sickness appears periodically, which, in 1908, caused the death of 200,000 persons. Uganda proper has a population of about 450,500, but including certain other territories, such as Usoga and Koki, it is placed at 3,750,000.

UHLANS (ōō'lănz), a term meaning landers, the light cavalry introduced to Western Europe by the Tartars, and now maintained as an adjunct to the armies of Germany, Austria, and Russia. The uhlands of Germany were distinguished particularly for their bravery and activity in the War of 1870-71. They rendered excellent service at Sedan and several other battles.

UINTA MOUNTAINS (û-în'tà), an elevated range of the Rocky Mountain system, in

the northeastern part of Utah. They trend in a general direction from east to west and join the Wasatch Mountains some distance west of Salt Lake City. The drainage is chiefly by the Green River and its tributaries. Gilbert Peak, the highest summit, has an elevation of 13,685 feet.

UJIJI (ō-jě'jě), a city of German East Africa, on the eastern shore of Lake Tanganyika. It is surrounded by a fertile region and is the center of a vast interior trade. A trade route connects it with Dar-es-Salaam, an important port on the Indian Ocean. The buildings are largely of wood and sun-dried brick and the streets are irregularly platted, but within recent years a number of government structures, churches, and mosques have been built. It has a large trade in ivory, fruit, and clothing. The surrounding country produces cotton, sugar cane, tobacco, fruits, and cereals. In the vicinity are extensive interests in rearing horses, cattle, and sheep. Ujiji was formerly a great slave market, an institution suppressed by German authority, and it is now the chief town on the lake. Most of the inhabitants are of African or Arabic descent. Christian missionaries have been doing active work. Population, 1909, 25,281.

ULM (ōlm), a city of Germany, in the government of Württemberg, 45 miles southeast of Stuttgart. It occupies an elevated site on the Danube, has extensive railroad facilities, and is one of the most strongly fortified cities of southern Germany. Two fine bridges cross the Danube and unite the city with New Ulm, a town in Bavaria. The chief building is the Münster, a fine Protestant cathedral, having a seating capacity for 10,000 people. It is 475 feet long and 165 feet wide. The tower is 530 feet high, being the highest in the world. Other buildings include the palace of justice, the city hall, the post office, the railroad depot, the gymnasium, an agricultural institute, and a number of commercial and industrial schools. Among the manufactures are leather, cotton and woolen fabrics, paper, linens, machinery, sailing vessels, ironware, tobacco products, and farming implements. Electric and gas lighting, stone and macadam pavements, waterworks, electric street railways, and several fine parks are among the improvements. The surrounding country is fertile, supporting fine vineyards, orchards, gardens, and farms. Ulm occupies the site of a Roman town. It joined the Reformation in 1531 and since then a large majority of its people have been Lutherans. In 1802 it became a part of Bavaria, three years later was the scene of a noted battle between Napoleon and the Austrians, and in 1810 was made a part of Württemberg. Population, 1905, 51,820.

ULTRAMARINE (ül-trā-mā-rēn'), a beautiful pigment of a blue color, valued for its durable quality. It is obtained from the mineral lazulite, or lapis lazuli, and contains lime, sulphuric acid, silicia, allumina, soda, sulphur, iron, and chlorine. Formerly it was obtained only from lazulite, which is found in Chile, Persia, and Siberia, but it is now produced on a commercial basis, hence is less expensive than formerly. Painters use it both for oil and water colors. The value of this pigment consists of being both attractive and permanent.

ULTRAMONTANISM (ül-trā-mōn'tā-nīz'm), the theory that the authority of the Pope should be increased rather than minimized. This view is held by a considerable number of the Roman Catholics, especially those who advocate the superiority of the Pope over the statutes of an ecumenical council. Those opposed to this view are known as *Gallicans* and their tendency is called Gallicanism. Ultramontanism considers the Pope superior to the general councils and independent of their decrees, and regards him the source of all jurisdiction in the church. This view was established as a doctrine by the Vatican Council of 1870, in connection with the doctrine of papal infallibility. The name Ultramontanes is applied to political parties in Austria, Germany, and France, these representing the view that greater consideration should be given to Roman Catholicism.

UMBELLIFERAE (üm-běl-lif'ē-rē), an extensive family of herbs and shrubs, so named from the shape of the umbels or clusters of flowers and fruit. They are found in both hemispheres, but are most numerous in the cool regions. Some writers apply the name *parsley* to the entire family. Most species have hollow stems and perfect umbels of flowers, but these are not uniform in all. Oil and resinous substances are derived from the leaves of many plants of this family and in many cases the odor is pleasing, while in others it is disagreeable. The roots contain starch and sugar. Many are poisonous and some yield medical properties of value, such as ammoniac and assafoetida. The species generally known and cultivated include the caraway, celery, parsley, parsnip, carrot, coriander, anise, dill, and fennel.

UMBER (üm'bēr), a mineral pigment of an olive-brown color when in a raw state, but which, when burned, has a deeper red. It is composed of ochreous earth and manganese, and is obtained from natural deposits or by artificial preparation. The best grade is known as *Turkey umber* and is obtained in Cyprus. UMBER is useful in oil and water-color painting, being durable and forming a good body.

It is often mixed with other pigments, especially white lead.

UMBRELLA BIRD (üm-brě'lá), the name of a singular bird found in South America, so called from its parasollike crest. This bird is allied to the crows. It has a stout bill, moderately large wings, a naked neck, and a chattering voice. It is not only peculiar for its crest, but likewise for its beardlike growth of feathers that project downward from the neck. Two species have been described.

UMBRIA (üm'brī-à), a division of ancient Italy, lying between the Adriatic Sea and Etruria. It was situated north of the Sabine country. The region included the Upper Tiber and the Rubicon and in the early period was restricted to the ridges of the Apennines, but at a later time it developed into a powerful state. Its principal cities were Sena Gallica (now Sinigaglia), Pisaurum (Pesaro), Fanum Fortunae (Fano), and Spoletium (Spoleto). The Umbrians and Etruscans were subjected by the Romans in 308 B. C., but they joined the Samnites in a formidable struggle against the Romans at Sentinum, where they met their final defeat in 295 B. C. The name Umbria is now applied to a province of Central Italy, lying southeast of Tuscany and north of Latium. Spoleto is the capital and Perugia is the chief city.

UNALASKA (ōō-nä-läs'kà), the second largest island of the Aleutian chain, situated southwest of the Alaska Peninsula. It is 75 miles long and from 10 to 25 miles wide. The area is about 1,100 square miles. Deep-cut fiords indent the shore and much of the interior is a barren and treeless tableland. Maku-shin, an active volcano, has an elevation of 5,961 feet. The inhabitants consist chiefly of Aleuts and are mostly at Unalaska, or Iliuliuk, on the northern shore. Fishing, sealing, and trading are the principal industries. Population, 1908, 443.

UNCIAL LETTERS (ün'shəl), a kind of letters used in preparing Greek and Latin manuscripts during the early part of the Middle Ages. These letters are more nearly round in form than the capitals and may be said to combine some of the features of the small characters with the capital letters. The custom of using uncial letters is thought to have originated from the greater difficulty of making the angular capitals, hence ease and speed seem to have contributed to the rounder script. These letters were the prevailing style from the 6th to the 8th century.

UNCTION (ünk'shŭn), the custom of anointing a part or the entire body with oil, as with the oil of olives. Anciently the practice

was resorted to as a luxury or to promote health, but it gradually developed into a religious one. In the Roman Catholic Church it is known as the *Extreme Unction* and the council of Trent declared it to be a sacrament. The oil used is blessed by the bishop, which he does with great solemnity once each year on Maundy Thursday, and the oil so blessed is used during the year. In the administration of the sacrament by the priest, he dips his finger in the oil and anoints the sick person by applying it upon the eyes, ears, nose, mouth, hands, and feet. At each locality he makes the form of the cross and repeats, "Through this holy unction, and His most tender mercy, may the Lord pardon thee whatever sins thou hast committed by thy sight. Amen."

UNDERGROUND RAILROAD, the name used in the United States before the Civil War to designate the system adopted by some people in the north to aid fugitive slaves in escaping from their masters. Many thousands of fugitives were thus directed to the northern boundary, where they passed into Canada and beyond the reach of the Fugitive Slave Law. The plan included to designate certain routes and list houses at convenient intervals, known as *stations*, and the whites conducted or conveyed the fleeing Negroes from one point to the next. In all cases they were given food and shelter, in return for which they worked a few days, or were sheltered, transferred, and even clothed from humanitarian motives. Levi Coffin was foremost in this movement and devoted nearly thirty years of his life to the enterprise. Most of the fugitives were conveyed from Virginia and Kentucky through Ohio and Pennsylvania. Thomas Garret claimed to have aided 2,700 slaves to make their escape, but was required to pay fines aggregating \$8,000. Charles Farrier is said to have personally aided 400 in escaping. According to some accounts, not less than 25,000 slaves escaped by these means during the 25 years preceding the war.

UNDERGROUND RAILWAY. See sub-head **Communication**, page 1532; **Tunnel**.

UNDERSHOT WHEEL, a kind of wheel used to develop power by utilizing the force of running water. It has a number of flat boards, called *floatboards*, placed on its circumference and is moved mainly by the impact or blow produced by the moving water acting upon the floatboards at its lowest part. This kind of water wheel is used where a large volume of water moves slowly, as in a tidal stream. In such a stream the floatboards are usually placed at right angle to the rim of the wheel and motion is obtained as the tides flow in and out.

However, when the direction of the stream is constant, the floatboards are inclined at an angle to the current, in which case the water acts partly by its weight as well as by impact.

UNGAVA (ũṅ-gā'vá), a district of the Dominion of Canada, including the peninsula of Labrador, except the Atlantic coast region, which comprises the territory of Labrador and belongs to Newfoundland. It is bounded on the north by Hudson Strait and Ungava Bay, east by the territory of Labrador, south by Quebec, and west by James Bay and Hudson Bay. The area is about 456,000 square miles. Much of the interior is a tableland with an elevation of 2,000 feet above the sea, but the northwestern part is a plain with an elevation of not more than 500 feet. The shores on Hudson Bay and Ungava Bay are low and quite uniform. Inland the country presents a varied aspect of marshy depressions, shallow lakes, and wide and sluggish streams. Most of the drainage is into Ungava Bay by the Leaf, Koksoak, and Whale rivers. The southwestern part is drained into James Bay and a few streams flowing into the Atlantic have their headwaters in the southeastern part.

The climate of Ungava is rigorous, but the dryness of the air contributes to make the winters favorable to northern people. Nearly the entire northern half is treeless, though large areas are covered with shrubs and small plants, such as currants, cranberries, huckleberries, and gooseberries. Large forests of birch and spruce are found in the valleys of the southern part. Tundras of considerable size extend inland from the northern coast, and these are characterized by the presence of lichens and Arctic flowering plants. Some classes of vegetables, especially potatoes, mature in the southern part, but the ground is frozen from September until June. Hunting and fishing are the principal occupations. The game consists mainly of the otter, beaver, fox, bear, reindeer, and water fowl. Extensive explorations were not made of the interior until 1894. Ungava was made a territory under the direct administration of the Dominion in 1897, but it was annexed to Quebec in 1908. The inhabitants consist mainly of Eskimos and half-breeds. Population, 1901, 5,113.

UNGULATA (ũṅ-gũ-lā'tà), an order of mammals which includes all those that have hoofs. Formerly the elephants were classified as Edentata, but they are now included with

the Ungulates, and the list embraces many relative forms that are now extinct. The ass, zebra, horse, and a number of others have solid hoofs, while most of the animals of this class have toes that are inclosed in a horny hoof, as the sheep, goat, deer, elk, and cattle. The ungulates are the only animals that possess horns. The larger part are included with the ruminants, which have peculiarly formed stomachs and chew their cud. The ungulates are the most important to mankind, since they include the animals that furnish a large part of the food and clothing and embrace many that aid in doing a large share of the work. As animals of draft and burden, the horse, camel, elephant, ox, ass, and reindeer are the most important. Cattle, camels, and goats furnish milk. Wool is obtained from the sheep, but material for wearing apparel is likewise derived from the goat and the llama. All the ungulates furnish skins or hides of value in the industries.

UNICORN (ũ'nĩ-kôrn), an animal having a single horn issuing from the middle of the forehead. It is mentioned by a number of Greek and Roman writers, but is thought to be fabulous. The unicorn is spoken of by Aristotle



TWO NEPALESE UNICORNS.

and Ctesias, both of whom describe it as native to India. It is said to have been about the size of a horse, with a white body, a red head, blue eyes, and a large horn on the forehead. Such an animal is not known to naturalists and it is thought that the mythical tales of unicorns arose from careless observers viewing an antelope from the side, when the larger species of that animal appear to have a single horn. Others connect the story with the rhinoceros. The unicorn is pictured on the British coat of arms. The narwhal is spoken of by some writers as the sea unicorn.

A class of sheep which are native to Nepal, in Asia, have the extraordinary peculiarity that the number of horns differs in different individuals. The number ranges from a single horn to two pairs. Specimens with two, three, and four horns are as common among these sheep as those with a single horn. The accompanying illustration of two unicorns was obtained from animals of this class which are in the zoölogical gardens of London, England. In a native state these animals live in the mountains and are very shy.

UNIFORM (*ū'nī-fōrm*), a particular fashion or style of dress worn by persons who belong to the same order or render the same service, as in the case of the police, the military, or a civic society. The custom of wearing some insignia or badge to designate position or rank is very ancient, and instances of it are found in the feathers and other objects worn by leaders among primitive peoples. However, authentic records of costumes do not extend back farther than the Crusades. The need for a particular kind of dress to be worn by divisions of an army seems to have originated in the time when different states or nations contributed to make up one powerful army, when a distinct pattern of dress was necessary to distinguish one subdivision, or the quota of men furnished by a particular state, from the others in the general military body.

The military uniforms of nearly all countries of Europe consist, at least in part, of styles that were worn as livery by the royal servants at some time in the past, and the colors of the royal coats of arms contribute largely in making up the respective apparels. In modern times the tendency has been to dispense with the gaudy and more attractive styles of dress, especially while in action, since the use of modern firearms makes it very desirable that the troops be uniformed as inconspicuously as possible. Khaki dye was introduced as early as 1880 for coloring uniforms, but originally it was not a fast color. In 1884 a fast dye was obtained and now both cotton and woolen materials are colored with this product, giving the uniforms a plain drab or dust-color appearance. While the advantage is that a body of men in action is thus less conspicuous, there is the disadvantage of having both contestants appear somewhat alike, which gave rise to frequent disadvantages even in the Anglo-Boer war. The Khaki color is now used to a considerable extent in painting the vehicles and large arms as well as the uniforms, the helmets, and the haversacks. This gives the soldier a dull shade and renders him practically invisible while partly

obscured by the smoke while in action. There is likewise a tendency to dispense with the prominent marks that distinguish officers in the field, making them less liable to be singled out as a target for riflemen.

Uniforms used in the modern navies are quite similar, both in color and in style or pattern. In general the colors are blue or white, and the means of distinction are found in epaulettes, insignia, and gold lace. Each service has its special regulation as to the details provided for the purpose of distinguishing it from the others. The distinctive marks of rank are usually on the sleeves and shoulders, being in the form of straps or stripes. The styles differ according to the season and climatic influences. In general the uniforms in the navies of Great Britain and the United States are quite similar. Officers have eight different suits, each intended to be worn on a specific occasion. These include what is known as the full dress, ball dress, frock coat, frock coat with epaulettes, undress, mess dress, mess undress, and white undress. In the navy of the United States the officer wears a double-breasted coat with brass buttons instead of the undress uniform common in the British navy.

UNION, a town of New Jersey, in Hudson County, one mile north of Hoboken. It is situated on the Erie, the West Shore, and the New York, Susquehanna and Western railroads and carries a large industrial trade. Among the features are the public library, the high school, the public park, and many fine churches. The manufactures include silk goods, malt liquors, clothing, and machinery. Population, 1905, 17,005; in 1910, 21,023.

UNION, a city of South Carolina, county seat of Union County, 65 miles northwest of Columbia, on the Southern Railway. It is surrounded by a fertile farming country, which produces large quantities of cotton and fruits. The manufactures consist of hosiery, cottonseed oil, ice, cotton goods, and machinery. Among the chief buildings are the county courthouse, the public library, the city hall, and a number of fine schools and churches. Electric lighting and waterworks are among the public utilities. It has a growing trade in farm produce and merchandise. Population, 1910, 5,623.

UNION THEOLOGICAL SEMINARY, an institution of New York City, incorporated in 1836, forming an important divinity school of the Presbyterian denomination. The courses include those for lay members, for graduate and special work, and for students of divinity. A number of scholarships and two fellowships of \$600 are offered by the institution. It has 15 professors, about 175 students, and a library of

85,000 volumes. The productive endowments of the seminary are valued at \$1,500,000.

UNIONTOWN, a city in Pennsylvania, county seat of Fayette County, 70 miles south-east of Pittsburg. It is on the Pennsylvania and the Baltimore and Ohio railroads and is surrounded by agricultural territory, which produces cereals, grasses, and fruits. In the vicinity are deposits of iron and coal, and large quantities of both minerals are transported from the region annually. The features include the county courthouse, the public library, the high school, and many churches and business houses. Among the manufactures are flour, tobacco products, clothing, iron and steel wares, carriages, glass, and machinery. It has gas and electric lighting, electric street railways, waterworks, and sanitary sewerage. The place was settled in 1767 and incorporated in 1796. Population, 1900, 7,344; in 1910, 13,344.

UNIT, in arithmetic, the name applied to a single thing, as *one* or *unity*, represented by the figure 1. In a wider sense, a number is a unit, or a collection of units classed under the same name, and answers the question, How many? In this sense the unit of a number is one of the things it expresses; thus, in five cents, one cent is the unit. Sometimes units are only relative in their character; thus, one foot is a unit in regard to feet, but it is only a part of a unit in regard to yards.

Three units are commonly used in electrical engineering. These are the unit of current, called the *ampere*; the unit of potential, called the *volt*; and the unit of resistance, called the *ohm*. For some purposes these quantities are subdivided; thus, in telegraphy the practical unit is the *milli-ampere*, that is, one-thousandth of an ampere. In some cases it is convenient to use multiples, as in the expression of insulation resistances in terms of *meg-ohms*, that is, a million ohms. The following multiples are used commonly:

- 1 megohm=1 million ohms,
- 1 microhm=1 millionth of an ohm,
- 1 kilowatt=1,000 watts,
- 1 microampere=1 millionth of an ampere.

The following are units for the various purposes stated:

One cubic foot of distilled water at 62° Fahr. is the unit of specific gravity for solids and liquids and one cubic foot of atmospheric air at 62° Fahr., for air and gases.

The quantity of heat necessary to raise the temperature of one pound of pure water from 39° to 40° Fahr. is the unit of heat, or the *thermal unit*, and in the metric system it consists of the amount of heat necessary to raise

the temperature of a gram of pure water from 3.94 cent. to 4.94 cent.

In the metric system, the *centimeter* is the unit of length; the *gram*, the unit of mass; and the *second*, the unit of time. Hence, the *square centimeter* is the unit of area; the *cubic centimeter*, the unit of volume; and a *velocity of one centimeter per second*, the unit of velocity. The momentum of a *gram* moving with a unit velocity is the *unit of momentum*.

UNITARIANISM (ū-nī-tā'rī-ān-iz'm), the doctrine of those professing Christians who, conceiving the Godhead as unipersonal, regard the Father as the only true God. The term *Unitarian* was used as early as Oct. 25, 1600, in a decree of the Transylvania diet, and was adopted by the Transylvanian Unitarians as the designation for their church in 1638. This branch is now known as the Hungarian Unitarian Church and has 60,000 members in Europe. Allied sects are well represented in many countries of Europe, especially in Great Britain and Poland. Unitarianism in America sprang from the Congregational body in the early history of New England, but it may be said to date as a distinct organization from the early part of the 19th century, when the preaching of William E. Channing and others brought its doctrines into prominent notice. The general body of American Unitarians accepts the Bible and the divinity of Christ, though the latter is not identified with the Deity. It has 575 ministers, 475 churches, and 78,500 communicants in the United States. The chief periodicals include *The Pacific Unitarian*, San Francisco; *The Christian Register*, Boston; *The Church Exchange*, Portland, Me.; *The Unitarian*, Boston; and *The New Unity*, Chicago. The church property has an estimated value of \$10,285,000. In 1908, Canada had 800 Unitarians.

UNITED BRETHREN IN CHRIST, a Protestant religious denomination, founded in Pennsylvania in 1760 by Philip William Otterbein (1726-1813), a missionary of the German Reformed Church. The members of this denomination are now mostly English-speaking people. Like the Methodists, they have classes and class leaders, local and itinerant preachers, circuits, and conferences. The ministers are designated as elders. At present there are two regularly organized branches, called the Old and New Constitutions. The former has 975 churches, 725 ministers, and 45,500 members; while the latter has 4,250 churches, 2,525 ministers, and 260,000 members. The belief of those holding under the old constitution is Arminian, and those holding under the new constitution have a form of doctrine allied to that of the





127 A 122 B 117 C 112 D 107 E 102 F



B 117 C 112 D 107 E 102 F

Hammond's Map of United States.

G 92 H 87 J 83 K 77 L 72 M 67



UNITED STATES

Scale of Miles



G 92 H 87 J 83 K 77 L 72 M 67



Congregational, Presbyterian, and Methodist churches. Missionary work is carried on in many foreign countries, especially in Africa, where the church has 450 preaching places and 7,500 members. The theological institutions include Otterbein University, Westerville, Ohio; Western College, Toledo, Iowa; and Lane University, Leocompton, Kan. The chief publishing house is at Dayton, Ohio, where they also maintain the Union Biblical Seminary. In Canada the United Brethren (Moravians) are represented by 1,650 members.

UNITED KINGDOM. See **Great Britain.**

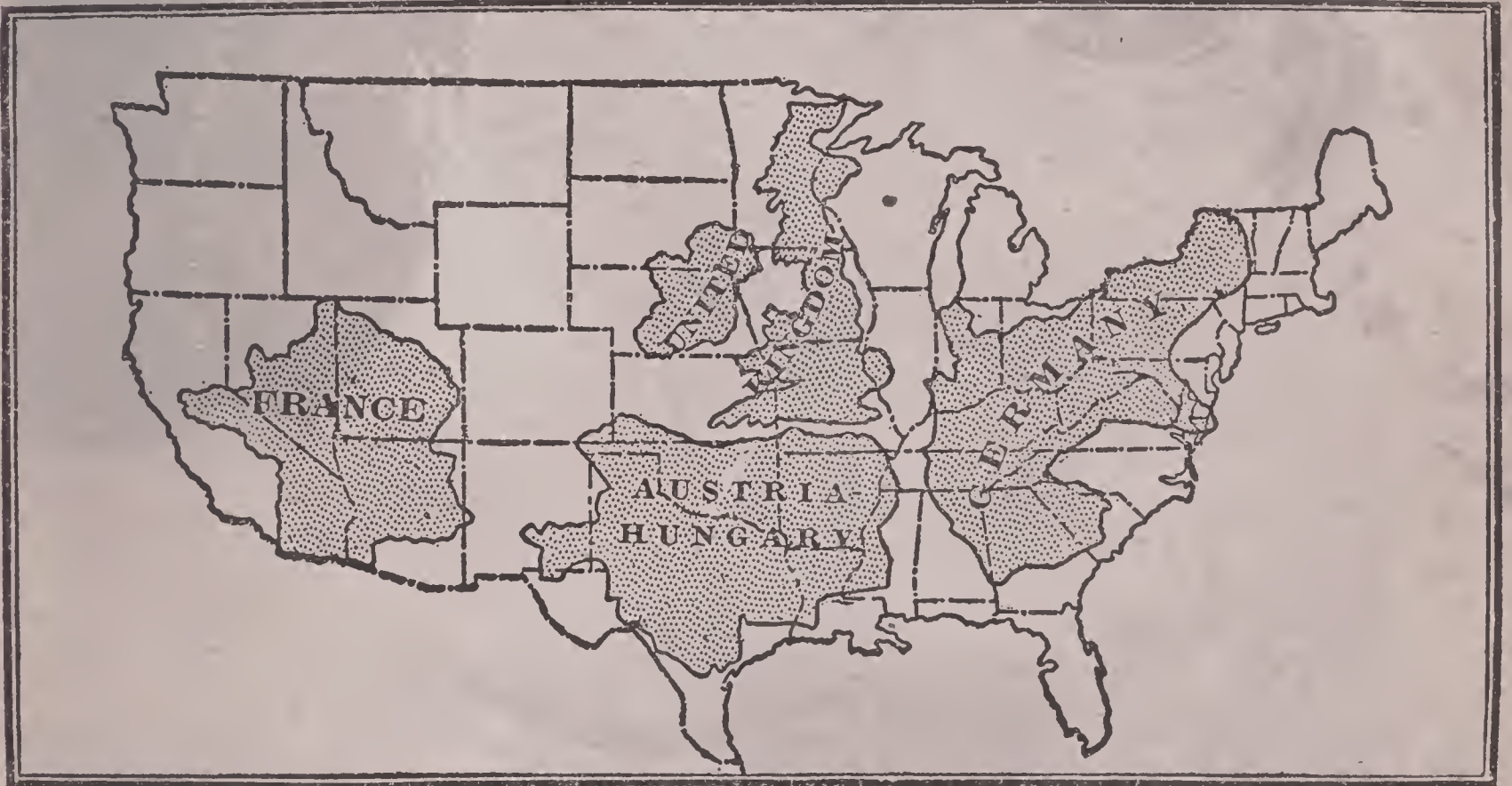
UNITED STATES, the political division which occupies the central part of North America, the most powerful republic in the world, called officially the *United States of*

ticle. For information on the political divisions and the colonial possessions of the United States, the reader is referred to the articles in which they are specially treated.

The following table contains a list of the principal possessions, together with the area:

NAME.	AREA.
Alaska.....	590,884
Cagayán de Joló (Sulu).....	1,029
Guam.....	190
Hawaii.....	6,450
Panama Canal Zone.....	474
Philippines.....	115,026
Porto Rico.....	3,606
Tutuila (Samoa).....	54
United States.....	3,025,600
Total.....	3,743,313

BOUNDARIES. A large part of the northern boundary is formed by the 49th parallel, which extends from the Strait of Georgia, an



MAP TO SHOW THE COMPARATIVE SIZE OF THE UNITED STATES.

America. It is bounded on the north by the Dominion of Canada, east by the Atlantic, south by the Gulf of Mexico and the Republic of Mexico, and west by the Pacific. The greatest extent from east to west is 3,100 miles and from north to south, 1,780 miles. It has an area of 3,025,600 square miles, exclusive of Alaska, which has an area of 577,390 square miles. The total area of the United States and Alaska is given by the United States Coast and Geodetic Survey to be 3,602,990 square miles, and, including the island possessions, 3,743,313 square miles, an expanse of territory larger than all of Europe. Alaska, which occupies the northwestern part of North America and includes the Aleutian Islands, is described in a special ar-

inlet from the Pacific, to the Lake of the Woods, on the northern border of Minnesota. This line is the most northern part of the United States, except a small peninsula in the western part of the Lake of the Woods, which extends about 25 miles farther north. From the Lake of the Woods the northern boundary extends eastward along the channel of the Rainy and the Pigeon rivers and through lakes Superior, Huron, Erie and Ontario, dividing these lakes about equally between the United States and Canada, except the larger part of Lake Superior belongs to the United States. East of Lake Ontario the boundary extends a short distance along the main channel of the Saint Lawrence River, to the 45th parallel, which it follows along the north-



UNITED STATES
 (Relief Map)
 SCALE
 0 50 100 200 300
 STATUTE MILES (CONTRIBUTED)

PHYSICAL MAP OF THE UNITED STATES.

ern border of New York and Vermont, thence it passes northeast along the border of New Hampshire and Maine. From the northerly point of Maine it extends southeast, following partly the Saint John River, then it extends along an arbitrary line to the Saint Croix River, which it follows to the Atlantic. The Atlantic coast line, which is 2,350 miles long exclusive of indentations, is characterized by a number of large bays and inlets, which include Penobscot, Cape Cod, Chesapeake, New York, Massachusetts, Delaware, and Narragansett bays and Long Island, Pamlico, and Albemarle sounds.

The southern boundary is formed in part by

Island. The total coast line, including the inlets, but exclusive of the Great Lakes, is 12,608 miles. This embraces 2,280 miles on the Pacific, 3,468 on the Gulf, and 6,861 on the Atlantic. A shore line of 3,618 miles on the Great Lakes, in addition to the above, makes the entire coast 16,226 miles.

ISLANDS AND PROJECTIONS. The islands off the Atlantic coast include Long Island, Nantucket, Staten, Martha's Vineyard, Manhattan, Roanoke, and Florida Keys. Those in the Gulf of Mexico comprise the islands of Santa Rosa, Galveston, Saint George's, Tortugas, Padre, and the Chandeleur group. The San Juan, Santa



MAP TO SHOW THE PHYSICAL DIVISIONS OF THE UNITED STATES.

the Rio Grande, from the Gulf of Mexico to about the middle of the southern border of New Mexico, whence the boundary follows an arbitrary line to the Colorado River. From the point of intersection of the arbitrary line and the Colorado, the border follows that stream northeast to the mouth of the Gila River, whence it runs almost due west to the Pacific. The western coast is indented by San Diego, San Francisco, and Willapa bays, Grays Harbor, and Admiralty Inlet, an extension from the Strait of Juan de Fuca. In the northwest the border is formed by the Strait of Juan de Fuca, the Canal de Haro, and the Gulf of Georgia, which separates the country from Vancouver

Catalina, and Santa Cruz groups are the chief islands off the Pacific coast.

Three large peninsulas project from the mainland, including Florida, between the Atlantic and the Gulf of Mexico; Lower Michigan, between lakes Huron and Michigan; and upper Michigan, between lakes Superior and Michigan. Among the chief projections on the Atlantic coast are Cape Cod and Cape Hatteras; on the Gulf Coast, Cape Saint Blas and the Delta of the Mississippi; and on the Pacific coast, capes Mendocino and Flattery.

GENERAL DESCRIPTION. The United States, except its distant insular possessions, is wholly within the North Temperate Zone, the belt that

comprises the seat of the leading nations of the world. It has much diversity of surface, climate, soil, and products. Five expansive natural divisions, differing in slope and elevation, make up the vast region extending from the Atlantic on the east to the Pacific on the west. These include the Atlantic slope, the Appalachian highlands, the Mississippi valley, the western highlands, and the Pacific slope.

The *Atlantic slope* is situated between the Atlantic and the Appalachian Mountains. It is but a few miles wide in the north, but gradually widens toward the south, forming an expanse of about 300 miles at the point where it joins the plains of the Gulf of Mexico. A narrow belt lying along the sea is known as the Atlantic coast plain, which gradually rises toward the west, where it finally merges into the Piedmont plain (q. v.). The latter comprises the foothills of the Appalachians and consist chiefly of a plain from a few hundred to a thousand feet above the sea.

The drainage of the Atlantic coast plain is toward the southeast into the Atlantic. Most of the rivers are small, but they flow with considerable rapidity, thus supplying an abundance of water power to many cities of commercial and manufacturing importance. The chief rivers of this section include the Penobscot, Kennebec, Hudson, Connecticut, Delaware, Potomac, Susquehanna, Roanoke, James, Neuse, Cape Fear, and Savannah.

The *Appalachian highlands* consist of several parallel ridges and chains, having altogether a breadth of about one hundred miles and including many long valleys. Some of the valleys are stony and unproductive and others possess remarkable fertility. The mountains are comparatively low, only a few of the peaks exceeding 6,000 feet in height. The highest points are in North Carolina and New Hampshire, being called the Blue Ridge Mountains in the former State and the White Mountains in the latter. Mount Mitchell is the highest peak of the Blue Ridge and Mount Washington of the White Mountains. Both rainfall and climatic conditions are quite favorable in the Atlantic coast plain and the Appalachian highlands, hence, a considerable per cent. of the regions is covered with grasses or is susceptible to successful cultivation. These two divisions are the seat of the many noted manufacturing cities and are penetrated by numerous canals and railroads.

The *Mississippi valley* comprises the great central plain lying between the Appalachian highlands and the Rocky Mountains. It contains more than two-fifths of the territory and

more than half of the population of the United States. This region is the most fertile and healthful farming and stock raising section of North America and of the world. It extends northward to the Great Lakes, where a large scope of country is known as the *Lake Region*, including all of Michigan and portions of Ohio, Indiana, Illinois, Wisconsin, and Minnesota. The drainage is by the Mississippi and its vast network of tributaries, including the Wisconsin, Illinois, Ohio, and Yazoo from the east, and the Minnesota, Des Moines, Missouri, White, Arkansas, Washita, and Red from the west. The surface is chiefly an undulating plain, traversed by belts of timber along the streams in the north and covered with considerable forests in the south. It has an average elevation of about 1,000 feet above sea level, the surface rising gradually from the Gulf of Mexico, where the elevation is only a few feet, while in the central part it is about 1,000 feet and in the northern part it is about 1,900 feet. The Ozark Mountains, a low range of highlands, traverse parts of Missouri, Oklahoma, and Arkansas, and another group of mountains, the Black Hills, is situated on the boundary between Wyoming and South Dakota. There is a general rise from the 99th meridian westward, and the region between it and the Rocky Mountains is a more or less elevated section. This scope of country extends from the Gulf of Mexico to the Canadian line, ranging in width from 200 to 500 miles, and is called the Great Plains. Much of the soil is naturally fertile, with sandy tracts along the western parts, but a lack of rainfall renders irrigation profitable for the production of cereals in portions of these plains, especially in eastern Colorado and Wyoming and western Nebraska, Kansas, and Oklahoma.

The *western highlands* include the region occupied by the Rocky Mountains, the Coast Range, the Cascade Range, and the Sierra Nevada Mountains. This section is from 500 to 1,000 miles wide, comprising many elevated ridges and extensive valleys, and nearly all of it is more or less arid. The Rocky Mountains constitute the eastern chain of the highlands, forming the watershed between the Mississippi system and the rivers farther west. Between them and the Cascade Range and Sierra Nevada Mountains is the great plateau that includes the Wasatch Mountains and Great Salt Lake. Some of the peaks attain to heights of 12,500 to 15,750 feet, their summits being covered perpetually with snow, but their slopes are covered more or less with hardy forest trees. Many of the great rivers of America

have their source in the Rocky Mountains, among them the Missouri, Colorado, Platte, Arkansas, Red, Rio Grande, Pecos, Columbia, and Yellowstone. In the great basin are the Bear and Jordan rivers, flowing into Great Salt Lake, and the Humboldt, flowing into Humboldt Lake. Between the Sierra Nevada Mountains and the Coast Range is the fertile valley of central California, through which flow the Sacramento and San Joaquin rivers. It is characterized by many fine lakes, beautiful waterfalls, and scenic cañons.

The *Pacific slope* includes the region west of the Cascade Range and Sierra Nevada Mountains. It is diversified by numerous valleys and mountain groups. Besides the Sacramento and San Joaquin rivers, it includes the Willamette, Umpqua, Rogue, and Klamath rivers, and the lower course of the Columbia. The Pacific coast has precipitous and rocky shores and stretches from Lower California to the Strait of Juan de Fuca, a distance of 2,280 miles. The principal inlets include the bays of San Diego, San Francisco, and Monterey. Puget Sound, an inlet from the Pacific through the Strait of Juan de Fuca and Admiralty Inlet, is in the northwestern part of Washington. Dead Valley, a depression in Southern California, is about 300 feet below the level of the sea.

DRAINAGE. The rivers furnish about 24,500 miles of navigation facilities. Many of the principal streams have already been mentioned under the five natural divisions into which the surface of the United States may be divided. However, the drainage may be classified into five distinct divisions, depending upon the direction in which their waters reach the sea. These include the rivers that belong to the systems of the Gulf, the Atlantic, the Pacific, the Great Lakes, and the Great Basin. They are important in the order named, both from the volume of water discharged and their relative importance commercially. The system of the Gulf, besides the Mississippi and its tributaries, includes the Appalachicola, the Alabama, the Sabine, the Pearl, the Trinity, the Brazos, the Colorado in Texas, the Nueces, and the Rio Grande. While all of them are more or less important in navigation, those flowing through the arid region of the Great Plains serve for irrigation. Few of the rivers belonging to the Great Lake system are large, but the Saint Lawrence, which forms the outlet to the sea, has vast value in the industries as a highway of commerce. The larger of these rivers include the Saint Louis, the Maumee, and the Genesee.

The rivers of the Atlantic coast plain are characterized by an escarpment at from 40 to 100 miles from the sea, hence the navigation in most cases extends to that point. Many of them discharge by broad estuaries, which furnish fine harbors, such as those of the Delaware, the Hudson, and the Potomac. Only two of the rivers belonging to the Pacific slope are of large size, but many are important through their passage over escarpments, since they furnish an unlimited amount of water power. They are used largely for irrigation purposes in the arid regions. The Columbia, in the northwest, and the Colorado, in the southeast, are the two largest. The Columbia is partly in Canada, receives the Snake, and discharges into the Pacific. The Colorado receives the Green. A part of its lower course is in Mexico, where it enters the Gulf of California. Three rivers of the extreme west are the Willamette, in Oregon, and the Sacramento and the San Joaquin, in California. The Great Basin system has no visible outlet to the sea, but many of the streams are of value in irrigation. Much of the drainage is into Great Salt Lake by numerous small streams, including the Sevier River. However, the largest stream of this section is the Humboldt, which disappears in Humboldt Lake.

LAKES. Small inland sheets of water are abundant in the northern section, especially in Michigan, Wisconsin, and Minnesota, each of which has many hundreds of fresh-water lakes. The Great Lakes in the north are lakes Superior, Huron, Erie, and Ontario, these forming a part of the northern boundary, and Lake Michigan, which lies wholly within the United States. Other lakes of importance are Moosehead, in Maine; Winnepesaukee, in New Hampshire; Champlain, between New York and Vermont; Onega, Cayuga, and Seneca, in New York; Okeechobee, in Florida; Winnebago, in Wisconsin; Pontchartrain, in Louisiana; Red, Leech, and Mille Lacs, in Minnesota; Devil's, in North Dakota; Flathead, in Montana; Yellowstone, in Wyoming; Utah, Sevier, and Great Salt Lake, in Utah; and Klamath, Tahoe, and Tulare, in California.

CLIMATE. The climate and soil of a region so vast as that included in the United States are necessarily diversified. In the southern part, as in California and Florida, the climate is almost tropical, but there is a gradual lowering of the temperature as we proceed toward the higher altitudes and toward the northern part of the country. However, every part of the United States has a climate favorable to Europeans. The winters are cold in the north-

ern part, but not to such an extent that man and domestic animals are materially hindered in the enjoyment of life, while that region has peculiarly pleasant and agreeable summers. In the western highlands and the Great Plains rainfall is considerably limited, but all other sections have an abundance of moisture for the culture and maturity of cereal crops, grasses, vegetables, and fruits. The mean annual rainfall east of the Missouri and Mississippi is about 37 inches; between the Missouri and the western highlands, from ten to thirty inches; and in the western highlands, from five to twelve inches. However, some minor sections of this region, as in parts of Nevada, are practically rainless. The region lying along the Pacific coast, from the Bay of San Francisco to Vancouver Island, has an average rainfall of from 40 to 60 inches; the region from the Brazos River, Texas, to southern Virginia, from 40 to 58 inches, and that from southern Virginia to northeastern Maine, from 30 to 50 inches.

The mean annual temperature has a corresponding variation in the different sections of the country. It is about 70° in the southern parts which are not materially affected by elevation or sea breezes, 55° throughout the central region, and from 45° to 50° in the northern part. In the north central section the average minimum falls as low as 40° below zero, as in northern Minnesota and Wisconsin, where the extreme low temperature sometimes falls to 60° below zero. On the other hand, the highest temperature is reached in the drier parts of Arizona and Texas, where the thermometer rises as high as 115° to 120°. As a whole the climate is controlled largely by characteristic winds, but the storm centers which pass over the country originate almost equally on the Atlantic and the Pacific. The stormiest portion of the country is in the region of the Great Lakes, which is in the path of the movement of winds from the West Indies and the slopes of the Rocky Mountains. These winds cause a large range of temperature within the year, ranging from 60° in Florida to about 150° in the central part and the upper valley of the Missouri River.

The vast range of rainfall and temperature is important as a factor in the yield of agricultural products, for which the country is noted. The most productive lands lie along the eastern coast plain and the rivers of the great interior, but by far the largest scope of productive and arable land is within the Mississippi basin. Extensive regions of the western highlands have fertile soil, but lack a sufficient quantity of moisture, though there are

large tracts entirely sterile, as large parts of the Utah basin. Vast scopes of country are fitted principally for grazing lands, as the plains of western South Dakota, Nebraska, Kansas, Oklahoma, eastern Colorado and Wyoming, and northwestern Texas.

NATURAL SCENERY. The United States is not surpassed by any other country in grand and beautiful scenery. Niagara Falls, the most noted cataract in America, is surpassed in height and the volume of water only by Victoria Falls, on the Zambezi. Yosemite Falls, in California, has a total height of 2,600 feet, in a series of three falls. The Falls of the Yellowstone, in Wyoming, is one of the wonders of the Yellowstone National Park. Shoshone Falls, on the Snake River, is next to Niagara among the falls of America in the volume of water passing over the precipice. The trip up the Hudson, from New York City to Albany, is rivaled only by that of the Rhine. Another trip of great beauty is from Portland, Ore., down the Willamette to the Columbia, thence up the Columbia to The Dalles, which for imposing scenery surpasses that of the Hudson. In the Appalachian Highlands are beautiful mountain lakes and deep gorges, through which clear streams wind like a silvery thread. The Water Gap, in the Delaware; the Pallisades, on the Hudson; and the Crawford Notch, in the White Mountains, are characteristic scenes of much grandeur. Other scenery of great beauty includes the Natural Bridge, in West Virginia; the Mammoth Cave, in Kentucky; the Grand Canyon, on the Colorado; the Whirlpool and Gorge, on the Niagara; and the Royal Gorge, in the Yosemite Valley. Yellowstone National Park, which is reserved by the government for the free use of the public, is a wonderland of canyons, waterfalls, geysers, and thermal springs.

FORESTS AND PLANT LIFE. The forests are peculiarly valuable and extensive. Scarcely any section of the country is entirely destitute of plant growth and the area of timber is proportionally large. Forests of valuable native woods are extensive throughout the regions which have an abundance of rainfall. They continue to yield large quantities of lumber and other timber products, and considerable growths of cedar and other evergreen trees are found even in the arid highlands of the West. All the section east of the Mississippi was formerly rich in primeval timber, fine tracts of which still remain in many sections, and a continuation of these forests extends into the section comprised in Missouri, Arkansas, Louisiana, Oklahoma, eastern Texas, eastern Kansas,



MAP TO SHOW THE ESTABLISHED AND PROPOSED FOREST RESERVES OF THE UNITED STATES.

and southern Iowa. The prairies of the northern Mississippi valley are enriched by belts of timber along the streams and in the western highlands are scattered tracts or belts, particularly in the cañons and valleys and on the mountain sides. In the region of the sources of the Mississippi and along the southern shore of Lake Superior splendid forests still abound. This is true also of Washington, Oregon, and California, where thrive the redwood and other great trees of the American continent.

Tree growth is limited most notably in the western sections of the great plains, though there are groups and belts of cottonwood, box elder, and willow trees along the streams, but in the *Llano Estacado*, or Staked Plains, of Texas and New Mexico, tree growth is very limited or entirely absent. Among the most abundant trees of North America are the oak, chestnut, beech, ash, black and white walnut, maple, hickory, locust, buckeye, laurel, cypress, azalea, magnolia, tulip, elm, pine, catalpa, cedar, arbor vitae, persimmon, redwood, guava, holly, acacia, fir, hackberry, pecan, birch, dogwood, palmetto, and hemlock spruce. The redwood and big tree, two species of the sequoia, found in California, are the largest trees of North America.

The plants which are native to the United States exceed in number those of Europe, the trees alone including about 400 species. As a whole the plant life is of the kind which characterizes the Temperate Zone, but it assumes a semitropical form in the southern part, as in Louisiana and Florida, where much of the vegetation resembles that of the West Indies. The native grasses are very numerous, ranging from the large forms of the Dismal Swamp to the small and highly nutritious buffalo grass of the arid regions of the West, but the latter in many sections is interspersed with cacti bunch grass, and sagebrush. Indian corn, or maize, and tobacco, two plants of high economic value, are native to the country. Practically all the more valuable commercial plants of Europe and Asia have been naturalized and are grown on a large scale, such as cotton, rye, oats, wheat, barley, clover, beans, oranges, lemons, etc.

ANIMAL LIFE. Formerly vast herds of wild animals inhabited the different sections now comprised within the United States. Buffaloes, elks, deer, and antelopes were abundant in the Mississippi valley and the western plains, and great flocks of aquatic birds found their home in the interior waters. The rapid settlement and improvement of the country has caused the larger species of wild animals to become limited and at present only scattering remnants are

found in different sections. The buffalo or bison has disappeared almost entirely, only small herds remaining in captivity and in the Yellowstone National Park. Elk, deer, antelopes, and kindred animals which were formerly very abundant, are now quite limited. Those remaining are confined largely to the mountains and highlands. Monkeys were never found in any part of the United States. The animals still quite abundant include the badger, bear, muskrat, wildcat, prairie dog, panther, skunk, rat, glutton, hare, lynx, raccoon, rabbit, mountain porcupine, mink, squirrel, woodchuck, fox, wolf, and cougar.

Many species of birds of song and plumage are native to the country, particularly in the Southern States, and aquatic birds are numerous in the watered and less populated districts. Among the edible birds are the duck, goose, snipe, grouse, prairie chicken, quail, plover, pigeon, partridge, brant, wild turkey, and sandpiper. Other birds more or less abundant are the humming bird, lark, heron, crane, coot, ibis, gull, mocking bird, finch, sparrow, flamingo, pelican, crow, hawk, owl, swallow, buzzard, falcon, woodpecker, vulture, and parrot. The alligator is found in the marshy regions of the Southeast, but it is becoming less numerous, being hunted for its skin. Lizards, tortoises, and turtles are common animals and serpents are indigenous to all sections, but they vary greatly in size and number with latitude and climatic conditions.

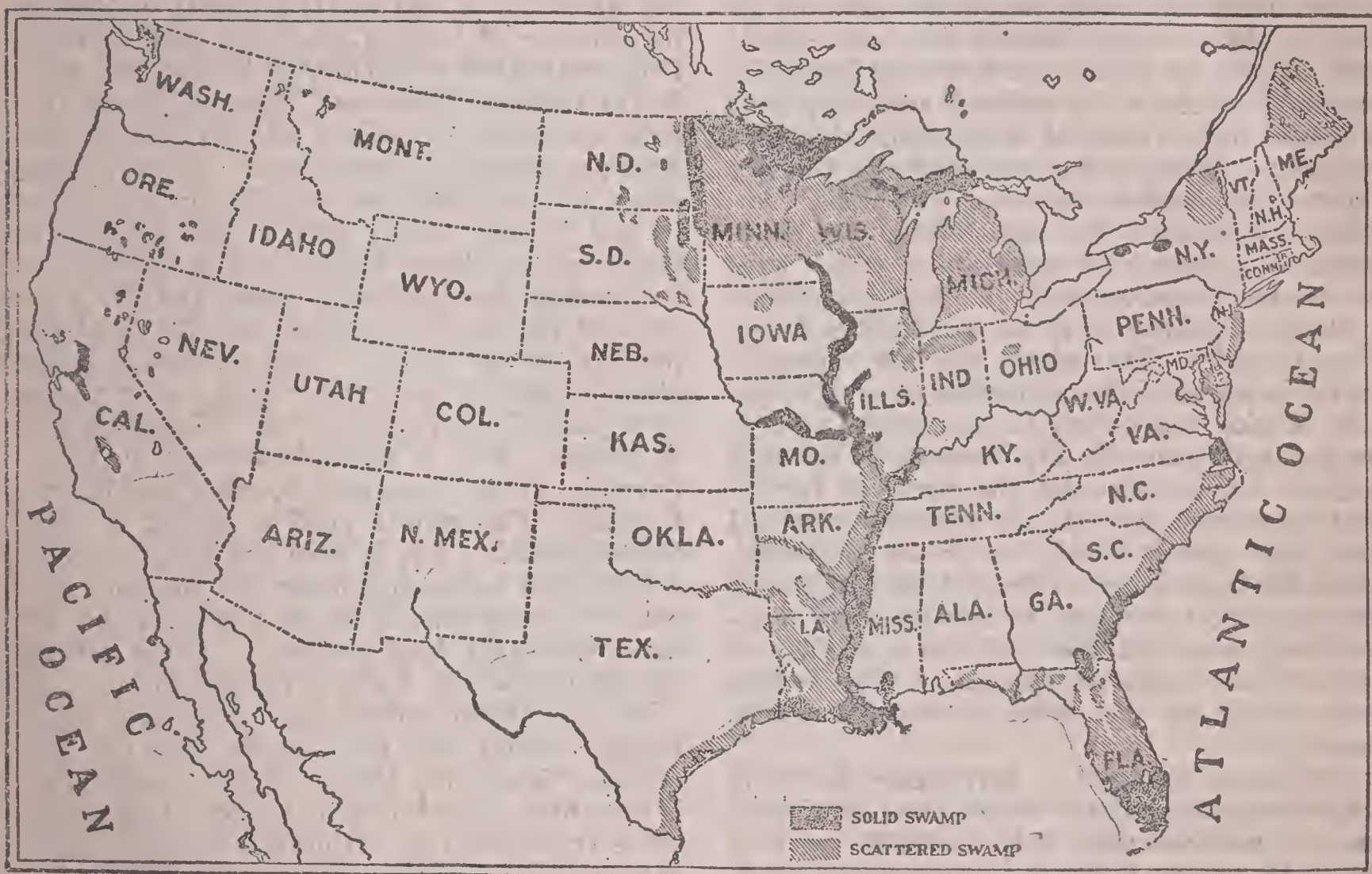
FISHERIES. The fishing industry of the United States had its origin in New England during the colonial period, and the enterprise is of such extent that the country is not surpassed in the value of the output. Although it seemed probable that some species might be exterminated from a lack of definite knowledge of methods of propagation, much has been done by the government and the states to obviate this difficulty. Hatcheries are maintained under the direction of the United States Fish Commission, by which extensive investigations and experiments are promoted. Both the interior waters and those lying off the coasts are valuable fishing grounds. Whaling was a productive enterprise until the middle of the 18th century, when the whale abandoned the waters off the coasts for seas farther north and south, but the catches of Alaska are still productive. The states that border on the Gulf, the Great Lakes, the Atlantic, and the Pacific have the largest fishing industries. Sponges and pearls are obtained off Florida and California. Lobsters and clams are taken off the coast of Maine, and the oyster industry is especially prolific in Chesapeake Bay and Long Island Sound. The salmon fisheries

of the Columbia River and Alaska yield large returns and the buffalo, the cat, and the German carp are plentiful in many waters. Sealing is profitable in the Alaskan seas. The Great Lakes yield whitefish, lake trout, and herring. Cod, bluefish, halibut, and menhaden are among the leading fishes of the Atlantic. Other species include the mackerel, perch, mullet, shad, ray, eel, pike, carp, and scallops. About 214,500 persons are employed in fishing and the value of the output is \$48,750,000 per annum.

MINING. The mineral wealth is not only abundant, but the mines are worked with great success. It is estimated that the coal measures

kota and elsewhere. Petroleum and natural gas are abundant in the coal regions of Pennsylvania, West Virginia, Ohio, Indiana, Kentucky, Kansas, Texas, Oklahoma, Colorado, California, and other states. Lead deposits occur in Illinois, Missouri, Arkansas, and Iowa. Copper is found in the regions of Lake Superior, especially in Michigan, and in Montana and Arizona. Zinc occurs in Missouri, Pennsylvania, and New Jersey.

Iron is widely distributed, especially in the Appalachian highlands, in the Ozark Mountains of Missouri, in Georgia and Alabama, and in the iron range of Michigan and Minnesota. Gold



MAP TO SHOW THE SWAMP LANDS OF THE UNITED STATES.

have an extent of 350,000 square miles. The finest anthracite coal deposits of the world are found in Pennsylvania, where gas and mineral oil are also abundant, and extensive deposits of bituminous coal are found in the region of the Appalachians, extending from New York to Alabama. Another vast belt of bituminous coal extends from Pennsylvania westward to Iowa, eastern Kansas, and Oklahoma. Bituminous coal occurs in extensive deposits in various sections of Michigan and the western highlands, especially in Wyoming, New Mexico, Montana, Idaho, and Colorado. Lignite coal is produced in large quantities for fuel and steam in North Da-

and silver are found in Colorado, Wyoming, California, Nevada, New Mexico, Oregon, Montana, Utah, and a number of other states. Other minerals more or less widely distributed include gypsum, marble, cobalt, iridium, nickel, copper, salt, salt rock, slate, limestone, granite, mercury, etc. Particular mention is made of the minerals found in the United States in the articles treating of gold, silver, iron, copper, etc., which see. The greatest development of mineral resources is in the states of the East and Central West and in the western highlands, but capital has been seeking investment in many of the Southern States, where the manufacturing and min-

ing interests are developing with almost equal pace. No country of the world has excelled the United States in the employment of modern machinery in operating mines and utilizing their products.

AGRICULTURE. The United States is the leading country of the world in the output of farm products, including live stock. It is characteristic of the people to invent and employ labor-saving machinery in working the land and in harvesting the crops. The natural result of this tendency has been to greatly increase the cultivated area. Much has been done by the government with this end in view, especially in that it has protected inventors by the granting of patents. Many swamp districts have been drained with the aid of the several states, or locally by counties, and both the national and state governments have expended large sums of money to irrigate lands which are naturally too dry for the germination and maturity of crops. Another prolific source has been through the maintenance of schools of agriculture, which have greatly facilitated adapting the crops as well as methods of cultivation to the peculiarities of various localities. This means has been especially useful in adapting the cultivation of certain species of rice and cotton in the South, in promoting agriculture by *dry farming* in the arid regions, and in extending the corn belt farther north and west than it was formerly supposed that this cereal could be grown profitably. Much has been done to extend the cultivation of the sugar beet, to promote interest in cultivating Kaffir corn and macaroni wheat in the arid regions, and to obtain species of fruits which are suitable to the different climatic conditions.

The capital invested in agriculture, including all interests for general farming and stock raising, is approximately \$24,500,000,000, or four times the amount invested in manufacturing enterprises. According to the government reports, the farms average 146.6 acres. They are smallest in the North Atlantic and largest in the Western States, being 96.5 in the former and 386.1 acres in the latter. The number of farms is placed at 5,750,000, of which about 70 per cent. are worked by their owners. Iowa stands first in the per cent. of the total land area included in farms, which is 97.4 per cent., but in this respect it is followed closely by Illinois, Ohio, and Indiana. The largest scope of cultivated land is in the valley of the Mississippi, where the greatest interests are vested in practically every branch of farming, but various products are raised in large quantities on the Atlantic coast and on the Pacific slope. Gardening and orchard-

ing are distinctive features of farming in the East, sugar cane and cotton culture in the South, tobacco in the central part of the Mississippi valley, cereals and hay in the Northwest, and fruits and cereals on the Pacific slope. Stock raising is a prolific enterprise in nearly all parts of the country, but the larger ranches are on the great plains, from the Gulf of Mexico to the border of the Dominion.

CEREALS. Corn is the leading cereal grown in the United States and the crop usually ranges from 2,250,000,000 to 2,650,000,000 bushels per year. Illinois, Iowa, Kansas, Missouri, Nebraska, Indiana, and Ohio are the leading corn-producing states. Oats and wheat are next to corn in the number of bushels produced, each yielding from 500,000,000 to 675,000,000 bushels per year. North Dakota, Minnesota, Kansas, South Dakota, California, Nebraska, and Indiana are the principal wheat-producing states. However, this cereal can be grown successfully in every State in the Union. About half of the product is spring wheat. Iowa, Illinois, and Wisconsin are the leading oats-producing states and the total yield of the country is nearly two-thirds of the product of the world. Barley usually yields about 132,500,000 bushels per year and is grown most extensively in California, Minnesota, and Wisconsin. Rice is an important crop in South Carolina, Texas, Louisiana, North Carolina, and Georgia. The annual yield is placed at 350,500,000 pounds. Rye is used less extensively as a food than in Europe, hence the amount cultivated is comparatively much less than that of other important food products. Other cereals include buckwheat, Kaffir corn, and spelt.

FRUITS. Fruit culture has developed more rapidly within the last decade than in any previous time in the history of the country. This is due chiefly to the fact that much of the product is transported in refrigerator cars, by which it has become possible to serve the semitropical fruits in a good condition on the table in the northern sections. Apples are grown more extensively than all other fruits combined and mature in nearly every part of the country, but the largest orchards are in New York, Virginia, Pennsylvania, and the central part of the Mississippi valley, especially in Missouri and Illinois. Peaches take rank as the second crop and are grown in large orchards of the South, in the vicinity of the Great Lakes, and on the Pacific coast. Grapes of a fine quality thrive in New York and California and pineapples and oranges are grown extensively in Florida. Strawberries, raspberries, and blackberries are cultivated in most parts of the country. Large interests are vested in cultivating English walnuts, figs, al-

monds, lemons, and apricots, especially in California. Other fruits grown more or less extensively include peaches, quinces, pears, bananas, and cherries.

COTTON AND TOBACCO. The United States is the leading cotton-growing country of the world and has large tracts of land which are suitable for the cultivation of sea island and other standard species. The cotton belt extends throughout the South, from Kentucky to the Gulf and from the Atlantic to the western part of Texas. From 12,500,000 to 14,500,000 bales, of 500 pounds each, are produced per year. The yield in Texas is greater than that of any other State. Other cotton-producing states include Georgia, Mississippi, South Carolina, Alabama, Arkansas, and Oklahoma. On the other hand, Kentucky is the leading tobacco-producing State, though this distinction was long maintained by Virginia and later by North Carolina. Besides the three states already mentioned, others producing large quantities of tobacco are Wisconsin, South Carolina, Pennsylvania, New York, Maryland, and Connecticut. The yield ranges from 625,500,000 to 725,500,000 pounds per year and the value of the output usually approximates \$55,500,000. Both cotton and tobacco are peculiar as economic products in that they furnish employment to an unusually large number of people.

OTHER CROPS. Hay is one of the leading products in all parts of the country. Among the chief species of grasses grown for hay are timothy, native grasses, clover, alfalfa, millet, and red top. Potatoes stand at the head of the list among the vegetables, but the yield is not large as compared to that of the leading countries of Europe. More attention is given to this crop in the North than in any other section, especially in Minnesota, Wisconsin, Michigan, and New York. While the crop grown in the South is not materially large, it is important that a larger part of it is shipped to supply the early market in the North. Flax is grown extensively for seed in North Dakota, Minnesota, Wisconsin, and other states of the North. Hops is cultivated on the Pacific slope and in New York. Sweet corn, tomatoes, and other crops of this kind are grown on large tracts in the East, especially in Delaware and New Jersey, where they are either marketed or canned. Other crops of importance are sugar cane, hemp, peas, beans, melons, sweet potatoes, celery, sugar beets, onions, and cabbages.

LIVE STOCK. The interests in stock raising are very extensive and, as compared with crop growing, they are much more important than in the countries of Europe. Cattle are the leading

domestic animals and they are grown both for meat and dairy purposes. Farming as a whole is diversified in the country in general, but stock raising is largely an exclusive business in the arid region where cattle, sheep, and horses are reared on large ranches. Texas stands first in the number of cattle, while Iowa and Illinois lead the other states in the swine industry. Large dairying interests are maintained in New York, Iowa, Illinois, Wisconsin, Ohio, and New England. Kentucky is noted for its breeding farms of driving horses. The Northwest has a reputation for the industry of rearing Clydesdale and Percheron breeds for draft purposes. Mules are grown more extensively in the South than any other section of the country, being used more extensively in that section for draft purposes than elsewhere. The sheep industry is largely represented in all sections and the breeds are mostly merino and southdowns. Ohio and Texas formerly held first rank, but the leading place is now credited to Montana, and large interests in this enterprise are vested in Wyoming, Idaho, and New England. Other domestic animals include goats and poultry, especially chickens, turkeys, ducks, and geese. Ostrich farming is promoted to some extent in California. The value of all live stock is placed at \$3,500,000,000, of which the larger part is invested in cattle, swine, and horses.

MANUFACTURES. The United States ranks as the most important manufacturing country of the world, and the value of the output is greater than that of Germany and over a third larger than that of Great Britain. This is accounted for principally by the fact that the American people are not only inventive, but have at their command the natural resources necessary to promote this enterprise. The large quantities of coal, iron, timber, farm produce, and other materials, together with extensive water power and vast shipping facilities, are the causes that contributed to the development of many large industrial enterprises. Another factor is the fact that interstate commerce is absolutely unrestricted by a tariff or other influences that would tend to localize the market. Prior to the Civil War the manufacturing interests were confined almost exclusively to the East, partly because the transportation facilities were not developed in the West and South, but more recently this condition has been vastly revolutionized. Although the East still has a majority of the greater enterprises, it may be said that the larger factories are distributed generally in the towns and cities of the entire country. Georgia and Alabama have made remarkable strides in developing the cotton and iron industries, while

North Carolina, South Carolina, and Kentucky maintain a high place in the manufacture of cotton textiles. Developments in similar lines have been made in the West and the Northwest, especially in such cities as Chicago, Saint Paul, Minneapolis, Saint Louis, Denver, Seattle, and San Francisco.

The leading manufactures include flour and grist, cured and packed meat, iron and steel, lumber and lumber products, cotton and woolen textiles, leather products, paper and paper pulp, and machinery. In the iron and steel industry it holds first rank. The annual output of iron is 16,775,000 metric tons, while the output of steel is 13,780,000 metric tons. Germany more nearly approaches the output in this industry than any other country, producing 9,500,000 metric tons of steel and 10,225,000 metric tons of pig iron per year. Pennsylvania stands at the head of the iron and steel industry. Other states that take high rank in this enterprise include Ohio, Illinois, and Indiana, in the order named. The manufacture of cotton goods is centered largely in New England, but in this section Massachusetts has the largest annual output. Other states, not included in New England, that have large cotton mills are Alabama, Georgia, North Carolina, and South Carolina. Woolens and carpets are made chiefly in Massachusetts, Pennsylvania, and Rhode Island, and silk textiles are produced in large quantities in Pennsylvania and New Jersey.

Slaughtering and meat packing are represented largely in the central west, owing to the convenience in shipping live stock to the packing-house centers. Chicago is unapproached by any other city in the world in the slaughtering and meat-packing enterprise. Other cities that rank high in this industry are Kansas City, South Omaha, Saint Louis, and Saint Joseph. About five-sixths of the product are sold fresh, being transported to markets in refrigerator cars, and the remainder is cured, though the proportion of cured pork is much greater than that of beef. Lumber and lumber products are obtained in various sections, especially in Minnesota, the Pacific slope, and the South. However, the paper industry is centered chiefly in New England, Pennsylvania, New York, and Wisconsin. Leather is made more extensively in Pennsylvania than any other State, but Massachusetts holds first rank in the output of boots and shoes. Though important as a shipbuilding country, it is exceeded in this respect by both Germany and Great Britain. However, in the production of farming machinery it surpasses every other country.

The output of dairy products has increased

very rapidly with every decade and the returns from fresh milk, cheese, and canned milk are extensive. In this industry and a number of others, there has been a marked tendency to combine and operate the enterprises either on the basis of coöperation or by large corporations. The United States is second only to Germany in the value of chemical and allied products. It produces large quantities of clocks, needles, pins, musical instruments, and hardware. In printing and publishing it ranks high, especially in the output of daily newspapers, magazines, and standard books. The periodicals published have a value of \$228,500,000, while book and job products aggregate \$141,250,000. New York City has the largest daily newspapers, but the publishing interests are well distributed throughout the larger cities. Pottery, tile, glass, brick, and tobacco products are materially large. Other general manufactures include dyestuffs, explosives, fertilizers, paints and varnishes, rubber goods, and malt and distilled liquors.

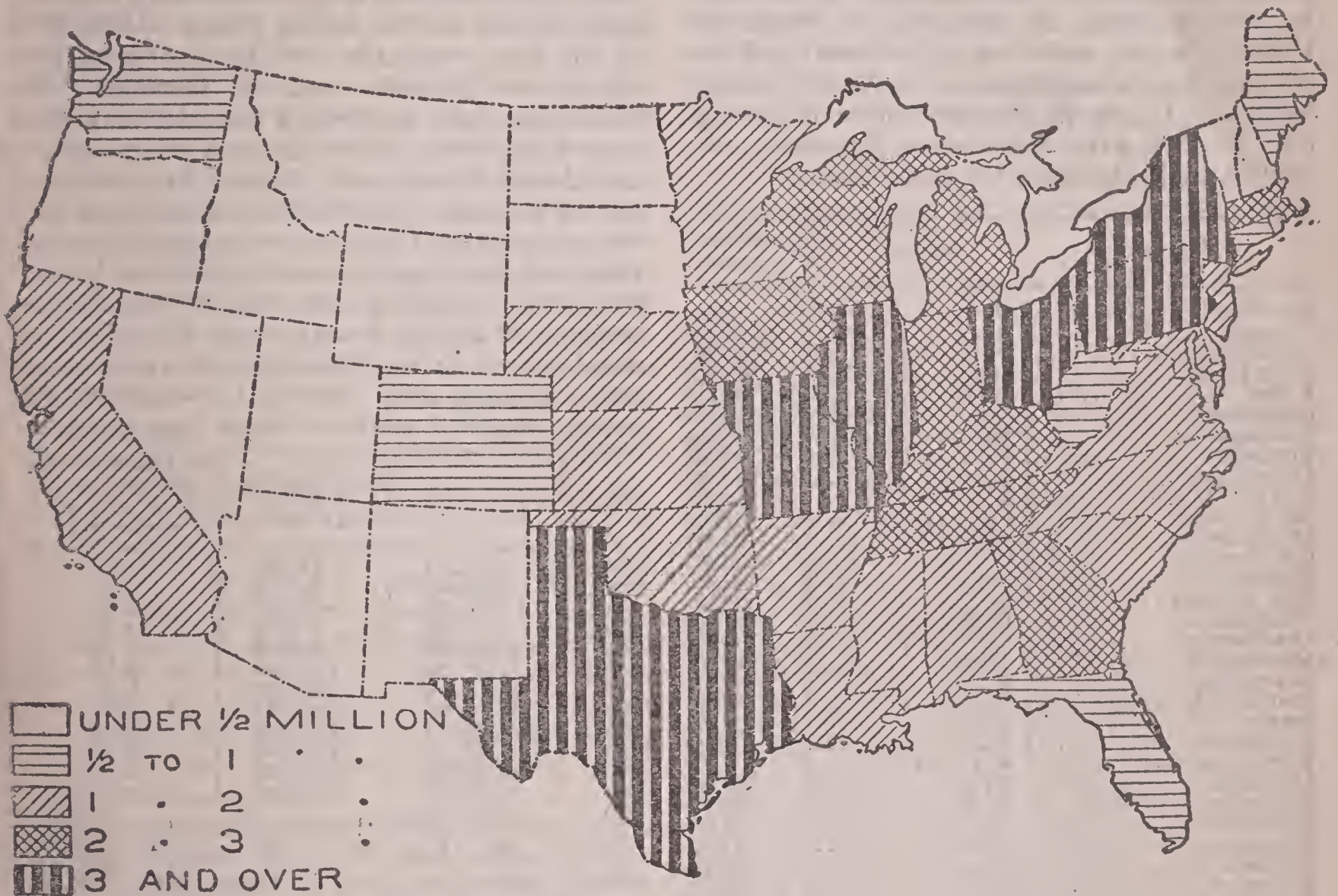
COMMERCE. In the volume of commerce the United States takes third rank, the aggregate value of all exports and imports being exceeded only by those of Germany and Great Britain. In 1908 the total exports were represented in value at \$1,518,561,720, this being the largest volume of exportation by any country of the world, and in the same year the exports of Germany were \$1,250,000,000 and those of Great Britain were \$1,470,000,000. In the same year the imports aggregated in value \$1,117,512,629, while the imports of Germany aggregated \$1,550,000,000 and those of Great Britain \$2,645,000,000. However, in the volume of the total trade, both foreign and domestic, the United States has the first place among the nations. The foreign trade in the order of value is with Great Britain, Germany, and France. Among the chief imports are India rubber, valued at \$53,189,711; chemicals and drugs, \$64,693,560; silk, \$93,654,593; and sugar, \$97,645,449. The chief exports include domestic animals, \$46,728,281; copper manufactures, \$86,225,291; breadstuffs, \$107,732,910; iron and steel, \$134,727,921; and unmanufactured cotton, \$379,965,014. In the decade from 1890 to 1900 the agricultural products of the United States increased 25 per cent.; mining products, 51 per cent.; and manufactures, 198 per cent. This material enlargement of production is the best explanation for an increasing trade, though there has been a noticeable effect commercially by the tariff laws of France, Germany, and other countries competing with the United States in the commerce of the world.

TRANSPORTATION. The transportation facilities

surpass those of any of the leading nations. Besides its 24,500 miles of navigable rivers and interior and coastal waters, the country has the most extensive network of railroads in the world. Numerous canals are maintained to facilitate transportation. The canals utilized most extensively are the Welland Canal (Canadian), around the Falls of Niagara; the Erie Canal, connecting the Hudson and Lake Erie; the Chicago Drainage Canal, extending from Lake Michigan at Chicago; the Saint Mary's Canal, at Sault Sainte Marie, Michigan; and the Miami

suburban and interurban lines, the latter conveying passengers, mail, express, and freight.

The highways of the United States are not constructed and maintained by the national government, though formerly some roads of this class received attention. Among these was the Cumberland Road, a national highway from Maryland to Illinois. At present the maintenance of highways is a local enterprise, chiefly by townships and in other cases by counties. Generally the roads are well platted and worked by grading, but they are not improved as ex-



Map to show the Relative Population of the States in 1900. Six States—that is, Illinois, Missouri, New York, Ohio, Pennsylvania, and Texas—had over 3,000,000 Inhabitants. These States and Massachusetts, making a total of Seven States, had over 3,000,000 Inhabitants in 1910.

Canal, in Ohio. At present the railroad lines are given at about 230,500 miles, many of them double-track, making sufficient mileage to encircle the earth about nine times. It is estimated that one passenger is injured to 175,000 carried on the railways and one killed to every 2,267,250 passengers conveyed. The capital stock of all railroads is \$8,276,524,380; the gross earnings, \$2,590,550,000; and the net earnings, \$449,080,203. Electric railways are in operation in all the cities with a population of about 10,000 or more. These are generally connected with

tensively by macadam as is the case in Europe. In some sections, especially where the soil is rich and the rainfall is large, the roads get quite muddy and in a bad condition during the rainy season. Communication by telephone and telegraph is general throughout the country, and telephone lines are utilized extensively even in many sparsely settled districts. Express lines are operated generally in connection with railways and steamboat transportation, while the postal system is managed by the government. Practically all the cities with a population of 8,000

have free delivery and rural free delivery routes are maintained in the more densely settled country districts, though this branch of the postal system is not as well represented as in European countries.

POPULATION. The census of 1900 accorded the United States, including Alaska, a population of 76,303,387. This embraced a total colored population of 9,312,585, or 12.2 per cent., of which 85,986 were Japanese; 119,050, Chinese; 266,760, Indians; and 8,840,789, Negroes. The colonial possessions had a population of 8,972,655, thus giving the nation a total population of 85,276,042. In 1910, according to the Federal census, the United States, exclusive of Alaska and the colonies, had a population of 91,972,266. Washington, D. C., on the Potomac River, is the capital. In 1910, fifty cities had a population over 100,000, as is shown in the table below:

CITY.	STATE.	POPULATION.
New York.....	N. Y.....	4,766,883
Chicago.....	Ill.....	2,185,283
Philadelphia.....	Pa.....	1,549,008
Saint Louis.....	Mo.....	687,029
Boston.....	Mass.....	670,585
Cleveland.....	O.....	560,663
Baltimore.....	Md.....	558,485
Pittsburg.....	Pa.....	533,905
Detroit.....	Mich.....	465,766
Buffalo.....	N. Y.....	423,715
San Francisco.....	Cal.....	416,912
Milwaukee.....	Wis.....	373,857
Cincinnati.....	O.....	364,463
Newark.....	N. J.....	347,469
New Orleans.....	La.....	339,075
Washington.....	D. C.....	331,069
Los Angeles.....	Cal.....	319,198
Minneapolis.....	Minn.....	301,408
Jersey City.....	N. J.....	267,779
Kansas City.....	Mo.....	248,381
Seattle.....	Wash.....	237,194
Indianapolis.....	Ind.....	233,650
Providence.....	R. I.....	222,326
Louisville.....	Ky.....	223,928
Rochester.....	N. Y.....	218,149
Saint Paul.....	Minn.....	214,744
Denver.....	Colo.....	213,381
Portland.....	Ore.....	207,214
Columbus.....	O.....	181,548
Toledo.....	O.....	168,497
Atlanta.....	Ga.....	154,839
Oakland.....	Cal.....	150,174
Worcester.....	Mass.....	145,986
Syracuse.....	N. Y.....	137,249
New Haven.....	Conn.....	133,605
Birmingham.....	Ala.....	132,685
Memphis.....	Tenn.....	131,105
Scranton.....	Pa.....	129,867
Richmond.....	Va.....	127,628
Paterson.....	N. J.....	125,600
Omaha.....	Neb.....	124,096
Fall River.....	Mass.....	119,295
Dayton.....	O.....	116,577
Grand Rapids.....	Mich.....	112,571
Nashville.....	Tenn.....	110,364
Lowell.....	Mass.....	106,294
Cambridge.....	Mass.....	104,839
Spokane.....	Wash.....	104,402
Bridgeport.....	Conn.....	102,054
Albany.....	N. Y.....	100,253

INCREASE IN POPULATION. At the time of the Revolutionary War about one-fifth of the

people were of foreign birth, but the greatest number of immigrants in any one year came to the country in 1903, when 857,046 foreigners landed at the ports. In that year the largest number of immigrants came from Italy, Russia, Sweden-Norway, Germany, and Ireland. However, the American people are made up largely from the descendents of Germans, English, Irish, Scotch, French, and Scandinavians, in the order named. The immigrants from Western Europe have been numerous throughout the existence of the Republic, but more recently, especially since 1890, large numbers have come from Italy, Poland, Greece, and the Balkan states. At the time of the first census, in 1790, the center of population was 23 miles east of Baltimore, Md. Since then there has been a constant movement toward the West, to which both the people of the United States and Europe have been attracted by larger opportunities in acquiring land and advantages in various industrial enterprises. However, the population of the cities has increased more rapidly than that of the country, and this is true in nearly every decade of national growth. The following table contains the entire population at the time of each national census, together with the urban population:

YEAR.	POPULATION.	POPULATION LIVING IN CITIES.	INHABITANTS OF CITIES IN EACH 100 OF THE TOTAL POPULATION.
1790....	3,929,214	131,472	3.35
1800....	5,308,483	210,873	3.97
1810....	7,239,881	356,920	4.93
1820....	9,633,822	475,135	4.93
1830....	12,866,020	1,864,509	6.72
1840....	17,069,453	1,453,994	8.52
1850....	23,191,876	2,897,586	12.49
1860....	31,443,321	5,072,256	16.13
1870....	38,558,371	8,071,875	20.93
1880....	50,155,783	11,318,547	22.57
1890....	62,622,250	18,284,385	29.20
1900....	76,303,387	24,992,199	32.57
1910....	91,972,266	.....	.....

LANGUAGE. English is the spoken and the official language. In 1900 there were 1,403,212 persons over ten years of age who were unable to speak English, but the number who can use other languages is vastly larger. Those who are unable to use the national language consist principally of Italians, Hebrews, Poles, Chinese, and Indians. Among the leading languages spoken aside from the English are German, French, Italian, Spanish, Polish, Scandinavian, Slovak, and Hebrew. However, the system of State schools maintained everywhere facilitates learning the English very rapidly, especially by the young. Another element contributing to the use of one language is the fact that no large scope of country anywhere is populated exclusively by a single race, but instead all races are quite generally distributed, or are freely in-

termixed. People of British and German descent are found in all sections of the country, while the Scandinavians are confined largely to the Northwest, the Hebrews to the larger cities, the Spanish to the Southwest, the French to Louisiana and some sections of the East, and the Greeks and Italians to the manufacturing and industrial centers. The English spoken differs in accent very noticeably from that of England and is somewhat characterized by local peculiarities, as the distinguishing form of expressions heard in New England and in the South. However, the printed form and the language as taught in the schools are absolutely uniform.

GOVERNMENT. The government of the United States is administered through three distinct and separate branches. These are the legislative, or lawmaking power; the executive, or law-enforcing power; and the judicial, or law-interpreting power. The *legislative* branch is vested in the Congress, which consists of a Senate and House of Representatives; the *executive*, in a President; and the *judicial*, in the Federal courts of law. After the United States secured its independence, from 1778 until 1789, the states were governed by the Articles of Confederation, which provided a government unsatisfactory to the newly formed and developing country. Accordingly the present Constitution was devised and adopted by a constitutional convention that met at Philadelphia, Pa., on May 25, 1787. George Washington was president of the convention and the new Constitution was adopted by that body on Sept. 17, 1787. It went into effect on March 4, 1789. Since then fifteen amendments have been made to the Constitution. The gold dollar, comprised of 100 cents, is the standard monetary unit.

EXECUTIVE DEPARTMENT. The President is the chief executive, and he is succeeded by the Vice President in case of death or removal by impeachment. Both are elected for a term of four years by the people through an electoral college, formed in each State, and composed of electors equaling the number of senators and representatives sent by the State to Congress. The President, who has his residence at the White House in Washington, D. C., receives a salary of \$75,000 a year. His general duties are to execute the laws. Though he is commander in chief of the army and navy of the United States, he does not appear at the head of these departments. He may conclude treaties by and with the consent of the Senate, make nominations and appointments for public offices, inform Congress of the state of the Union by messages, and convoke Congress in special session. While

he may veto measures enacted by Congress, yet a bill may be passed by a two-thirds vote in each house of Congress and become a law without his sanction.

The Vice President is president of the Senate and receives a salary of \$12,000 per year. Both the President and Vice President are eligible to office under the same conditions; namely, that they are born within the jurisdiction of the United States, have attained to the age of 35 years, and have been 14 years resident within the United States. In case both the President and Vice President die or are removed by conviction on impeachment, the cabinet officers succeed to the Presidency in the following order: Secretary of State, of the Treasury, of War, Attorney-General, Postmaster-General, Secretary of the Navy, and Secretary of the Interior.

The presidents of the United States are treated in special articles, but the following is a complete, tabulated list:

NAMES.	ELECTED FROM	PARTY.	DATE OF INAUGURATION.
George Washington...	Va.	Federalist.	April 30, 1789
John Adams.....	Mass.	Federalist.	March 4, 1797
Thomas Jefferson.....	Va.	Democrat.	March 4, 1801
James Madison.....	Va.	Democrat.	March 4, 1809
James Monroe.....	Va.	Democrat.	March 4, 1817
John Quincy Adams. }	Mass.	National-Republican.	March 4, 1825
Andrew Jackson.....	Tenn.	Democrat.	March 4, 1829
Martin Van Buren....	N. Y.	Democrat.	March 4, 1837
Wm. H. Harrison.....	Ohio	Whig.	March 4, 1841
John Tyler.....	Va.	Whig.	April 6, 1841
James K. Polk.....	Tenn.	Democrat.	March 4, 1845
Zachary Taylor.....	La.	Whig.	March 5, 1849
Millard Fillmore.....	N. Y.	Whig.	July 9, 1850
Franklin Pierce.....	N. H.	Democrat.	March 4, 1853
James Buchanan.....	Pa.	Democrat.	March 4, 1857
Abraham Lincoln.....	Ill.	Republican.	March 4, 1861
Andrew Johnson.....	Tenn.	Democrat.	April 15, 1865
Ulysses S. Grant.....	Ill.	Republican.	March 4, 1869
Rutherford B. Hayes..	Ohio.	Republican.	March 5, 1877
James A. Garfield.....	Ohio.	Republican.	March 4, 1881
Chester A. Arthur.....	N. Y.	Republican.	Sept. 20, 1881
Grover Cleveland.....	N. Y.	Democrat.	March 4, 1885
Benjamin Harrison....	Ind.	Republican.	March 4, 1889
Grover Cleveland.....	N. Y.	Democrat.	March 4, 1893
William McKinley....	Ohio	Republican.	March 4, 1897
Theodore Roosevelt....	N. Y.	Republican.	Sept. 14, 1901
William H. Taft.....	Ohio.	Republican.	March 4, 1909

The President is assisted in the discharge of his duties by nine cabinet officers, who are the heads of the different departments of the government. These include secretaries of State, of the Treasury, of War, of the Interior, of the Navy, of Agriculture, of Commerce and Labor, Postmaster-General, and Attorney-General. Among the chief duties of these officials are to advise with the President and make reports to him relative to the state of affairs in their respective departments. Their general duties are discussed under United States, Departments of, which see. The salary is \$12,000 per year and the term of office is dependent upon

the incumbency of the President, who appoints them subject to approval by the Senate.

Below is a complete list of the vice presidents, together with the presidents serving at the same time, and to the right are the years of their birth and death:

VICE-PRESIDENTS.	ELECTED FROM	PRESIDENT.	BORN	DIED.
John Adams.....	Mass.	Washington.	1735	1826
Thomas Jefferson.....	Va.	John Adams.	1743	1826
Aaron Burr.....	N. Y.	Jefferson.	1756	1836
George Clinton.....	N. Y.	Jefferson and Madison.	1739	1812
Elbridge Gerry.....	Mass.	Madison.	1744	1814
Daniel D. Tompkins...	N. Y.	Monroe.	1774	1825
John C. Calhoun.....	S. C.	J. Q. Adams.	1782	1850
Martin Van Buren....	N. Y.	Jackson.	1782	1862
Richard M. Johnson...	Ky.	Van Buren.	1780	1850
John Tyler.....	Va.	Harrison.	1790	1862
George M. Dallas.....	Penn.	Polk.	1792	1864
Millard Fillmore.....	N. Y.	Taylor.	1800	1874
William R. King.....	Ala.	Pierce.	1786	1853
John C. Breckenridge..	Ky.	Buchanan.	1821	1875
Hannibal Hamlin....	Me.	Lincoln.	1809	1891
Andrew Johnson.....	Tenn.	Lincoln.	1808	1875
Schuyler Colfax.....	Ind.	Grant.	1823	1895
Henry Wilson.....	Mass.	Grant.	1812	1875
William A. Wheeler..	N. Y.	Hayes.	1819	1887
Chester A. Arthur.....	N. Y.	Garfield.	1830	1886
Thomas A. Hendricks.	Ind.	Cleveland.	1819	1885
Levi P. Morton.....	N. Y.	Harrison.	1824	
Adlai E. Stevenson...	Ill.	Cleveland.	1835	
Garrett A. Hobart....	N. J.	McKinley.	1844	1899
Theodore Roosevelt...	N. Y.	McKinley.	1858	
Charles W. Fairbanks.	Ind.	Roosevelt.	1852	
James S. Sherman.....	N. Y.	Taft.	1855	

LEGISLATIVE DEPARTMENT. Congress is composed of senators, two of whom are elected by the Legislature of each State, and of representatives, who are chosen by the electors of the several states, the number depending upon the population. At present the Senate is constituted of 92 members and the House of 391 members. This makes the basis of representation in the House 193,291, but each State is entitled to at least one representative. See **Congress.**

JUDICIAL DEPARTMENT. The judicial department of the national government is vested in a Supreme Court, having a chief justice and eight associate justices, and in the circuit courts of appeal, circuit courts of the United States, district courts of the United States, and the supreme court of the District of Columbia. Congress has power to establish and organize all the courts except the Supreme Court, which is established by the Constitution, and the judges of these courts are nominated by the President subject to confirmation by the Senate. The government of each State, like that of the nation, is composed of the three departments, executive, legislative, and judicial, most of the State officers being elective by the people. See **City; County; State.**

ARMY AND NAVY. The military forces of the United States have varied considerably within recent years, owing to the war with Spain and

a number of garrisons that are maintained in the colonies. At present the peace footing, including the colonial troops, is limited to 104,000 men, but the army is constituted of only about 85,000 men and officers. In addition to the national army there is a militia in the different states. All able-bodied men between the ages of 21 and 45 years are liable to military duty in case of emergency. The navy has been materially increased within recent years and now consists of 25,000 men and about 200 vessels. It includes 25 battleships, fifteen protected cruisers, eighteen destroyers, twelve monitors, thirty torpedo boats, fifteen submarines, and a number of vessels of different minor classes. The Krag-Jorgensen rifle has been used largely in the army, but it has been superseded by the Springfield model of 1903. The President is the commander of both the army and the navy. See **United States Military Academy.**

EDUCATION. The educational affairs of the United States are largely under the direction of the several states. In this respect the public schools are quite like the statal system of Germany. Each State has a system of elementary and public high schools. The State institutions of higher learning are maintained by taxation and appropriations under the laws of the respective states. The elementary schools have courses of study in all grades from the kindergarten to the high school, while the high schools are designed to prepare for the higher institutions, and the latter fit for entrance into the university. A superintendent of public instruction or a commissioner of education, assisted by county and city superintendents, has general supervision of the educational affairs of the State. In each State are a number of very excellent private denominational and sectarian colleges, and in many of them universities, supported either wholly or in part by endowments. However, the national government has made liberal appropriations for the support of universities, industrial schools, and institutions disseminating knowledge in agriculture and mechanical arts. The support given by the national government to these institutions includes 75,000,000 acres of the public domain, besides appropriations made by Congress from the public funds. Similar public grants have been made to support a naval and military academy, two institutions of public interest constituting the only ones under direct supervision of the national government.

The Bureau of Education is maintained under the Department of the Interior, of which the Commissioner of Education is the chief officer, whose duty is to diffuse information and gather

statistics. He publishes from time to time reports upon educational questions, makes public addresses, and issues circulars relative to interests connected with public intelligence. The Signal Service Bureau, the Smithsonian Institution, a national observatory; and commissions to make scientific inquiry and historical research are maintained by the nation. Special commissions to make geographical, geological, and naval surveys and explorations are other enterprises supported by the national government. The educational interests are at present in the highest state of development in the regions of the Central West. This is true especially in the rudiments of education and educational arts, while the lowest ebb in public instruction prevails in some of the Southern States, a condition to be expected after the long enslavement of the Negroes. However, the impetus resulting from the long period of prosperity since the Civil War, which extended from 1861 to 1865, is fast displacing the barriers and promulgating intelligence. Attendance upon public schools is alike free to all. A limited compulsory attendance law is on the statute books of most of the states, requiring attendance usually from the age of eight to fourteen years. In a number of the Southern States separate schools are maintained for the children of white and colored families.

LITERATURE. See **American Literature.**

RELIGION. The free exercise of religious belief and worship is guaranteed by the Constitution of the United States and by the constitutions of the individual states. However, it is made obligatory to observe one weekly holiday by refraining from pursuing the ordinary avocations, but individuals are given the right to observe either Sunday or Saturday as the Sabbath. Practically all the religious denominations of the world are represented, the actual church membership being 30,120,000. The proportion of Protestants to Roman Catholics is about four to one. The numerical order of the larger bodies is approximately in the following order: Roman Catholics, Methodists, Baptists, Lutherans, Presbyterians, Disciples of Christ, Episcopalians, Congregationalists, Latter Day Saints, German Reformed, United Brethren, German Evangelical, Jews, Universalists, Friends, Greek Catholics, Christian Scientists, and Spiritualists. Many institutions of secondary and higher learning are maintained by the religious bodies.

POLITICAL DIVISIONS. The United States proper consists of 46 states, two territories, and the District of Columbia. Besides these is Alaska, which is organized as a Territory. Many of the State boundary lines are formed by

rivers, lakes, and other natural lines of demarkation. For this reason they are somewhat irregular, only four divisions cornering at the same point, these being Colorado, Utah, Arizona, and New Mexico. Each State is guaranteed a republican form of government by the national Constitution, and is limited in various respects by that fundamental law in its general rights and powers. Below is a complete list of the states in the order in which they came into the Union, the first thirteen named being the original states, hence the date given is that on which the Constitution was ratified. The numbers to the right represent the number of electors to which the states are entitled, which are equal to the two senators and the several representatives sent by the states to the national Congress:

NO.	NAMES OF STATES.	DATES OF RATIFICATION OR ADMISSION.	CAPITALS.	ELECTORS.
1	Delaware.....	Dec. 7, 1787	Dover.....	3
2	Pennsylvania....	Dec. 12, 1787	Harrisburg....	34
3	New Jersey.....	Dec. 18, 1787	Trenton.....	12
4	Georgia.....	Jan. 2, 1788	Atlanta.....	13
5	Connecticut.....	Jan. 9, 1788	Hartford.....	7
6	Massachusetts...	Feb. 6, 1788	Boston.....	16
7	Maryland.....	Apr. 28, 1788	Annapolis.....	8
8	South Carolina..	May 23, 1788	Columbia.....	9
9	New Hampshire..	June 21, 1788	Concord.....	4
10	Virginia.....	June 25, 1788	Richmond.....	12
11	New York.....	Jul. 26, 1788	Albany.....	39
12	North Carolina..	Nov. 21, 1789	Raleigh.....	12
13	Rhode Island....	May 29, 1790	Providence....	4
14	Vermont.....	Mar. 4, 1791	Montpelier....	4
15	Kentucky.....	June 1, 1792	Frankfort.....	13
16	Tennessee.....	June 1, 1796	Nashville.....	12
17	Ohio.....	Feb. 19, 1803	Columbus.....	23
18	Louisiana.....	Apr. 30, 1812	Baton Rouge..	9
19	Indiana.....	Dec. 11, 1816	Indianapolis..	15
20	Mississippi.....	Dec. 10, 1817	Jackson.....	10
21	Illinois.....	Dec. 3, 1818	Springfield....	27
22	Alabama.....	Dec. 14, 1819	Montgomery..	11
23	Maine.....	Mar. 15, 1820	Augusta.....	6
24	Missouri.....	Aug. 10, 1821	Jefferson City.	18
25	Arkansas.....	June 15, 1836	Little Rock...	9
26	Michigan.....	Jan. 26, 1837	Lansing.....	14
27	Florida.....	Mar. 3, 1845	Tallahassee...	5
28	Texas.....	Dec. 29, 1845	Austin.....	18
29	Iowa.....	Dec. 28, 1846	Des Moines....	13
30	Wisconsin.....	May 29, 1848	Madison.....	13
31	California.....	Sept. 9, 1850	Sacramento....	10
32	Minnesota.....	May 11, 1858	Saint Paul....	11
33	Oregon.....	Feb. 14, 1859	Salem.....	4
34	Kansas.....	Jan. 29, 1861	Topeka.....	10
35	West Virginia...	Jun. 19, 1863	Charleston....	7
36	Nevada.....	Oct. 31, 1864	Carson City...	3
37	Nebraska.....	Mar. 1, 1867	Lincoln.....	8
38	Colorado.....	Aug. 1, 1876	Denver.....	5
39	North Dakota...	Nov. 2, 1889	Bismarck.....	4
40	South Dakota....	Nov. 2, 1889	Pierre.....	4
41	Montana.....	Nov. 8, 1889	Helena.....	3
42	Washington.....	Nov. 11, 1889	Olympia.....	5
43	Idaho.....	Jul. 3, 1890	Boise City....	3
44	Wyoming.....	Jul. 10, 1890	Cheyenne....	3
45	Utah.....	Jan. 4, 1896	Salt Lake City	3
46	Oklahoma.....	Nov. 16, 1907	Guthrie.....	7
47	Arizona.....	June 16, 1910	Phoenix.....	....
48	New Mexico....	June 16, 1910	Santa Fé.....	....

Alaska, purchased of Russia in 1867 and organized as a territorial government in 1884,

is a Territory. It has a delegate representative to Congress, who may speak upon questions, but is not allowed a vote in that body. The government is administered in the territories by a Territorial Legislature chosen by popular vote, but the Governor is nominated by the President, subject to approval by the Senate. Congress has direct charge of the District of Columbia, and those residing within its boundary are not privileged to take part in the national elections. The colonies are governed similarly to the territories and have local privileges as to the management of affairs pertaining to education, internal improvements, and other matters of local interest. The states and the surveyed portions of territories are divided into counties, usually consisting of sixteen townships, and each township consisting of 36 sections. A section of land comprises 640 acres, which is again subdivided into quarters or smaller divisions. Congress has power to admit new states formed from territory of the United States. The admission of a Territory as a State is dependent mainly upon its population and apparent ability to support a State government and maintain its authority.

HISTORY. The history of the United States in a wider sense dates from the discovery of America by Christopher Columbus, who set foot upon land in the new world on Oct. 12, 1492. However, it is reasonable to assume that earlier discoveries were made by Norsemen and Scandinavians. Eric the Red, a Norseman, is thought to have discovered Greenland in 985. Lief Ericson, son of Eric the Red, sailed from Norway to Iceland in 1000 and the following year came to the northeastern coast of North America. These discoveries are mentioned in the Sagas, but little accurate knowledge can be obtained of them, aside from the fact that America was visited by these navigators, though their discoveries and explorations bore no material fruit. Owing to this, it is safe to assume that American history dates from 1492, though Columbus did not visit the mainland of North America. Sebastian Cabot, an English explorer, cruised along the northeastern coast of North America in 1498, exploring it from Virginia to Labrador. Ponce de León landed near Saint Augustine, Fla., in 1513, and penetrated inland in search of a fountain that had the power to confer perpetual youth upon those who would partake of its water.

COLONIZATION. The first settlements within the region now included in the United States were made by the Spaniards. They built forts and founded colonies at Saint Augustine in 1565, and at Santa Fé, N. M., in 1605. The earliest permanent English settlement was made at James-

town, Va., in 1607, under the direction of the London Company. Soon after, in 1613, the Dutch settled at New York, then called the New Netherlands, and the Massachusetts Colony at Plymouth was established in 1620. French explorers penetrated to the region of the Great Lakes and the Mississippi, the latter being explored by La Salle in 1682. Permanent settlements were made soon after at Kaskaskia, Ill., and Mobile, Ala. The Swedes had colonies on the Delaware and Hudson, but they were deprived of their lands by the Dutch in 1655, when they were compelled to surrender to an army sent from New Amsterdam, now New York City.

Subsequently the English and Dutch became involved in boundary disputes, giving rise to serious trouble between the two claimants, and the Duke of York, in 1664, captured the Dutch possessions, annexing them to those of the English. This resulted in the claims to territory in America being limited to the English, Spanish, and French. The Spanish settlements were confined to the southeastern part; the French settlements extended to the northeastern region and the territory contiguous to the Great Lakes and the Mississippi; while the English claims extended from Florida to Nova Scotia. Steadily the English extended their settlements toward the interior, pressing before them the Indians and confining the Spanish and French to narrower limits. However, the English colonies were not united by any ties of material effect until 1688, when settled and uniform relations were established.

The Treaty of Utrecht, in 1713, gave a monopoly of the slave trade to England, which, since the reign of Elizabeth, had imported slaves from Africa into the colonies of America and the West Indies. It likewise gave England possession of Acadia, which long had been an object of contention with the French. King George's War, known in Europe as the War of the Austrian Succession, witnessed the loss of Louisburg to the French, but the Treaty of Aix-la-Chapelle ceded it back to France. The French and Indian War was the next contest for supremacy. The English under Braddock sustained a defeat at Fort Duquesne in 1755, but the tide of war turned in their favor, and General Wolfe with an English army defeated the French under General Montcalm in a decisive battle on the Plains of Abraham, near Quebec, on Sept. 13, 1759. Both generals fell in the battle, but it was the engagement that lost Canada and the Atlantic coast to the French. As a result France ceded all the lands east of the Mississippi to England, thus giving that country possession of

all the eastern part of North America north of Florida and Louisiana.

The table below gives an alphabetical list of the states, together with their area in square miles and population in 1910:

NO.	NAME.	SQUARE MILES.	POPULATION, 1910.
1	Alabama.....	52,250	2,138,093
2	Arizona.....	113,020	204,354
3	Arkansas.....	53,850	1,574,449
4	California.....	158,360	2,377,549
5	Colorado.....	103,925	799,024
6	Connecticut.....	4,990	1,114,756
7	Delaware.....	2,050	202,322
8	Florida.....	58,680	752,619
9	Georgia.....	59,475	2,609,121
10	Idaho.....	84,800	325,594
11	Illinois.....	56,650	5,638,591
12	Indiana.....	36,350	2,700,876
13	Iowa.....	56,025	2,224,771
14	Kansas.....	82,080	1,690,949
15	Kentucky.....	40,400	2,289,905
16	Louisiana.....	48,720	1,656,388
17	Maine.....	33,040	742,371
18	Maryland.....	12,210	1,295,346
19	Massachusetts.....	8,315	3,366,416
20	Michigan.....	58,915	2,810,173
21	Minnesota.....	83,365	2,075,708
22	Mississippi.....	46,810	1,797,114
23	Missouri.....	69,415	3,293,335
24	Montana.....	146,080	376,053
25	Nebraska.....	77,510	1,192,214
26	Nevada.....	110,700	81,875
27	New Hampshire.....	9,305	430,572
28	New Jersey.....	7,815	2,537,167
29	New Mexico.....	122,580	327,301
30	New York.....	49,170	9,113,614
31	North Carolina.....	52,250	2,206,287
32	North Dakota.....	70,795	577,056
33	Ohio.....	41,060	4,767,121
34	Oklahoma.....	70,057	1,657,155
35	Oregon.....	96,030	672,765
36	Pennsylvania.....	45,215	7,665,111
37	Rhode Island.....	1,250	542,610
38	South Carolina.....	30,570	1,515,400
39	South Dakota.....	77,650	583,888
40	Tennessee.....	42,050	2,184,789
41	Texas.....	265,780	3,896,542
42	Utah.....	84,970	373,351
43	Vermont.....	9,565	355,956
44	Virginia.....	42,450	2,061,612
45	Washington.....	69,180	1,141,990
46	West Virginia.....	24,780	1,221,119
47	Wisconsin.....	56,040	2,333,860
48	Wyoming.....	97,890	145,965

COLONIAL GOVERNMENT. The English possessions of North America, which are at present included in the United States, were divided into thirteen colonies, each coinciding more or less with the states now bearing their names. These colonies were Delaware, Pennsylvania, Georgia, New Jersey, Massachusetts, Connecticut, South Carolina, Maryland, Virginia, North Carolina, New York, Rhode Island, and New Hampshire. The government of the colonies was administered by England through a resident governor and other officers appointed by the crown. However, the government was administered under the general theory that the colonies belong to the mother country as a matter of right and may exercise no commercial or political right, except such as may be granted to them by the home government. This theory,

although it was accepted by the leading nations at that time, was the occasion of much contention in America, where the sturdy pioneers began to assert a spirit of unrest and revolution. Finally, being burdened by excessive taxation, which the English levied to aid in defraying the expenses of the war with the French, the colonies gradually became dissatisfied and began to organize for establishing an independent government.

REVOLUTIONARY WAR. When the colonists resisted the policy of the home government, they were met by retaliatory measures, such as were designed to compel obedience to the laws. These hastened the events that caused the Revolutionary War. A number of garrisons were established in the meantime by the British and the colonists were taxed to support them. Other causes of the Revolution included the Importation Act of 1733, the Writs of Assistance in 1761, and the Stamp Act of 1765. These led to the Tea Party, the Boston Massacre, and an order issued to General Gage commanding that force should be used in subduing the colonists. Petitions for redress were sent in vain to George III. and on Sept. 5, 1774, the First Continental Congress met in Philadelphia. This assemblage made a declaration of rights, but the British Parliament obstinately refused to make concessions.

The first hostilities between the continentals and the British regulars broke out on April 19, 1775, at Lexington, and soon after the colonists were defeated at Bunker Hill. On May 10, 1775, the Second Continental Congress convened at Philadelphia and made provisions for securing the united action of the colonies. It again petitioned the king and British people for redress, but provided for actual war and selected George Washington as commander in chief for the defense of American liberty. The Declaration of Independence was adopted by a unanimous vote on July 4, 1776, and that document named the country the United States of America. Most of the seaport cities were captured by the British, but the Americans held the interior and recaptured some of the cities. The first decisive battle and the one which is considered the turning point of the war occurred at Saratoga, Oct. 17, 1777, when General Burgoyne surrendered with a large army to General Gates.

The colonists were assisted by a number of French, German, and Polish officers, and French troops came to their assistance. Cornwallis was pressed by Washington and Lafayette and finally surrendered at Yorktown on Oct. 19, 1781, thus ending the war. Peace was concluded in November, 1782, and the final treaty of peace was

signed at Versailles, France, on Sept. 3, 1783, by which Great Britain formally acknowledged the independence of the United States. Counting from the Battle of Lexington to the official proclamation of the cessation of hostilities, in 1783, the Revolutionary War extended over a period of eight years. The American troops engaged in the Revolution included 232,000 regular soldiers and 55,500 militia, while the British had an army of 115,000 men and officers and a navy of 22,500 men. About 5,000 French soldiers fought on the American side, and further assistance was given to the colonists by an alliance between Spain and France against England. The British had a navy of 130 vessels and many transports, while the Americans had only seventeen vessels at the beginning of the war. However, Paul Jones and other privateers captured a number of British vessels and almost destroyed the British commerce.

INDEPENDENT GOVERNMENT. As soon as the colonies obtained an independent government they turned their attention to organizing civil institutions and developing internal resources. The Articles of Confederation, adopted in 1777, soon proved unsatisfactory and movements were organized for obtaining a more stable plan of government. In 1787 the Constitution was prepared, which went into effect March 4, 1789. The preamble to that document declares its object, and is as follows: "We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America." The first Congress under the Constitution met April 6, 1789, and on April 30 of the same year George Washington and John Adams were inaugurated as President and Vice President. England, humiliated by defeat in America, continued to display a spirit of hostility. That country claimed the right of searching American ships and impressing into the British service persons who had formerly been British subjects.

WAR OF 1812. A second war between the two countries was formally declared by the United States on June 18, 1812, but the Americans had already captured a large number of British ships and sailors. It is generally spoken of in history as the War of 1812. The vessels of the Americans were superior to those of their opponents and destroyed the maritime supremacy of Great Britain within a year. Two unsuccessful invasions of Canada, in 1812, were followed by a successful invasion under Generals Ripley and

Scott in 1814, who captured Chippewa and administered a partial defeat to the British at Lundy's Lane. The British attempted an invasion by way of Lake Champlain, but they were defeated. However, they successfully ascended Chesapeake Bay, defeated the Americans at Bladensburg, and on Aug. 24, 1814, captured Washington. Greater success crowned the Americans in the naval contest, especially on the Great Lakes, where Commodore Perry destroyed a British fleet and captured 63 guns. The war ended by the Treaty of Ghent, signed on Dec. 24, 1814, but the last battle occurred on Jan. 8, 1815, at New Orleans, where General Jackson defeated the British under General Pakenham. That battle was a severe loss to the British and was fought before any information of the peace treaty reached the United States.

MEXICAN WAR. The war with Mexico was the next military contest to engage the United States. It was caused partly by the United States annexing Texas in 1845 and partly by a boundary dispute between Mexico and the new territory. Texas had previously been a part of Mexico, but had been organized as an independent republic, and a Mexican army crossed the Rio Grande on April 26, 1845, to maintain Mexican authority. The Mexicans were met by an American army under General Taylor, who displayed much vigor in their pursuit, defeating them at Palo Alto, Monterey, and Saltillo, and finally subduing them at Buena Vista on Feb. 23, 1847. Another army under Scott landed at Vera Cruz, which was captured March 29, 1847, and the American army rapidly pushed forward to Contreras, Churubusco, and the City of Mexico, which was captured on Sept. 14, 1847. The treaty of peace, signed Feb. 2, 1848, made the Rio Grande the boundary, and ceded New Mexico and California to the United States.

SLAVERY. Early in the history of the country the feeling between the political parties was more or less pronounced, at first between the Federalists and the Anti-Federalists, and later between the former and the more vigorous Democratic party. However, the successful administration of James Madison removed many questions from controversy and gave rise to the *Era of Good Feeling*. Later the rise of the Whig party again divided the people into two great political organizations and forced many issues of commerce, transportation, finance, and internal improvement to the front.

In the meantime the feeling became intense on the question of slavery extension. In the Northern States, where slavery was both unpopular

and unprofitable, the sentiment against its extension, and even retention, was decidedly strong, while the Southern States advocated the enlargement of the slave-holding territory with the view of maintaining the balance of political power. Slavery had been introduced as early as 1619, when a Dutch vessel brought the first slaves to the colonies, and the slave trade from African ports was long an important source of revenue. The traffic in slaves had been abolished in the United States in 1808, but the question at issue was whether to maintain slavery in the states where it was already recognized as an institution and to extend it to new territories. The acquisition of California and New Mexico intensified the contest, since the Northern States were pronounced in their opposition to making the new territory a slave-holding region.

CIVIL WAR. The Civil War, extending from 1861 to 1865, finally spread like a vast cloud over the land. It may be assigned to various causes. Prominent among them were the extension of slavery, differences in industrial interests, and a lack of intercourse between the people of the North and the South. John Brown's raid on Harper's Ferry in 1859 had already caused great excitement throughout the Union, which was further intensified by local war in Kansas and the election of Abraham Lincoln to the Presidency. Eleven of the Southern States promptly seceded from the Union and established the Confederate States of America (q. v.). Jefferson Davis, of Mississippi, was elected President and Alexander H. Stephens, of Georgia, became Vice President of the new government. The southern authorities immediately prepared for war by seizing valuable stores and blockading Fort Sumter, in Charleston harbor. President Lincoln declared in his inaugural address, March 4, 1861, that the Southern States were afforded no ground for apprehending any invasions of their rights by the election of a Republican administration and took immediate steps to maintain the Union. The first shot of the war was fired against the granite walls of Fort Sumter on April 12, 1861, and two days later the commanding officer, Major Anderson, surrendered to General Beauregard, but he was permitted to sail with his garrison to New York.

The armed contest for the maintenance of the Union is one of the most sanguinary in the history of the world. President Lincoln issued a proclamation on April 15, 1861, calling for 75,000 men for three months. It was the general opinion that the war would be of short duration, but the people of the Southern States responded to the call to arms with characteristic alacrity and

fought with remarkable bravery, thus extending the contest about four years. The number of men enrolled in the Union army at different times included 2,775,500, while the army was largest on May 1, 1865, when it consisted of 1,000,516 men. The Confederate troops numbered 692,000. It is estimated that the total number of deaths exceeded 512,000, of which 318,000 belonged to the Federal army. The losses of both Federal and Confederate soldiers in the greatest battles were as follows: Shiloh, 27,000; Chancellorsville, 31,000; Stone River, 37,000; Antietam, 38,000; Gettysburg, 53,000; McClellan's peninsular campaign, 50,000; Sherman's campaign, 125,000; and Grant's peninsular campaign, 180,000. The war closed with the surrender of General Lee at Appomattox, Va., April 9, 1865. On Jan. 1, 1863, President Lincoln issued the emancipation proclamation to free the slaves. Other incidents of interest in the war include the unfriendly spirit shown by England to the success of the Union cause, the loss of hundreds of merchantmen and other vessels, and the construction and successful use of the *Monitor*. The war paralyzed the industries of the Southern States and caused the national debt to reach \$2,756,431,571 on Aug. 1, 1865, which was its highest point.

RECONSTRUCTION. President Lincoln and Congress anticipated the problems involved in bringing the seceded states back into the Union and establishing responsible and loyal governments in the same. In fact reconstruction began to be discussed as early as 1863, although the period involved in this feature of the Civil War properly extends from the close of the conflict of arms in 1865 until the withdrawal of the Federal troops from the Southern States in 1877. Lincoln having been assassinated, in 1865, the Vice President, Andrew Johnson, became the chief executive. The latter adopted the lenient policy of Lincoln in the issues of reconstruction, but new questions arose and at length estranged him from a majority in Congress. Accordingly he was impeached and subjected to an extended trial before the Senate, where a single vote saved him from conviction. Congress in the meantime proposed the Thirteenth Amendment to the Constitution, abolishing slavery, which was ratified by the requisite number of states in December, 1865. In the same year both houses of Congress proposed the Fourteenth Amendment, which, after much discussion, was ratified in July, 1868. This provides that all persons born or naturalized in the United States, and subject to the jurisdiction thereof, shall be deemed to be citizens of the United States and the State where they reside. Congress

finally passed the Tenure of Office Bill, over the veto of the President, as a restriction to limit the chief executive in his power of removal from office. However, the President removed Stanton as Secretary of War and appointed Lorenzo Thomas in his stead, considering that Congress had invaded the constitutional rights of the President. This was the direct cause of the impeachment proceedings. Other features of the period include the carpetbaggers' (q. v.) government in the South, the Ku Klux Klan (q. v.), and the building of the Pacific railroads. The eleven states which had seceded were readmitted to the Union as follows: Tennessee in 1866; Alabama, Arkansas, Florida, Georgia, Louisiana, North Carolina, and South Carolina in 1868; and Mississippi, Texas, and Virginia in 1870. In 1877, in the administration of President Hayes, the remaining troops were withdrawn from the South.

NATIONAL DEVELOPMENT. The subsequent history of the United States records remarkable growth in population and wealth. It is an epoch of development in industries and educational enterprises. Not only were the seceded states reconstructed as members of the Union, but all feeling of sectionalism has passed away. It has witnessed greater commercial and social intercourse between the two sections than were maintained at any other time in the history of the country, which has resulted in welding enduring ties of sympathy and sentiment.

SPANISH-AMERICAN WAR. No military contest occurred in the period from 1865 until the beginning of the Spanish-American War, in 1898. This war was the outgrowth of Spanish oppression in Cuba and Porto Rico, where a war for independence had been waged for many years. Naturally sympathetic for the people struggling for independence, the Americans were greatly aroused by the destruction of the battleship *Maine* with its crew of 262 men, in Havana harbor, by a torpedo mine, on Feb. 15, 1898. Congress passed a bill on April 25 declaring that a state of war existed between the United States and Spain and that it had so existed since and including April 21.

The first shot of the Spanish-American war was fired on April 22 by the gunboat *Nashville*, which captured the Spanish ship *Buenaventura* off the coast of Florida. It may be said that the short and decisive contest was one of battleships, in which the United States demonstrated remarkable efficiency as a naval power. Commodore Dewey destroyed the Spanish fleet in Manila Bay, in the Philippines, and Commodore Schley located the most powerful fleet of Spain, that under command of Admiral Cervera, in

Santiago harbor. The latter was blockaded by the American ships off the harbor entrance, including the *Iowa*, *New York*, *Brooklyn*, *Indiana*, *Oregon*, *Texas*, *Marblehead*, and *New Orleans*. Admiral Cervera made a well-directed effort to escape from the harbor into the open sea, but the Americans under the direct command of Commodore Schley, the commanding officer, Commodore Sampson, being temporarily absent, captured or destroyed every Spanish vessel. Among the battles fought by the army are those under General Lawton at El Caney, Cuba, on July 1, and that of San Juan Hill on the same date under General Wheeler and General Hawkins, the whole expedition being commanded by General Shafter. These battles compelled the capitulation of the Spanish army under General Toral at Santiago, which was surrendered on July 17. Peace was concluded by the Treaty of Paris on Dec. 10, 1898, which ceded Porto Rico and the Philippines to the United States and recognized the right of Cuba to establish an independent government, the United States paying Spain \$20,000,000 in consideration of the latter country relinquishing its claims to the Philippines.

PHILIPPINE INSURRECTION. A large party in the Philippines being hostile to American annexation, an independent government was established by the insurgent Filipinos on June 12, 1898, of which Aguinaldo was made president. The Philippine republic was proclaimed three weeks later and a general address was issued, which consisted in part of an appeal to the European powers for official recognition. Hostilities between the American troops under General Otis and the insurgents became active and a desultory guerrilla warfare was inaugurated by the Filipinos. At the close of 1899 the United States had 2,051 officers and 63,483 men in the service against the insurgents. With this force it was possible to clear central Luzón of effective Filipino soldiery and the islands toward the south were occupied with more or less dispatch. Major General Lawton was killed in action in December, 1899, and subsequently severe skirmishes occurred in Luzón and Mindanao. Maj. Gen. Arthur McArthur was made commander in chief of the Philippines in 1900, and on May 5 of that year published an amnesty proclamation to affect those surrendering to the United States authority. However, hostilities of more or less importance continued until March 23, 1901, when Aguinaldo was captured by a detachment of the United States army under Gen. Frederick Funston. It may be said that this capture ended armed opposition in the archipelago. For the political history see the



TERRITORIAL GROWTH
 OF THE
UNITED STATES
 Since 1770

SCALE OF MILES.
 0 100 200 300 400

article on POLITICAL PARTIES IN THE UNITED STATES.

TERRITORIAL EXPANSION. The territorial growth of the United States has been constant, the nation emerging from all its military contests with signal success. At the time of the peace treaty that concluded the war of independence, in 1783, the territorial expanse was 827,844 square miles. Thomas Jefferson negotiated the Louisiana Purchase in 1803, thus adding 1,171,931 square miles. Florida was purchased of Spain in 1819, the region ceded under this purchase containing 59,368 square miles. With the annexation of Texas, in 1845, 376,133 square miles were added, and the Mexican cession of 1848 increased the national domain by 545,783 square miles. The Gadsden Purchase, a tract of land lying south of the Gila River, was secured from Mexico in 1853 in consideration of \$10,000,000. It embraces an area of 45,535 square miles. Alaska, containing 590,884 square miles, was purchased of Russia in 1867 for \$7,200,000.

COLONIES. The chief colonial possessions of the United States are Porto Rico, Hawaii, and the Philippines, all of which are treated in special articles, which see.

Guam, the largest of the Ladrone Islands, was ceded to the United States by the treaty at Paris in 1898. It is located 900 miles from Manila and 5,200 miles from San Francisco. It has an area of 150 square miles. Spanish is the prevailing language. The inhabitants are mostly immigrants from the Philippines, and the rate of illiteracy is placed at ten per cent. Tropical fruits, sugar cane, and rice are the chief products.

Wake Island, a small tract of land lying on the route between Hawaii and Japan, about 2,000 miles from the former and 3,000 miles from the latter, was claimed for the United States by Commander Taussig, of the *Bennington*, in 1899. With it are included a number of small islands of rocky or coral reef formation and the larger part is uninhabited.

Tutuila, one of the Samoan Islands, was ceded to the United States in 1899 in a treaty concluded with Germany and Great Britain. It has an area of 54 square miles and a population of 5,800 inhabitants. Pago-Pago, the chief town, is considered the most valuable island harbor in the entire Pacific ocean. This harbor could hold the entire naval force of the United States. The coaling station, being surrounded by high bluffs, is safe from shells thrown from the outside. Being located on a direct line from San Francisco to Australia and about 2,200 miles from Hawaii, the possession is of value commercially as a station.

In 1904 a tract of land was acquired from the republic of Panama, known as the Panama Canal Zone. This grant was made in perpetuity for the construction and maintenance of the Panama Canal and extends from the Caribbean Sea to the Pacific Ocean. It includes a total of 474 square miles, embracing the small islands in the Bay of Panama, known as Culebra, Flamingo, Nacs, and Perico, and such other land outside of the zone which may be necessary for the operation and protection of said canal.

WORLD POWER. The birth of the United States may be said to date from the discovery of Columbus in 1492. Although more than 100 years elapsed from that time until the permanent settlements were established along the coast of the Atlantic, the few scattered settlements soon grew to become thirteen regularly constituted colonies. This is the simple story of the early and primitive communities that have since developed into a nation of forty-six states, several territories, and a group of colonial possessions, constituting at present one of the foremost political and industrial powers of the world. The lofty principles which underlie the government and the notable achievements in the history of the nation are proof that the country has in store still greater achievements for the future. No better display of national intelligence was ever made than that exhibited in the World's Columbian Exposition at Chicago in 1893, the Louisiana Purchase Exposition at Saint Louis, in 1904, and a number of smaller but notable exhibitions of more recent dates. The nation stands among the foremost in wealth, in educational achievements, in commercial enterprise, and in industrial development. These and many other factors, such as the building of the Panama Canal and its attainments in diplomacy, are factors that make the country noted as a world power.

UNITED STATES, Constitution of the, the basic or fundamental law of the United States of America. It is the organic law that unites the states and binds them into a perpetual Union. All the laws of the nation and of the several states are subordinate to the Constitution of the United States, and any law made by a legislative body within its jurisdiction must be in accord with the basic law, otherwise it is void and inoperative. The Constitution is preceded by the preamble and consists of seven original articles and fifteen articles of amendment. It was adopted on Sept. 17, 1787, by a constitutional convention held in Independence Hall, Philadelphia, and went into effect on March 4, 1789. The full text is as follows:

CONSTITUTION OF THE UNITED STATES.

We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America.

ARTICLE I.

SECTION 1.—All legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

SEC. 2.—The House of Representatives shall be composed of members chosen every second year by the people of the several states, and electors in each State shall have the qualifications requisite for electors of the most numerous branch of the State Legislature.

No person shall be a representative who shall not have attained the age of twenty-five years, and been seven years a citizen of the United States, and who shall not, when elected, be an inhabitant of that state in which he shall be chosen.

Representatives and direct taxes shall be apportioned among the several states which may be included within this Union, according to their respective numbers, which shall be determined by adding to the whole number of free persons, including those bound to service for a term of years, and excluding Indians not taxed, three-fifths of all other persons. The actual enumeration shall be made within three years after the first meeting of the Congress of the United States, and within every subsequent term of ten years, in such manner as they shall by law direct. The number of representatives shall not exceed one for every thirty thousand; but each State shall have at least one representative; and until such enumeration shall be made, the state of New Hampshire shall be entitled to choose three, Massachusetts, eight, Rhode Island and Providence Plantations, one, Connecticut, five, New York, six, New Jersey, four, Pennsylvania, eight, Delaware, one, Maryland, six, Virginia, ten, North Carolina, five, South Carolina, five, and Georgia, three.

When vacancies happen in the representation from any State, the executive authority thereof shall issue writs of election to fill such vacancies.

The House of Representatives shall choose their speaker and other officers; and shall have the sole power of impeachment.

SEC. 3.—The Senate of the United States shall

be composed of two senators from each State, chosen by the Legislature thereof, for six years; and each Senator shall have one vote.

Immediately after they shall be assembled in consequence of the first election, they shall be divided, as equally as may be, into three classes. The seats of the senators of the first class shall be vacated at the expiration of the second year, of the second class, at the expiration of the fourth year, and of the third class, at the expiration of the sixth year, so that one-third may be chosen every second year; and if vacancies happen, by resignation or otherwise, during the recess of the Legislature of any State, the executive thereof may make temporary appointments until the next meeting of the Legislature, which shall then fill such vacancies.

No person shall be a Senator who shall not have attained to the age of thirty years, and been nine years a citizen of the United States, and who shall not, when elected, be an inhabitant of that State for which he shall be chosen.

The Vice President of the United States shall be President of the Senate, but shall have no vote unless they be equally divided.

The Senate shall choose their other officers, and also a president *pro tempore*, in the absence of the Vice President, or when he shall exercise the office as President of the United States.

The Senate shall have the sole power to try all impeachments. When sitting for that purpose, they shall be on oath or affirmation.

When the President of the United States is tried, the Chief Justice shall preside; and no person shall be convicted without the concurrence of two-thirds of the members present.

Judgment, in cases of impeachment, shall not extend further than to removal from office, and disqualification to hold and enjoy any office of honor, trust, or profit under the United States; but the party convicted shall, nevertheless, be liable and subject to indictment, trial, judgment, and punishment, according to law.

SEC. 4.—The times, places, and manner of holding elections for senators and representatives shall be prescribed in each State by the Legislature thereof; but the Congress may, at any time, by law, make or alter such regulations, except as to the places of choosing senators.

The Congress shall assemble at least once in every year; and such meeting shall be on the first Monday in December, unless they shall by law appoint a different day.

SEC. 5.—Each house shall be the judge of the elections, returns, and qualifications of its own members; and a majority of each shall constitute a quorum to do business; but a smaller number may adjourn from day to day, and may

be authorized to compel the attendance of absent members, in such manner and under such penalties as each house may provide.

Each house may determine the rules of its proceedings, punish its members for disorderly behavior, and, with the concurrence of two-thirds, expel a member.

Each house shall keep a journal of its proceedings, and from time to time publish the same, excepting such parts as may in their judgment require secrecy; and the yeas and nays of the members of either house, on any question, shall, at the desire of one-fifth of those present, be entered on the journal.

Neither house, during the session of Congress, shall, without the consent of the other, adjourn for more than three days, nor to any other place than that in which the two houses shall be sitting.

SEC. 6.—The senators and representatives shall receive a compensation for their services, to be ascertained by law, and paid out of the treasury of the United States. They shall, in all cases except treason, felony, and breach of the peace, be privileged from arrest during their attendance at the session of their respective houses, and in going to and returning from the same; and, for any speech or debate in either house, they shall not be questioned in any other place.

No Senator or Representative shall, during the time for which he was elected, be appointed to any civil office under the authority of the United States which shall have been created, or the emoluments whereof shall have been increased, during such time; and no person holding any office under the United States shall be a member of either house during his continuance in office.

SEC. 7.—All bills for raising revenue shall originate in the House of Representatives; but the Senate may propose or concur with amendments, as on other bills.

Every bill which shall have passed the House of Representatives and the Senate, shall, before it becomes a law, be presented to the President of the United States; if he approve he shall sign it, but if not he shall return it, with his objections, to that house in which it shall have originated, who shall enter the objections at large on their journal, and proceed to reconsider it. If after such reconsideration, two-thirds of that house shall agree to pass the bill, it shall be sent, together with the objections, to the other house, by which it shall likewise be reconsidered, and, if approved by two-thirds of that house, it shall become a law. But in all such cases, the votes of both houses shall

be determined by yeas and nays; and the names of the persons voting for and against the bill shall be entered on the journal of each house respectively. If any bill shall not be returned by the President within ten days (Sundays excepted) after it shall have been presented to him, the same shall be a law in like manner as if he had signed it, unless the Congress by their adjournment prevent its return, in which case it shall not be a law.

Every order, resolution, or vote, to which the concurrence of the Senate and House of Representatives may be necessary (except on a question of adjournment), shall be presented to the President of the United States; and, before the same shall take effect, shall be approved by him, or, being disapproved by him, shall be repassed by two-thirds of the Senate and House of Representatives, according to the rules and limitations prescribed in the case of a bill.

SEC. 8.—The Congress shall have power:—

To lay and collect taxes, duties, imposts, and excises, to pay the debts, and provide for the common defense and general welfare, of the United States; but all duties, imposts, and excises shall be uniform throughout the United States:

To borrow money on the credit of the United States:

To regulate commerce with foreign nations, and among the several states, and with the Indian tribes:

To establish an uniform rule of naturalization, and uniform laws on the subject of bankruptcies throughout the United States:

To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures:

To provide for the punishment of counterfeiting the securities and current coin of the United States:

To establish post offices and post roads:

To promote the progress of science and useful arts, by securing for limited times, to authors and inventors, the exclusive right to their respective writings and discoveries:

To constitute tribunals inferior to the Supreme Court:

To define and punish piracies and felonies committed on the high seas, and offenses against the law of nations:

To declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water:

To raise and support armies; but no appropriation of money to that use shall be for a longer term than two years:

To provide and maintain a navy:

To make rules for the government and regulation of the land and naval forces:

To provide for calling forth the militia to execute the laws of the Union, suppress insurrections, and repel invasions:

To provide for organizing, arming and disciplining the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the states respectively, the appointment of the officers, and the authority of training the militia according to the discipline prescribed by Congress.

To exercise exclusive legislation, in all cases whatsoever, over such district (not exceeding ten miles square) as may, by cession of particular states, and the acceptance of Congress, become the seat of government of the United States, and to exercise like authority over all places purchased by the consent of the Legislature of the State in which the same shall be, for the erection of forts, magazines, arsenals, dockyards, and other needful buildings:—And.

To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the government of the United States, or in any department or office thereof.

SEC. 9.—The migration or importation of such persons as any of the states now existing shall think proper to admit, shall not be prohibited by the Congress prior to the year one thousand eight hundred and eight; but a tax, or duty, may be imposed on such importation, not exceeding ten dollars for each person.

The privilege of the writ of *habeas corpus* shall not be suspended, unless when in cases of rebellion or invasion the public safety may require it.

No bill of attainder or *ex post facto* law shall be passed.

No capitation or other direct tax shall be laid, unless in proportion to the census, or enumeration, hereinbefore directed to be taken.

No tax or duty shall be laid on articles exported from any State. No preference shall be given by any regulation of commerce or revenue to the ports of one State over those of another; nor shall vessels bound to or from one State be obliged to enter, clear, or pay duties, in another.

No money shall be drawn from the treasury but in consequence of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time.

No title of nobility shall be granted by the

United States; and no person holding any office of profit or trust under them shall, without the consent of the Congress, accept of any present, emolument, office or title of any kind whatever, from any king, prince, or foreign state.

SEC. 10.—No state shall enter into any treaty, alliance, or confederation; grant letters of marque and reprisal; coin money; emit bills of credit; make anything but gold and silver coin a tender in payment of debts; pass any bill of attainder, *ex post facto* law, or law impairing the obligations of contracts; or grant any title of nobility.

No State shall, without the consent of the Congress, lay any imposts or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws; and the net produce of all duties and imposts laid by any State on imports or exports, shall be for the use of the treasury of the United States; and all such laws shall be subject to the revision and control of the Congress. No State shall, without the consent of Congress, lay any duty of tonnage, keep troops or ships of war in time of peace, enter into any agreement or compact with another State or with a foreign power, or engage in war, unless actually invaded, or in such imminent danger as will not admit of delay.

ARTICLE II.

SECTION 1.—The executive power shall be vested in a President of the United States of America. He shall hold his office during the term of four years, and together with the Vice President, chosen for the same term, be elected as follows:—

Each State shall appoint, in such manner as the Legislature thereof may direct, a number of electors equal to the whole number of senators and representatives to which the State may be entitled in the Congress; but no Senator or Representative, or person holding an office of trust or profit under the United States, shall be appointed an elector.

The electors shall meet in their respective states, and vote by ballot for two persons, of whom one, at least, shall not be an inhabitant of the same State with themselves. And they shall make a list of all the persons voted for, and of the number of votes for each; which list they shall sign and certify, and transmit sealed to the seat of the government of the United States, directed to the President of the Senate. The President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates; and the votes shall then be counted. The person having

the greatest number of votes shall be the President, if such number be a majority of the whole number of electors appointed; and if there be more than one who have such majority, and have an equal number of votes, then the House of Representatives shall immediately choose, by ballot, one of them for President; and if no person have a majority, then, from the five highest on the list the said house shall, in like manner, choose the President. But, in choosing the President, the votes shall be taken by states; the representation from each State having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the states; and a majority of all the states shall be necessary to a choice. In every case, after the choice of the President, the person having the greatest number of votes of the electors shall be the Vice President. But if there should remain two or more who have equal votes, the Senate shall choose from them, by ballot, the Vice President. (This clause has been superseded by Amendment XII.)

The Congress may determine the time of choosing the electors, and the day on which they shall give their votes; which day shall be the same throughout the United States

No person, except a natural born citizen, or a citizen of the United States at the time of the adoption of this Constitution, shall be eligible to the office of President; neither shall any person be eligible to that office who shall not have attained to the age of thirty-five years, and been fourteen years a resident within the United States.

In case of the removal of the President from office, or of his death, resignation, or inability to discharge the powers and duties of the said office, the same shall devolve on the Vice President; and the Congress may, by law, provide for the case of removal, death, resignation, or inability, both of the President and Vice President, declaring what officer shall then act as President; and such officer shall act accordingly, until the disability be removed, or a President shall be elected.

The President shall, at stated times, receive for his services a compensation, which shall neither be increased nor diminished during the period for which he shall have been elected; and he shall not receive within that period any other emolument from the United States, or any of them.

Before he enter on the execution of his office, he shall take the following oath or affirmation:

"I do solemnly swear (or affirm) that I will faithfully execute the office of President of the

United States and will, to the best of my ability, preserve, protect, and defend the Constitution of the United States."

SEC. 2.—The President shall be commander in chief of the army and navy of the United States, and of the militia of the several states, when called into the actual service of the United States; he may require the opinion, in writing, of the principal officer in each of the executive departments, upon any subject relating to the duties of their respective offices, and he shall have power to grant reprieves and pardons for offenses against the United States, except in cases of impeachment.

He shall have power, by and with the advice and consent of the Senate, to make treaties, provided two-thirds of the Senators present concur; and he shall nominate, and by and with the advice and consent of the Senate, shall appoint, ambassadors, other public ministers, and consuls, judges of the Supreme Court, and all other officers of the United States, whose appointments are not herein otherwise provided for, and which shall be established by law; but the Congress may, by law, vest the appointment of such inferior officers as they think proper, in the President alone, in the courts of law, or in the heads of departments.

The President shall have power to fill up all vacancies that may happen during the recess of the Senate, by granting commissions, which shall expire at the end of their next session.

SEC. 3.—He shall, from time to time, give to the Congress information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and expedient; he may, on extraordinary occasions, convene both houses, or either of them, and, in case of disagreement between them with respect to the time of adjournment, he may adjourn them to such time as he shall think proper; he shall receive ambassadors and other public ministers; he shall take care that the laws be faithfully executed; and shall commission all the officers of the United States.

SEC. 4.—The President, Vice President, and all civil officers of the United States, shall be removed from office on impeachment for and conviction of treason, bribery, or other high crimes and misdemeanors.

ARTICLE III.

SECTION 1.—The judicial power of the United States shall be vested in a Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish. The judges, both of the supreme and inferior courts, shall hold their offices during good behavior;

and shall, at stated times, receive for their services a compensation, which shall not be diminished during their continuance in office.

SEC. 2.—The judicial power shall extend to all cases, in law and equity, arising under this Constitution, the laws of the United States and treaties made, or which shall be made, under their authority; to all cases affecting ambassadors, other public ministers, and consuls; to all cases of admiralty and maritime jurisdiction; to controversies to which the United States shall be a party; to controversies between two or more states, between a State and citizens of another State, between citizens of different states, between citizens of the same State claiming lands under grants of different states, and between a State, or the citizens thereof, and foreign states, citizens, or subjects.

In all cases affecting ambassadors, other public ministers and consuls, and those in which a State shall be a party, the Supreme Court shall have original jurisdiction. In all the other cases before mentioned, the Supreme Court shall have appellate jurisdiction both as to law and fact, with such exceptions, and under such regulations as the Congress shall make.

The trial of all crimes, except in cases of impeachment, shall be by jury; and such trial shall be held in the State where the said crimes shall have been committed; but, when not committed within any State, the trial shall be at such place or places as the Congress may by law have directed.

SEC. 3.—Treason against the United States shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort. No persons shall be convicted of treason unless on the testimony of two witnesses to the same overt act, or on confession in open court.

The Congress shall have power to declare the punishment of treason, but no attainder of treason shall work corruption of blood or forfeiture, except during the life of the person attainted.

ARTICLE IV.

SECTION 1.—Full faith and credit shall be given in each State to the public acts, records, and judicial proceedings of every other State. And the Congress may by general laws prescribe the manner in which such acts, records, and proceedings shall be proved, and the effect thereof.

SEC. 2.—The citizens of each State shall be entitled to all privileges and immunities of citizens in the several states.

A person charged in any State with treason,

felony, or other crime, who shall flee from justice, and be found in another State, shall, on demand of the executive authority of the State from which he fled, be delivered up, to be removed to the State having jurisdiction of the crime.

No person held to service or labor in one State under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labor may be due.

SEC. 3.—New states may be admitted by the Congress into this Union; but no new State shall be formed or erected within the jurisdiction of any other State; nor any State be formed by the junction of two or more states, or parts of states, without the consent of the Legislature of the State concerned, as well as of the Congress.

The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States; and nothing in this Constitution shall be so construed as to prejudice any claims of the United States, or of any particular State.

SEC. 4.—The United States shall guarantee to every State in this Union a republican form of government, and shall protect each of them against invasion; and on application of the Legislature, or of the executive (when the Legislature cannot be convened), against domestic violence.

ARTICLE V.

The Congress, whenever two-thirds of both houses shall deem it necessary, shall propose amendments to this Constitution: or, on the application of the legislatures of two-thirds of the several states, shall call a convention for proposing amendments, which, in either case, shall be valid to all intents and purposes, as part of this Constitution, when ratified by the legislatures of three-fourths of the several states, or by conventions in three-fourths thereof, as the one or the other mode of ratification may be proposed by the Congress; provided, that no amendment which may be made prior to the year one thousand eight hundred and eight shall in any manner affect the first and fourth clauses in the ninth section of the first article; and that no State, without its consent, shall be deprived of its equal suffrage in the Senate.

ARTICLE VI.

All debts contracted, and engagements entered into, before the adoption of this Constitution,

shall be as valid against the United States under this Constitution, as under the confederation.

This Constitution, and the laws of the United States which shall be made in pursuance thereof; and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the judges in every State shall be bound thereby, anything in the constitution or laws of any State to the contrary notwithstanding.

The senators and representatives before mentioned, and the members of the several State legislatures, and all executive and judicial officers, both of the United States and of the several states, shall be bound by oath or affirmation to support this Constitution; but no religious test shall ever be required as a qualification to any office or public trust under the United States.

ARTICLE VII.

The ratification of the conventions of nine states shall be sufficient for the establishment of this Constitution between the states so ratifying the same.

Done in convention by the unanimous consent of the states present, the seventeenth day of September, in the year of our Lord one thousand seven hundred and eighty-seven, and of the independence of the United States of America the twelfth. In witness whereof we have hereunto subscribed our names.

GEORGE WASHINGTON, *President,*
and Deputy from Virginia.

NEW HAMPSHIRE.—John Langdon, Nicholas Gilman.

MASSACHUSETTS.—Nathaniel Gorham, Rufus King.

CONNECTICUT.—William Samuel Johnson, Roger Sherman.

NEW YORK.—Alexander Hamilton.

NEW JERSEY.—William Livingston, David Bearley, William Patterson, Jonathan Dayton.

PENNSYLVANIA.—Benjamin Franklin, Thomas Mifflin, Robert Morris, George Clymer, Thomas Fitzsimons, Jared Ingersoll, James Wilson, Gouverneur Morris.

DELAWARE.—George Read, Gunning Bedford, Jr., John Dickinson, Richard Bassett, Jacob Broom.

MARYLAND.—James McHenry, Daniel of St. Thomas Jenifer, Daniel Carroll.

VIRGINIA.—John Blair, James Madison, Jr.

NORTH CAROLINA.—William Blount, Richard Dobbs Spaight, Hugh Williamson.

SOUTH CAROLINA.—John Rutledge, Charles Cotesworth Pinckney, Charles Pinckney, Pierce Butler.

GEORGIA.—William Few, Abraham Baldwin.

Attest: WILLIAM JACKSON, *Secretary.*

AMENDMENTS TO THE CONSTITUTION.

ARTICLE I.

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech or of the press; or the right of the people peaceably to assemble, and to petition the government for a redress of grievances.

ARTICLE II.

A well-regulated militia being necessary to the security of a free State, the right of the people to keep and bear arms shall not be infringed.

ARTICLE III.

No soldier shall, in time of peace, be quartered in any house without the consent of the owner; nor in time of war, but in a manner to be prescribed by law.

ARTICLE IV.

The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated; and no warrants shall issue but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the person or things to be seized.

ARTICLE V.

No person shall be held to answer for a capital or otherwise infamous crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia when in actual service in time of war or public danger; nor shall any person be subject, for the same offense, to be twice put in jeopardy of life or limb; nor shall be compelled, in any criminal case, to be a witness against himself; nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use without just compensation.

ARTICLE VI.

In all criminal prosecutions the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the State and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor; and to have the assistance of counsel for his defense.

ARTICLE VII.

In suits at common law, where the value in controversy shall exceed twenty dollars, the right

of trial by jury shall be preserved; and no fact tried by a jury shall be otherwise reexamined in any court of the United States than according to the rules of the common law.

ARTICLE VIII.

Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.

ARTICLE IX.

The enumeration in the Constitution of certain rights, shall not be construed to deny or disparage others retained by the people.

ARTICLE X.

The powers not delegated to the United States by the Constitution, nor prohibited by it to the states, are reserved to the states respectively, or to the people.

ARTICLE XI.

The judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States, by citizens of another State, or by citizens or subjects of any foreign state.

ARTICLE XII.

The electors shall meet in their respective states, and vote by ballot for President and Vice President, one of whom, at least, shall not be an inhabitant of the same State with themselves; they shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice President; and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice President, and of the number of votes for each, which lists they shall sign and certify, and transmit sealed to the seat of the government of the United States, directed to the president of the Senate; the president of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted; the person having the greatest number of votes for President shall be the President, if such number be a majority of the whole number of electors appointed; and if no person have such majority, then from the persons having the highest numbers, not exceeding three on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But, in choosing the President, the votes shall be taken by states, the representation from each State having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the states,

and a majority of all the states shall be necessary to a choice. And if the House of Representatives shall not choose a President, whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice President shall act as President, as in the case of death or other constitutional disability of the President.

The person having the greatest number of votes as Vice President, shall be the Vice President, if such number be a majority of the whole number of electors appointed: and if no person have a majority, then from the two highest numbers on the list, the Senate shall choose the Vice President; a quorum for the purpose shall consist of two-thirds of the whole number of senators, and a majority of the whole number shall be necessary to a choice.

But no person constitutionally ineligible to the office of President, shall be eligible to that of Vice President of the United States.

ARTICLE XIII.

SECTION 1.—Neither slavery nor involuntary servitude, except as a punishment for crime, whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction.

SEC. 2.—Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XIV.

SECTION 1.—All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.

SEC. 2.—Representatives shall be apportioned among the several states, according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for choice of electors for President and Vice President of the United States, representatives in Congress, the executive and judicial officers of a State, or the members of the Legislature thereof, is denied to any of the male inhabitants of such State being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportion

which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

SEC. 3.—No person shall be a Senator, or Representative in Congress, or elector of President and Vice President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken an oath as a member of Congress, or as an officer of the United States, or as a member of any State Legislature, or as an executive or judicial officer of any State, to support the Constitution of the the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof; but Congress may, by a vote of two-thirds of each house, remove such disability.

SEC. 4.—The validity of the public debt of the United States authorized by law, including debts incurred for payment of pensions, and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States, nor any State, shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void.

SEC. 5.—The Congress shall have power to enforce by appropriate legislation the provisions of this article.

ARTICLE XV.

SECTION 1.—The rights of citizens of the United States to vote shall not be denied or abridged by the United States, or by any State, on account of race, color, or previous condition of servitude.

SEC. 2.—Congress shall have power to enforce this article by appropriate legislation.

UNITED STATES, Departments of, the executive departments of the Union, whose chief officers are known as secretaries and comprise the board of advisers or Cabinet of the President. Although executive departments had been established before the adoption of the Constitution, these departments did not constitute an advisory board holding the dignity of the present presidential Cabinet. A Postmaster-General had been provided in 1775 and the four executive departments of Finance, Marine, War, and Foreign Affairs were organized in 1781. Three of the present departments, those of State, War, and the Treasury, were established by the act of Aug. 7, 1789, and the other six were organized subsequently. The Post Office Department was established in 1792, the Department of the Navy in 1798, of the Interior in 1849, of Justice

in 1870, of Agriculture in 1889, and of Commerce and Labor in 1903. The head of each department is appointed by the President, subject to confirmation by the Senate, and receives a salary of \$12,000 per annum. Besides supervising the important work relative to the respective departments, the cabinet officers may be required to give their opinion in writing to the President on any subject relating to the duties of their respective offices. All the departments have offices in fine, large buildings erected by the government at Washington, D. C.

DEPARTMENT OF THE TREASURY. The Treasury Department may be regarded one of the most important, since the Secretary of the Treasury is charged with the duty of preparing plans for the management and improvement of the revenue. It has charge and control, not only of all the fiscal affairs of the government, but has direct supervision of the national banks, of the customs and internal revenue systems, of the currency and coinage, and of the commercial marine. Other duties imposed upon the department include the inspection of steam vessels and of the marine hospitals, supervision of the life-saving systems, and superintendence of printing and engraving. About 5,000 clerks and officers are employed by the department. Alexander Hamilton was the first Secretary of the Treasury, serving in that capacity from 1789 until 1795.

DEPARTMENT OF STATE. The Department of State is under the supervision of the Secretary of State. His duties are not clearly defined by law, but depend to a considerable extent upon instructions of the President. He is the medium of communication between the United States and the several states and between the nation and foreign countries. In his custody are copies of all public documents, treaties, laws, and official correspondence with foreign countries. He is the custodian of the great seal of the United States, which he affixes to all national documents requiring it, and countersigns all commissions issued by the President. The ambassadors and consuls are under the direction of this department. Citizens desiring to visit or travel in foreign countries receive passports from the Secretary of State. He presents foreign ministers to the President and authenticates all proclamations issued by the chief executive. Thomas Jefferson served as Secretary of State from 1789 to 1794, being the first to fill that position.

DEPARTMENT OF WAR. The Department of War is presided over by the Secretary of War, who has superintendence of all matters relating to war or to the army, including the purchase

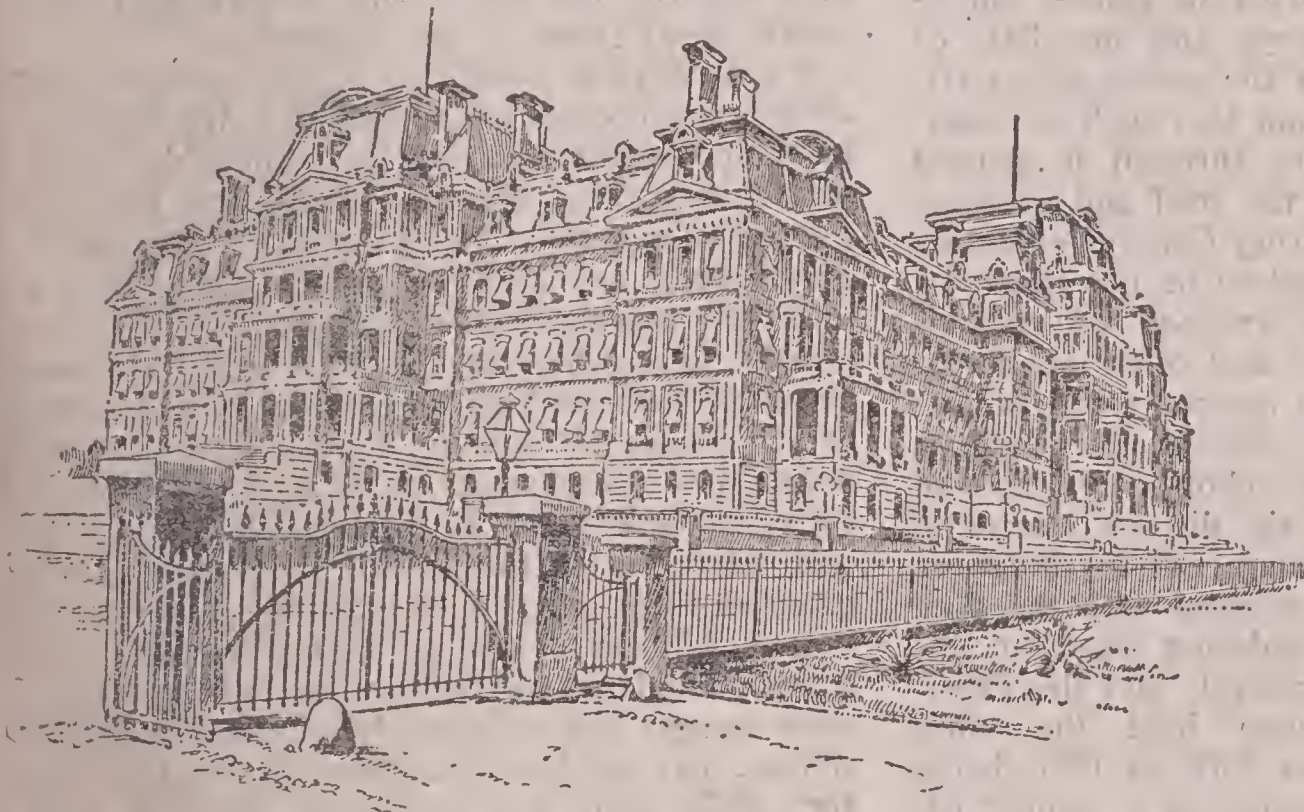
and distribution of supplies and army transportation. He has charge of the disbursement of river and harbor appropriations and of the signal service and meteorological records. A large number of subordinate officers assist the head of the department, chief among which are the adjutant general, inspector general, paymaster general, quartermaster general, surgeon general, commissary general, chief of engineers, chief of ordnance, chief signal officer, and chief judge-advocate general. The Secretary of War and his subordinates have custody of the various records appertaining to their duties. He is required to report to the President on the state of the army and all matters relating to their duties. The President is head of the army in the same sense that he is head of the nation, though he does not take command in person in case of war, yet he has the power were he so disposed. It is probably a wise plan to have the control and general operations of the army

eral by the second Continental Congress, serving as superintendent of the mails during the American struggle for independence. It is due largely to his studious efforts that the mail service was placed on an efficient basis in the early republic. As now organized, the *first assistant* postmaster-general supervises the money-order system, the free-delivery system, the establishment of new post offices, and the dead-letter office, an office maintained to receive certain classes of unclaimed-mail matters. The *second assistant* supervises the purchase of supplies, arranges the mail service, and directs matters relating to contracts. Postage stamps, wrappers, postal cards, and other supplies, and the general financial matters are under the direction of the *third assistant*. Appointments for fourth-class post offices are made by the *fourth assistant*, who in addition has charge of post office inspectors and issues commissions to postmasters. This department has charge of the entire mail service of the

nation, including that of the territories and the colonies. Samuel Osgood served as Postmaster-General from 1789 to 1791, but Timothy Pickering was the first to be appointed to that office after the department was regularly established, holding the position from 1791 until 1795. William T. Barry was the first Postmaster-General to have a place in the Cabinet. He held the position from 1829 to 1835.

DEPARTMENT OF THE NAVY. The Department of the Navy is under the management of the

Secretary of the Navy. It has charge of the vessels, guns, navy yards, and all other matters pertaining to the navy. Eight bureaus are maintained in the Navy Department. They are the bureaus of navigation, ordnance, yards and docks, medicine and surgery, provisions and clothing, steam engineering, and equipment and recruiting. The department is further assisted by the commandant of the marine corps and by the judge-advocate general. It prepares nautical charts with sailing directions and publishes the *Nautical Almanac*, a work of much value to seamen. George Cabot was the first Secretary of the Navy, holding the office in 1798.



BUILDING OCCUPIED BY THE STATE, NAVY, AND WAR DEPARTMENTS.

under the President, since these duties are of an executive character. The President being charged with them, he is able to act on a plan of unity and promptness in maintaining peace at home and in resisting foreign aggression. In 1789 Henry Knox became the first Secretary of War, serving until 1795.

POST OFFICE DEPARTMENT. The Post Office Department was the first to be organized, after the first three originally established, but it was not raised to the dignity of a cabinet position until in 1829. The Postmaster-General is at its head. He is aided by four assistant postmasters-general, each having a specified line of duties. Benjamin Franklin was made Postmaster-Gen-

DEPARTMENT OF THE INTERIOR. The Department of the Interior is directed by the Secretary of the Interior, who has charge of patents and copyrights, public documents, Indian affairs, pensions, mines and mining, and public lands. He has supervision of the national census, which is taken every ten years, beginning in 1790. Other duties pertain to the public-land surveys, to railroads subsidized by the Federal government, to the management of affairs in the territories, and to the superintendence of certain charitable institutions of the District of Columbia. The commissioners of education, of Indian affairs, of pensions, of patents, and of public lands are subordinate officers of this department. Thomas Ewing served as the first Secretary of the Interior, holding the office from 1849 to 1850.

DEPARTMENT OF JUSTICE. The Department of Justice was created in 1789, but was not organized as a cabinet position until 1870. This cabinet office is under the direction of the Attorney-General, who is charged with the general superintendence of the attorneys and marshals of all the Federal courts in the states and territories. It is quite important that such a department be maintained, since through it general uniformity is secured in the trial and prosecution of cases. The Attorney-General examines the title of lands proposed to be purchased by the government for the erection of custom-houses, forts, post offices, and other public institutions. Four assistant attorneys-general are employed. The Attorney-General rarely argues cases, this being done by subordinates, and he may employ counsel to aid district attorneys. Besides making an annual report to Congress, the Attorney-General is charged with the duty of giving opinions and rendering legal services to the heads of the departments and the President. Amos T. Ackerman held the office of Attorney-General from 1870 to 1871, being the first to hold the position as a cabinet officer.

DEPARTMENT OF AGRICULTURE. The Department of Agriculture was established in 1862, but the secretaryship was not made a cabinet position until 1889. It is presided over by the Secretary of Agriculture, whose duty is to obtain and disseminate useful information regarding agriculture to the classes interested in that industry, and to distribute among them seeds of new and useful plants. The department collects and publishes statistics in relation to agricultural products and domestic animals, investigates diseases among animals, observes the influence of climatic conditions upon plants and animals, and disseminates knowledge as to the diseases and insects affecting crops and live stock. Norman

J. Coleman was Commissioner of Agriculture in 1889, when the office was made a cabinet position, but was succeeded in the same year by Jeremiah M. Rusk.

DEPARTMENT OF COMMERCE AND LABOR. See *Commerce and Labor, Department of.*

UNITED STATES, Independence of the, the freedom from dependence upon other nations that the Union has acquired. It dates from July 4, 1776, when the thirteen colonies adopted the following

DECLARATION OF INDEPENDENCE:

When in the course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume among the powers of the earth, the separate and equal station to which the laws of nature and of Nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain inalienable rights, that among these are life, liberty and the pursuit of happiness. That to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed. That whenever any form of government becomes destructive of these ends, it is the right of the people to alter or abolish it, and to institute new government, laying its foundation on such principles and organizing its powers in such form, as to them shall seem most likely to effect their safety and happiness. Prudence, indeed, will dictate that governments long established should not be changed for light and transient causes; and accordingly all experience hath shown, that mankind are more disposed to suffer, while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed. But when a long train of abuses and usurpations, pursuing invariably the same object, evinces a design to reduce them under absolute despotism, it is their right, it is their duty, to throw off such government, and to provide new guards for their future security.—Such has been the patient sufferance of these colonies; and such is now the necessity which constrains them to alter their former systems of government. The history of the present King of Great Britain is a history of repeated injuries and usurpations, all having in direct object the establishment of an absolute tyranny over these states. To prove this, let facts be submitted to a candid world.

He has refused his assent to laws, the most wholesome and necessary for the public good.

He has forbidden his governors to pass laws of immediate and pressing importance, unless suspended in their operation till his assent should be obtained; and when so suspended, he has utterly neglected to attend to them.

He has refused to pass other laws for the accommodation of large districts of people, unless those people would relinquish the right of representation in the legislature, a right inestimable to them and formidable to tyrants only.

He has called together legislative bodies at places unusual, uncomfortable, and distant from the depository of their public records, for the sole purpose of fatiguing them into compliance with his measures.

He has dissolved representative houses repeatedly, for opposing with manly firmness his invasions on the rights of the people.

He has refused for a long time, after such dissolutions, to cause others to be elected; whereby the legislative powers, incapable of annihilation, have returned to the people at large for their exercise; the state remaining in the mean time exposed to all the dangers of invasion from without, and convulsions within.

He has endeavored to prevent the population of these states; for that purpose obstructing the laws for naturalization of foreigners; refusing to pass others to encourage their migration hither, and raising the conditions of new appropriations of lands.

He has obstructed the administration of justice, by refusing his assent to laws for establishing judiciary powers.

He has made judges dependent on his will alone, for the tenure of their offices, and the amount and payment of their salaries.

He has erected a multitude of new offices, and sent hither swarms of officers to harass our people, and eat out their substance.

He has kept among us, in times of peace, standing armies without the consent of our legislature.

He has affected to render the military independent of, and superior to, the civil power.

He has combined with others to subject us to a jurisdiction foreign to our constitution, and unacknowledged by our laws; giving his assent to their acts of pretended legislation:

For quartering large bodies of armed troops among us:

For protecting them, by a mock trial, from punishment for any murders which they should commit on the inhabitants of these states:

For cutting off our trade with all parts of the world:

For imposing taxes on us without our consent:

For depriving us, in many cases, of the benefits of trial by jury:

For transporting us beyond seas to be tried for pretended offences:

For abolishing the free system of English laws in a neighboring province, establishing therein an arbitrary government, and enlarging its boundaries so as to render it at once an example and fit instrument for introducing the same absolute rule into these colonies:

For taking away our charters, abolishing our most valuable laws, and altering fundamentally the forms of our governments:

For suspending our own legislatures, and declaring themselves invested with power to legislate for us in all cases whatsoever.

He has abdicated government here, by declaring us out of his protection and waging war against us.

He has plundered our seas, ravaged our coasts, burnt our towns, and destroyed the lives of our people.

He is at this time transporting large armies of foreign mercenaries to complete the works of death, desolation and tyranny, already begun with circumstances of cruelty and perfidy scarcely paralleled in the most barbarous ages, and totally unworthy the head of a civilized nation.

He has constrained our fellow citizens taken captive on the high seas to bear arms against their country, to become the executioners of their friends and brethren, or to fall themselves by their hands.

He has excited domestic insurrections amongst us, and has endeavored to bring on the inhabitants of our frontiers the merciless Indian savages, whose known rule of warfare is an undistinguished destruction of all ages, sexes, and conditions.

In every stage of these oppressions we have petitioned for redress in the most humble terms. Our repeated petitions have been answered only by repeated injury. A prince, whose character is thus marked by every act which may define a tyrant, is unfit to be the ruler of a free people.

Nor have we been wanting in attention to our British brethren. We have warned them from time to time of attempts by their legislature to extend an unwarrantable jurisdiction over us. We have reminded them of the circumstances of our emigration and settlement here. We have appealed to their native justice and magnanimity, and we have conjured them by the ties of our common kindred to disavow these usurpa-

tions, which would inevitably interrupt our connections and correspondence. They too have been deaf to the voice of justice and of consanguinity. We must, therefore, acquiesce in the necessity which denounces our separation, and hold them, as we hold the rest of mankind, enemies in war, in peace friends.

We, therefore, the representatives of the United States of America, in general congress assembled, appealing to the Supreme Judge of the world for the rectitude of our intentions, do, in the name, and by authority of the good people of these colonies, solemnly publish and declare, That these united colonies are, and of right ought to be free and independent states; that they are absolved from all allegiance to the British crown, and that all political connection between them and the state of Great Britain, is and ought to be totally dissolved; and that as free and independent states, they have full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which independent states may of right do. And for the support of this declaration, with a firm reliance on the protection of Divine Providence, we mutually pledge to each other our lives, our fortunes, and our sacred honor.

CONNECTICUT.

Roger Sherman,
Samuel Huntington,
William Williams,
Oliver Wolcott.

DELAWARE.

Caesar Rodney,
Geo. Read,
Tho. M'Kean.

GEORGIA.

Button Gwinnett,
Lyman Hall,
Geo. Walton.

MARYLAND.

Samuel Chase,
Wm. Paea,
Thos. Stone,
Charles Carroll, of Carrollton.

MASSACHUSETTS BAY.

Samuel Adams,
John Adams,
Robt. Treat Paine,
Elbridge Gerry.

NEW HAMPSHIRE.

Josiah Bartlett,
William Whipple,
Matthew Thornton.

NEW JERSEY.

Richd. Stockton,
Jno. Witherspoon,
Francis Hopkinson,
John Hart,
Abraham Clark.

JOHN HANCOCK.

NEW YORK.

Wm. Floyd,
Philip Livingston,
Francis Lewis,
Lewis Morris.

NORTH CAROLINA.

William Hooper,
Joseph Hewes,
John Penn.

PENNSYLVANIA.

Robt. Morris,
Benjamin Rush,
Benjamin Franklin,
John Morton,
Geo. Clymer,
Jas. Smith,
Geo. Taylor,
James Wilson,
Geo. Ross.

RHODE ISLAND.

Stephen Hopkins,
William Ellery.

SOUTH CAROLINA.

Edward Rutledge,
Thos. Hayward, Jr.,
Thomas Lynch, Jr.,
Arthur Middleton.

VIRGINIA.

George Wythe,
Richard Henry Lee,
Thomas Jefferson,
Benjamin Harrison,
Thos. Nelson, Jr.
Francis Lightfoot Lee,
Carter Braxton.

UNITED STATES INDIAN TRAINING AND INDUSTRIAL SCHOOL, an institu-

tion at Carlisle, Pa., founded in 1879 by the government of the United States. This educational institution is designed to lead the Indian youth to more fully understand and better appreciate the trend of modern civilization, by offering training in the civil arts and in educational courses. While the boys and girls are pursuing study in the common school branches, they are trained in the manual trades and in domestic economy, and under a system of *outing* they are at opportune times placed as servants in the homes of white people. Both in school and while serving practically in the home, they practice the arts of the whites, thus developing the traits and customs of the Caucasian. Practically all the races of Indians found in Alaska and the United States have been represented in this institution, which has given training to more than 5,000 different students. The graduates, of which there are about 425, have engaged largely in the material industries and many have found employment under the government, either as teachers or in the public service. The attendance is about 1,400 students.

UNITED STATES MILITARY ACADEMY, the national institution of the United States for the education of officers for the army, located at West Point, N. Y. The necessity for a military academy for the technical training of officers became manifest in an early period of the Revolution. A plan for such a school was proposed by Gen. Henry Knox in 1776 and was elaborated by Alexander Hamilton. Its establishment was frequently recommended by Washington. The last letter written by him declares this to be "an object of primary importance to this country."

The United States Military Academy was organized under an act of Congress in 1802. Its first superintendent was Col. Jonathan Williams, a grand-nephew of Benjamin Franklin. Col. Sylvanus Thayer, whose statue at West Point bears the legend "The Father of the Military Academy," was superintendent from 1817 to 1833. The curriculum, military and academic, was adopted under his leadership. The traditions of Thayer were carried on and improved, under the supervision of Gen. James G. Totten, inspector of the institution from 1838 to 1864, by a succession of able superintendents. For 47 years one policy prevailed and the type of West Point education was fixed. The experience in the wars of 1846, 1861, and 1898 introduced modifications of details, leaving the early traditions substantially unchanged.

The first object of the institution is to form character. Habits of faithfulness, obedience, and attention to first duty, last and all the time,

are inculcated throughout the entire course of four years. At the end of this period the cadet receives a commission as lieutenant in the army. The discipline is strict. A system of daily "marks" enables each cadet to judge his own conduct and to bring himself up to the required standard. By this method habit becomes a second nature. The officer carries into the service qualities that have been inculcated continuously. All delinquencies are noted and punished, and the habit of punctuality is thus established. This is true likewise with other habits. The large number of instructors, all of whom are officers of the army, enables the proficiency of all cadets in every subject to be tested daily. Competence as well as satisfactory conduct is insisted upon in the daily routine. A high standard of personal honor and truthfulness is maintained. The record of the disbursing officers of the army for scrupulous honesty has never been equalled by any other organization.

The curriculum comprises courses in mathematics, English, French, Spanish, physics, chemistry, mineralogy, geology, electricity, history, military, constitutional and international law, civil and military engineering, tactics, topography, building construction, ordnance and gunnery, fortifications, the art of war, and military history. The corps of cadets comprises 522 persons, who are appointed by the President of the United States. One cadet is appointed from each congressional district (on the recommendation of its Representative), one from each Territory, one from the District of Columbia, one from Porto Rico, two from each state at large (on the recommendation of its senators), and forty from the United States at large. The total number of graduates is about 4,850.

It is worthy of note that the graduates are successful in civil as well as in military pursuits. They have given to the country 1 President, 4 cabinet officers, 1 ambassador, 14 ministers to foreign courts, 26 United States senators or representatives, 16 governors of states or territories, 46 presidents of colleges, 133 professors and teachers, 87 presidents of railroad or other corporations, 63 chief engineers, 228 civil engineers, 179 authors, etc., etc. In 1902 President Roosevelt said "No other educational institution in the land has contributed so many names as West Point to the honor roll of the nation's greatest citizens."

UNIVERSALISTS (ū-nī-vēr'sal-ists), a religious sect which holds to the doctrine that all men will be saved, that even the fallen angels will be forgiven and enjoy eternal life. Those who support this faith hold to the view that

salvation is universal and that the Scriptures declare it to be the purpose of God to reveal His grace as extensively as sin is or can be, hence all souls are to be reconciled to God that He may be all in all. The doctrine stands in direct opposition to the dogma of eternal punishment. Universalism, as a specific faith, was founded about 1750, but many members of other sects hold the view that universal bliss is in store for mankind. That man is not a fallen creature, sunk in total depravity, but a being created in the spiritual image of God, is the central element of Universalism. It teaches that salvation is a redemption from sin itself, but not a redemption from the consequences of sin. The chief duty of man is held to be the creating and upbuilding of character, in which he is assisted by a contemplation of the ideals of life as represented by Jesus Christ. In 1909, Canada had about 500 Universalists. In the United States they have 765 ministers, 798 churches, and a membership of 60,675. Their church property is valued at \$10,800,000. They maintain a Young People's Christian Union, which has 480 societies. The *Christian Leader*, Boston, and *The Universalist*, Chicago, are the leading periodicals.

UNIVERSAL LANGUAGE. See **Esperanto**; **Volapük**.

UNIVERSE (ū'nī-vēr's), the grand and total aggregate of created things, or all the created things viewed as constituting one system. Anciently the earth was supposed to be the center of the universe and it was thought that all the heavenly bodies revolve about it. The invention of the telescope and the discovery of the law of gravitation revolutionized this theory to the extent that the sun was made the center of the universe, but it was supposed that all the planets and the countless stars move about it as a common center. Ultimately it became known that space includes many solar systems and that the sun is but the center of one system within the universe. Modern astronomy makes the universe one grand whole, so widely extensive, entirely endless in space, that the mind is incapable of conceiving any limits or fixing boundaries beyond which its influence does not extend. In this sense the universe includes not only the planets and all the satellites known to us, but embraces every particle of creation. It comprises not only our solar system, but includes the numerous other similar systems of which many of the fixed stars seem to be the centers. See **Solar System**.

UNIVERSITY (ū-nī-vēr'sī-tĭ), an institution of higher learning. It affords facilities for superior instruction, or for the examination of students who have already been instructed in

certain higher courses, and has power to confer degrees to those making a creditable record in the branches of study pursued. The term originated from the word *universitas*, meaning the whole of anything, and was first used to designate a collection of teachers and learners. Hence, the word university originally had a very various application, indicating a society or body of musicians, priests, teachers, or players. The modern universities had their rise in Europe in the Middle Ages and were at first essentially ecclesiastical. Gradually their functions became specialized, thus giving rise to several faculties, each of which became devoted to some important branch of instruction, as is now the case in Germany. In other instances colleges or subordinate teaching bodies were formed, as in the large universities of England, where the relation of the university to the college is similar to that of a federal government to the several states composing a federation.

The name university has been applied loosely to many institutions in the United States, though this country has the largest number of educational establishments bearing that name. However, many of them have a standard lower than that of others which are institutes, or colleges, and some represent only a single faculty. At present there is a general tendency to restrict the word to institutions having affiliated professional schools and offering nonprofessional instruction beyond the bachelor's degree. A large number of the American universities are sectarian, though none of this class belongs to the Federal or State institutions. In the states a number of universities are maintained, some of which have a fully developed university course, while others answer more especially to the term normal school or college. The American universities and colleges include about 400 different institutions. They have 9,650 professors and teachers and about 175,500 students. The libraries of these institutions have 2,200,000 volumes. These estimates are taken from the latest reports available, but conditions are always such that the number of students varies greatly from year to year. The money invested in schools of technology, colleges, and universities in the United States is placed by statisticians at \$325,550,000.

The students studying medicine, law, and theology in the American universities are placed at 48,500, while the number pursuing studies in the liberal arts and technology is given at 115,250. Most of the institutions of higher learning in America are coeducational, though some are open only to men and others only to women. Apparently there is a constant increase

in the number of students who make it an objective point to study politics, science, sociology, jurisprudence, and similar topics. Among the most important institutions of the United States classed as universities are the Armour Institute of Technology, Chicago, Ill., founded in 1893; Boston University, Boston, Mass., 1872; University of California, Berkeley, Cal., 1868; Central High School, Philadelphia, Pa., 1837; University of Chicago, Chicago, Ill., 1889; College of the City of New York, New York City, 1847; Columbia University, New York City, 1754; Cornell University, Ithaca, N. Y., 1818; Columbian University, Washington, D. C., 1821; Girard College, Philadelphia, Pa., 1848; Harvard University, Cambridge, Mass., 1636; University of Illinois, Champaign, Ill., 1867; Indiana University, Bloomington, Ind., 1820; University of Iowa, Iowa City, Iowa, 1856; University of Kansas, Lawrence, Kan., 1866; Lake Forest University, Lake Forest, Ill., 1876; Leland Stanford Junior University, Palo Alto, Cal., 1891; Massachusetts Institute of Technology, Boston, Mass., 1865; University of Michigan, Ann Arbor, Mich., 1837; University of Minnesota, Minneapolis, Minn., 1868; University of Nebraska, Lincoln, Neb., 1871; New York University, New York City, 1831; Northwestern University, Evanston, Ill., 1855; Ohio State University, Columbus, Ohio, 1870; Pratt Institute, New York City, 1887; Princeton University, Princeton, N. J., 1746; University of Nashville, Nashville, Tenn., 1785; Washington University, Saint Louis, Mo., 1853; University of Wisconsin, Madison, Wis., 1849, and Yale University, New Haven, Conn., 1701. Each of the foregoing institutions has an attendance of more than 1,000 students. Other institutions of importance include William and Mary College, Williamsburg, Va., 1693; Brown University, Providence, R. I., 1764; Dartmouth College, Hanover, N. H., 1769; Johns Hopkins University, Baltimore, Md., 1776; Rutgers College, New Brunswick, N. J., 1770; University of Georgia, Athens, Ga., 1801; Amherst College, Amherst, Mass., 1821; Washington and Lee University, Lexington, Va., 1749, and Vanderbilt University, Nashville, Tenn., 1875.

Germany is noted for its great universities, which at present rank as the most famous institutions of learning in the world. Fully twenty institutions in the German Empire may be classed as more than national, since they attract a large number of students from all parts of the world. The oldest European institutions of higher learning are those of Bologna and Paris, both dating as universities from the 13th century. England and Scotland each have four

universities; Ireland, two; and Italy, twenty. The universities of Russia are modeled after those of Germany, both in the courses of study and in the discipline, and many of the professors are German. They include those of Saint Petersburg, Moscow, Kiev, Helsingfors, Kazan, and Dorpat; the last named has a noted theological faculty. The most celebrated Greek university is at Athens. It was established in 1837, has four faculties, and is organized on the German plan. The principal Mohammedan university is at Cairo, Egypt. Celebrated universities are maintained in China, Japan, and India. A number of excellent institutions carrying university courses are maintained in Australia and South America, particularly in Peru, Colombia, Argentina, and Brazil. Below is a list of the larger institutions of the world, outside of the United States, arranged according to their attendance. The number of students given in this list is from various sources, representing the attendance in 1908-1909:

LOCATION.	COUNTRY.	STU- DENTS.
Paris.....	France.....	12,250
Berlin.....	Germany.....	12,000
Madrid.....	Spain.....	6,142
Vienna.....	Austria.....	5,940
Naples.....	Italy.....	5,150
Moscow.....	Russia.....	4,500
Budapest.....	Austria.....	4,495
Munich.....	Germany.....	4,495
Athens.....	Greece.....	3,500
Oxford.....	England.....	3,500
Leipsic.....	Germany.....	3,500
Saint Petersburg.....	Russia.....	3,450
Cambridge.....	England.....	2,960
Prague.....	Austria.....	2,950
Kiev.....	Russia.....	2,950
Manchester.....	England.....	2,925
Edinburgh.....	Scotland.....	2,560
Turin.....	Italy.....	2,190
Lyons.....	France.....	2,145
Bordeaux.....	France.....	2,140
Helsingfors.....	Finland.....	2,000
Copenhagen.....	Denmark.....	1,915
Rome (Royal University).....	Italy.....	1,898
Tokio.....	Japan.....	1,890
Barcelona.....	Spain.....	1,880
Toulouse.....	France.....	1,825
Glasgow.....	Scotland.....	1,775
Gratz.....	Austria.....	1,765
Toronto.....	Canada.....	1,750
Halle.....	Germany.....	1,745
Bonn.....	Germany.....	1,740
Bucharest.....	Rumania.....	1,685
Louvain.....	Belgium.....	1,670
Freiburg.....	Germany.....	1,645
Kharkov.....	Russia.....	1,590
Padua.....	Italy.....	1,575
Lemberg.....	Austria.....	1,575
Montpellier.....	France.....	1,515
Upsala.....	Sweden.....	1,510
Breslau.....	Germany.....	1,500
Montreal.....	Canada.....	1,500
Cracow.....	Austria.....	1,490
Würzburg.....	Germany.....	1,430
Liège.....	Belgium.....	1,420
Palermo.....	Italy.....	1,390
Göttingen.....	Germany.....	1,375
Lille.....	France.....	1,350
Havana.....	Cuba.....	1,350
Urbana.....	Italy.....	1,340
Brussels.....	Belgium.....	1,315
Strassburg.....	Germany.....	1,265

LOCATION.	COUNTRY.	STU- DENTS.
Manila.....	Philippines.....	1,260
Tübingen.....	Germany.....	1,260
Salamanca.....	Spain.....	1,250
Dublin.....	Ireland.....	1,230
Heidelberg.....	Germany.....	1,212
Christiania.....	Norway.....	1,200
Amsterdam.....	Holland.....	1,175
Erlangen.....	Germany.....	1,160
Pisa.....	Italy.....	1,150
Santiago.....	Chile.....	1,140
Bern.....	Switzerland.....	820

UNIVERSITY EDUCATION, Coöperative, the movement to promote a "noble community of learning" among the world's great universities. For some years there has been such affiliation as permits a student to work for the higher degrees in several different institutions. This enables him to get the best out of each university and, as a form of educational "reciprocity," is growing in favor. A new and powerful impetus was given to the idea of mutual work in university education by Cecil Rhodes, the "Colossus of South Africa," whose bequest of \$10,000,000 created in 1902 the Rhodes scholarships at Oxford, England. Under liberal conditions students from the United States, Germany, and the British colonies are appointed to these scholarships. This promises to result in strengthening the racial and intellectual bonds by which a world civilization is held together.

Among American universities there is now frequent interchange of professors. Members of the Harvard faculty, for example, lecture for a semester or a year at the University of California; men from Johns Hopkins do the same at the University of Chicago, and so with others. Similar exchanges of professorial service have taken place also between American and foreign institutions. But the most noteworthy step that has yet been taken in university coöperation was initiated by the German emperor, Wilhelm II., in 1904. The emperor, at his New Year's reception to the diplomatic corps in that year, suggested to Charlemagne Tower, the American ambassador, an official interchange of professors between German and American universities. The suggestion was worked out in detail at an informal conference between President Nicholas Murray Butler, of Columbia University, the German emperor, and the Prussian minister of education, Herr Althoff, at Wilhelmshöhe, in August, 1905. Its practical application was made possible on the American side by the munificence of James Speyer of New York City, who placed \$50,000 in the hands of the trustees of Columbia University for the endowment of a professorship in the University of Berlin.

This professorship, known as the Theodore Roosevelt Professorship, is tenable for one year at a time. The incumbents are nominated by the trustees of Columbia University and confirmed by the Prussian minister of education. They will lecture on American history and institutions, including American political economy. Their services may be extended to other German universities. The first lecturer appointed to this professorship was John William Burgess, dean of the faculty of political science at Columbia. He began his work in the winter of 1906-1907. The government of Germany endowed a similar professorship at Columbia University and Hermann Schumacher, professor of political economy in the University of Bonn, was nominated by the Prussian minister of education as the first incumbent. The appointment was confirmed by the authorities of Columbia University and Dr. Schumacher entered upon his duties also in the winter of 1906-1907. This arrangement marks an important epoch in education which has since borne good results in many institutions.

UNIVERSITY EXTENSION, a plan whereby the benefits of university work may be enjoyed by persons residing in different communities from those in which such an institution is located. The movement to carry means of higher education to persons of all classes and of both sexes by organizing local associations in suitable places dates from 1872, when the University of Cambridge, England, appointed a syndicate to organize lectures by university men. These lectures, which have since grown to marked popularity, are similar in character to those given at Cambridge. A like plan was established by Oxford University in 1885. The university extension movement was first introduced into the United States in 1887 by J. N. Larned, superintendent of the Buffalo library, but was recommended by persons connected with Johns Hopkins University in the same year. No widespread movement was inaugurated until the plan was taken up by the University of Pennsylvania, in 1890, and an organization was formed under the name of the American Society for the Extension of University Teaching. Since then the movement has spread into all parts of the country and has been taken up by all the larger colleges and universities. In some sections of the country the institutions of higher learning have formed coöperative associations, thus giving the movement the prestige of combined effort and the advantage of associating the talent of a number of eminent instructors and lectures.

The University of Chicago maintains a special

department of this work. Those joining the classes in different communities are organized into university extension centers. These centers have regular meetings, usually twice each month, at which the topics outlined in a well-planned course of study are discussed under the direction of a local leader, and lectures are given in addition by eminent educators or by the ablest professors of the institutions managing the university extension work. The course of study is usually issued in installments of twelve numbers, each covering a month's work, and the whole course outlines one subject, such as political science, literature, or history. Those completing the work and passing a satisfactory examination are granted certificates, the examination work being done under the direction of some one appointed by the association, and the papers are afterward sent to the institution having charge of the enterprise, where they are inspected and certificates are issued according to the work done. The movement as a whole has been of incalculable benefit, since it has carried superior thought and consecutive study to communities otherwise deprived of such advantages and given many persons the attendant benefits. The plan outlined in this article is in successful use by many institutions and the branches studied cover a wide range of knowledge.

UNIVERSITY OF CHICAGO. See *Chicago, University of*.

UPAS (ū'pās), a tree of the nettle family, which yields an acrid, milky juice that contains a virulent poison, the *upas antiar*. It is native to Java and other islands of the East Indies and several species of it are indigenous to tropical Africa. The stem is naked for the first 50 to 80 feet and its height often exceeds 100 feet. The leaves are lanceolate and alternate and the fruit is a kind of drupe, covered with fleshy scales. It was long thought that mere contact with the tree would result in injury to animals and plants, but it is known that the poisonous properties are similar in effect to those of the poison ivy. Natives use the juice of the tree in poisoning their arrows. Several species have been described, some of which yield an inner bark that is valuable in making bags and clothing. In 1844 specimens were brought to Europe and several species are now grown in gardens and hothouses.

UPSALA (üp-sä'lä), or **Upsal**, a city of Sweden, on the Fyris River, 42 miles northwest of Stockholm. It occupies a fine site in a fertile valley and may be reached by a number of railways. The University of Upsala is the chief educational institution in Sweden. It was

founded in 1477, has a library of 300,000 volumes, and is attended by 1,510 students. This library contains a Bible in which Luther and Melancthon wrote comments. The cathedral, founded in 1258, is a beautiful structure in the Gothic style. In it are the tombs of Linnaeus, Gustavus Adolphus, and several other prominent men of Sweden. Upsala has beautiful botanical and zoölogical gardens, numerous secondary schools and churches, the Museum of Northern Antiquities, and the Ultuna Agricultural Institute. It has fine public improvements, including pavements, sewerage, waterworks, gas and electric lighting, and ample facilities for rapid transit. About three miles north of the city is the town of Gamla Upsala, which occupies the site of the traditional capital and fortress built by Odin. Although it has some manufactures and a brisk trade, it is important mainly as an educational center. Population, 1906, 24,450.

URAL (ūr'al), a river rising in the Ural Mountains and forming a part of the boundary between Asia and Europe. The general course is toward the south. Although it has a length of 1,385 miles, it is shallow in the greater part of the course and is not valuable in commerce. It flows into the Caspian Sea by a considerable delta. Only a small portion is navigable, but it contains extensive fisheries. The lower course of the river is strongly fortified. Orenburg and Ouralsk are the chief cities on its banks. The affluents include the Or, Kizie, and Sakmara rivers.

URAL MOUNTAINS, a chain of mountains in Eurasia. They form the principal part of the boundary between Asia and Europe, stretching southward from the Kara Sea fully 1,875 miles. These mountains contain a number of parallel ridges, from which swells and spurs extend at nearly right angles, and attain heights of 4,500 to 5,515 feet. There is a gradual rise from the Kara Sea until the north central part is reached, where the chain attains its highest summits. The slopes are gradual in the greater part of these highlands. Extensive deposits of minerals abound, chiefly coal, iron, copper, platinum, gold, topaz, emerald, diamond and amethyst. The northern region has a very cold climate, but the southern part is favorable to the production of cereals and live stock and contains valleys of great fertility. Among the streams rising in the Ural Mountains are the Petchora, Kama, Tobal, and Ural rivers.

URANIA (ūr-rā'nī-à), in Greek mythology, one of the nine Muses, a daughter of Zeus and Mnemosyne. She was the goddess of astronomy and was usually represented with a staff pointing at a celestial globe.

URANIUM (ūr-rā'nī-ŭm), a rare metallic element discovered by Klaproth in 1789, so named from the planet Uranus. It occurs chiefly in pitchblende, has a silvery luster, and melts at a bright red heat. Compounds of uranium are obtained from the uran-ocher found at Cornwall, England. Sodium uranate, known commercially as uranium yellow, is one of many salts obtained from it. This product is used in painting on glass and porcelain. Uranoso-uranic oxide, which is obtained from uranium, is used to some extent in producing a black glaze on porcelain. Becquerel, in 1896, demonstrated that certain radiations are emitted by uranium and by the salts of uranium.

URANUS, one of the superior planets, occupying a place between Saturn and Neptune. The ancients knew of this planet, but it was rediscovered by William Herschel in 1781, after the construction of his great reflecting telescope. His attention was attracted by a star in the constellation Gemini, which he observed as having a disk different from the others. He announced soon after that he had discovered a new comet, but a few months later the error was revealed and the body was admitted to be a member of the solar system. The diameter of Uranus is about 31,900 miles. Its density is about equal to that of ice, somewhat lighter than water. The mean distance of Uranus from the sun is placed at 1,781,900,000 miles and its year is about 84 of our years. Little is known of the seasons of Uranus, but the length of its day is placed at between nine and ten hours, and the light received from the sun is estimated at about the quantity which would be afforded by 300 full moons. Uranus has four satellites, which revolve round it from east to west and move in planes nearly perpendicular to the ecliptic, a circumstance not known in the case of any other planet. The satellites are Ariel, Umbriel, Titania, and Oberon. See **Satellite**.

URBANA (ūr-bān'ā), a city of Illinois, county seat of Champaign County, 75 miles northeast of Springfield, on the Wabash and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. It is surrounded by an agricultural and mineral region and has a number of extensive machine shops and manufacturing establishments. The principal buildings include the high school, the public library, the county courthouse, the Y. M. C. A. building, the Masonic Temple, and many fine churches. It has Crystal Lake Park. The University of Illinois, situated between Urbana and Champaign, is reached by an electric railway. It has public waterworks and sanitary sewerage. The place was settled in 1824 and incorporated in 1860;

Near it is the University of Illinois, an institution of learning established in 1862. Population, 1900, 5,728; in 1910, 8,245.

URBANA, a city in Ohio, county seat of Champaign County, 94 miles northeast of Cincinnati, on the Pennsylvania, the Erie, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. It is surrounded by a fertile farming and dairying country. The notable buildings include the county courthouse, the public library, the high school, and the Urbana University. Among the manufactures are machinery, cigars, furniture, brooms, woolen goods; and carriages. Electric and gas lighting, public waterworks, and sanitary sewerage are among the municipal improvements. The place was platted in 1805 and was garrisoned in 1812. Population, 1900, 6,808; in 1910, 7,739.

URBINO (ŭr-bé'nŏ), a town of Italy, in the Apennine region of Marches, about twenty miles from the Adriatic Sea. It is situated between the Foglia and Metauro rivers, near the valley of the latter. Its magnificent palace was formerly occupied by the dukes of Urbino, and surrounding it are walls dating from the 14th century. The Albini palace, built by an Albanian family, is also at Urbino. This family furnished one of the popes, Clement XI. Urbino has manufactures of pins, matches, earthenware, utensils, and pottery. The city dates from the time of the Romans and in the Middle Ages became the seat of independent dukes. It was made a part of United Italy in 1860. Population, 1906, 18,968.

URCHIN. See **Sea Urchin**.

URIM AND THUMMIM (ŭ'rĭm, thŭm'mĭm), a contrivance mentioned in connection with the breastplate of the Jewish high priest and employed as a sort of divine oracle. The exact nature of this contrivance is not known, but it is supposed to have consisted of four rows of precious stones bearing the names of the twelve tribes, and in connection with these were two small figures or images. The figures are thought to have personified light and perfection, but some writers think that they signified truth and revelation, and others that they personified doctrine and judgment. The Urim and Thummim is mentioned only in or before the time of Solomon, when it was put over the breast of the high priest as he entered into the presence of Jehovah. Joseph Smith used the names in connection with the reading of the plates alleged to have contained the Book of Mormon.

URINE (ŭ'rĭn), in mammals, the fluid which is secreted from the blood by the kidneys. In birds and reptiles, the urine is a solid

or semisolid excretion. The urine of man is a clear and transparent fluid with a normal density of 1.02. It is slightly acid, has a color which somewhat resembles amber, and chemically consists mainly of an aqueous solution of urea, salt, uric acid, and small quantities of hippuric acid. In a healthy individual it consists of 40 parts of solid matter to 960 parts of water. About two and a half pints are discharged daily by an adult, but the quantity varies somewhat, being diminished by excessive perspiration and increased by cold and by drinking large quantities of water. It is transmitted slowly but continuously by the ureters of the kidneys to the bladder, where it is retained until the distension of the organ requires its evacuation. The secretion is derived from arterial blood and is expelled by the agency of the abdominal muscles assisted by the contraction of the walls of the bladder. The urine is greatly affected by diseased conditions of the body. It may contain bile pigments, as in jaundice; sugar, as in diabetes; and albumin, as in Bright's disease. See **Kidney**.

URSA MAJOR AND URSA MINOR. See **Bear, Great and Little**.

URSULINES (ŭr'sŭ-lĭnz), an order of nuns in the Roman Catholic Church, founded by Saint Angela Merici of Brescia (1470-1540) in 1537, so named from Saint Ursula. The institution was organized with the special object of nursing sick, educating young women, attending to the wants of the poor, and sanctifying the lives of its members. Pope Paul III. confirmed the foundation of the order in 1544. Pope Paul V. issued a bull in 1612, by which the congregation was made a religious order, with solemn vows and strict inclosure. Several distinct congregations have been formed since that time. The celebrated sister, Madeline Saint Beuve of France, belonged to the Ursulines. Convents of the Ursulines were organized in Canada as early as 1639, the first one being instituted at Quebec. They are very numerous in Austria and Germany. Ursuline convents are maintained in Saint Louis, New Orleans, New York City, Louisville, San Antonio, Cleveland, Savannah, Columbia, and a number of other cities of the United States.

URUGUAY (ŭ-rŭ-gwĭ'), a river of South America, having its source in the province of Saint Catharina, in southern Brazil. The upper course is toward the west, but it makes a bold curve near the boundary of Argentina, whence it flows in a southern direction and joins the La Plata opposite Buenos Ayres. The Uruguay is important for its navigation facilities and fisheries and its basin is rich in fertile soil

and an abundance of timber. Its entire length is 925 miles. The Rio Negro and Arapey are its chief tributaries. Salto, Concepcion, and Porto Ruiz are the chief towns on its banks.

URUGUAY, a republic of South America, the smallest country of that continent. It is bounded on the north by Brazil, east by Brazil and the Atlantic, south by the Atlantic and the estuary of the Rio de la Plata, and west by Argentina, from which it is separated by the Uruguay River. The area, including a few small islands, is 72,151 square miles.

DESCRIPTION. Much of the surface is fertile coast and valley land, characterized in localities by tablelands of moderate elevation. The northeastern part is hilly and from it elevated ridges extend toward the southwest, where the country resembles the pampas of Argentina. The highest elevations in the northwest do not exceed 2,000 feet. Sandy and marshy tracts of low land border on the ocean. Forests of considerable extent occur in most parts of the country, including the cedar, acacia, palm, aloe, myrtle, poplar, walnut, rosewood and eucalyptus.

The larger part of the drainage is by the Rio de la Plata, the Uruguay, and the Rio Negro. The Rio Negro rises in the southern part of Brazil and, after a course of 250 miles toward the southwest, flows into Uruguay. The Rio Arapey flows into the Uruguay. Lake Mirim, on the border of Brazil, receives the inflow of the Rio Cebollali. This lake affords considerable facilities for navigation.

Uruguay has a mild and healthful climate and an abundance of rainfall. The thermometer seldom falls below 33° and along the shores rarely rises above 85°, while the summer heat in the interior seldom passes above 100°. Cold storms blow from the southwest during the winter, when the highland regions are visited by occasional snows.

RESOURCES. The minerals are abundant in the hilly district of the northeast, but mining is not important as an industry. Gold, silver, iron, zinc, lead, sulphur, coal, antimony, and tin exist in paying quantities. Granite and limestone of good quality are found in the hilly part of the north. The fisheries of the coast yield many species of marketable fish, but those of the interior, though valuable, have not been developed to a considerable extent.

The interior highlands are well grassed, but here the hot summers cause the grasses to dry early in some sections. Wild animal life is still abundant, including the tiger or ounce, puma, deer, wild dog, tapir, fox, water hog, and wild cat. Birds of song and plumage are nu-

merous and the marshy lagoons are frequented by large numbers of water fowl. Among the reptiles are several species of lizards, rattlesnakes, tortoises, and turtles. More than 2,000 species of insects abound, including venomous spiders and scorpions.

INDUSTRIES. Farming is the principal industry and corn and wheat are the chief cereals, both of which are exported. About half the cultivated area is utilized in growing wheat. Corn of a good quality is grown. Other crops include oats, barley, linseed, rye, and hay. Olives, grapes, lemons, oranges, peaches, apples, cherries, pomegranates, and figs are grown in abundance. Stock raising is carried on extensively, but the largest interests are vested in raising sheep and cattle. Other live stock includes horses, mules, swine, goats, and poultry.

Manufacturing is not an extensive enterprise, but considerable development has been made in the output of clothing, utensils, and machinery. Other manufactures include flour and grist, leather, cured and salted meats, canned fish and fruits, cheese and canned milk, and lumber and lumber products. The exports include meats, cattle, wool, fruits, and cereals, while the imports consist principally of textiles, hardware, and machinery. Commerce is largely with Brazil, Argentina, Germany, France, Great Britain, Spain, and the United States.

TRANSPORTATION. Uruguay has 685 miles of maritime and river navigation. Large steamers ply on the Rio de la Plata and the Uruguay, and small craft navigates the Rio Negro. Lake Mirim is important as an outlet on the border of Brazil. The railroad lines in operation include 1,415 miles and about 5,500 miles of highways are in an improved state. Communication by telegraph and telephone lines is general throughout the populated sections of the country. The post office system is well managed. The peso is the monetary unit and is equal to \$1.034.

GOVERNMENT. The government is based on a constitution that dates from 1830. It vests the executive authority in the president, who is selected by male suffrage for a term of four years. He is assisted by a cabinet of five members, including those of the interior, finance, instruction and public work, war and marine, and foreign affairs. Legislative power is vested in the congress, which consists of a senate and a chamber of deputies. Each province or department is represented in the congress by one senator, who is chosen for a term of six years by an electoral college, the members of which are elected by popular vote. The chamber of deputies is composed of 69 representatives,

elected for three years by popular suffrage. Uruguay is divided into nineteen departments or provinces for the purpose of local government. Each of these is ruled by an executive appointed by the president, but local legislation is vested in an administrative council for each department, whose membership is selected by popular vote. The smallest province has an area of 256 square miles, while the largest contains 8,074 square miles.

EDUCATION. The government contributes annually to the maintenance of a system of elementary and secondary schools, at which attendance is free and compulsory. These schools are maintained in part by local taxation. Montevideo is the seat of the University of Uruguay, which has an attendance of 450 students. Two normal training schools are maintained for the instruction of teachers. Other educational institutions include parochial schools, seminaries, a military institute, and an industrial school. Spanish is the official language. Roman Catholic is the state religion, but all other faiths are tolerated.

INHABITANTS. About seventy per cent. of the inhabitants are native born. This element is composed chiefly of people of Spanish descent, but includes a considerable element of Indian blood. European immigration is chiefly from Spain, France, Italy, and Germany. A large element of Brazilians is found in the northern part, and the western section contains many people who entered the country from Argentina. Montevideo, on the estuary of the Rio de la Plata, is the capital and largest city. Other cities include Salto, Mercedes, and Paysandu. Population, 1908, 1,103,040.

HISTORY. Uruguay was first visited by Juan Diaz de Solis, a Spanish explorer, in 1512, who found there a class of natives called Charuras. In 1516 he made a second visit to the region, but was slain by the natives in Colonia. Sebastian Cabot visited the region in 1527, but was defeated by the natives and compelled to retreat. The country was finally conquered by Jesuits in the time of Philip III. In the meantime numerous commercial settlements were formed by the Portuguese, but the Spanish established themselves at Montevideo in 1729. The region was long a part of Argentina, but in 1750 organized as an independent provincial government. A long struggle between the revolutionary government of Buenos Ayres and Brazil for supremacy in Uruguay finally made possible the establishment of the present republic in 1830. It was subsequently invaded at various times until 1870, but since then its development has kept pace with that of other

South American states. Claudio Williman was elected president in 1907.

URUMIAH (ōō-rōō-mě'ā), or Urmia, a city in Persia, ten miles west of Lake Urumiah and about fifty miles southwest of Tabriz. It occupies a fine site in a fertile valley about 4,500 feet above sea level and is defended by a wall of brick and mud. The surrounding country produces large quantities of grapes, vegetables, and flowers. It is visited regularly by caravans and has a brisk trade. The city is beautified by fine gardens, though it includes only a few buildings of importance. A Nestorian bishop has his palace in the city, and it is the seat of a number of foreign missionaries and mission schools. It has manufactures of carpets, clothing, earthenware, and furniture. Urumiah is the reputed birthplace of Zoroaster. Population, 48,500.

URUMIAH, a large lake of northern Persia, about 160 miles west of the Caspian Sea. It is 82 miles long and 26 miles wide. The area is 1,960 square miles. It has no outlet to the sea, hence its waters are exceedingly salty. The Jage-tu River, 138 miles long; the Ta-tu, 88 miles long; and the Aji-su, 175 miles long, flow into it, but the average depth does not exceed twenty feet. Fish and mollusks do not live in its waters, being too strongly impregnated with saline matter to sustain animal life. Extensive deposits of salt occur in the vicinity of the lake, which is itself gradually decreasing in depth and leaving a belt of saline deposits on its shores. Maragha, a town of 25,000 inhabitants, is situated 22 miles southeast of the lake.

USBEKS (ūs'běks). See **Uzbeks**.

USEDOM (ōō'zě-dōm), an island in the Baltic Sea. It is situated near the mouth of the Oder and belongs to Germany. The island is 35 miles long and 15 miles wide. It has an area of 150 square miles. The shape is very irregular, being indented by numerous bays and otherwise diversified by peninsulas and capes. For government purposes the island is a part of Pomerania. It is traversed by a railroad, which enters the island from the mainland, crossing the strait by an extensive iron bridge. The town of Usedom is on the southern shore and the port of Swinemunde is on the northern coast. Population, 1908, 34,628.

USURY (ū'zhŭ-rŷ), a term originally applied to the practice of lending money at interest, but now restricted to the charge of excessive rates of interest and to rates higher than those allowed by law. Legislation on the subject of usury dates from ancient times, but the practice attracted the most scrutinizing attention in the Middle Ages. In Athens, Solon

canceled all the debts made on the security of the person or land of the debtor and established a law that subsequent loans could not be made on the bodily security of the borrower, but instead provided that the creditor should be limited to property security. Aristotle was persistent in the opinion that no profit should accrue to the lender of money, a view approved quite generally by the church throughout the Middle Ages. This position, taken by the fathers of the church and the Christian lawmakers, was the means of giving the Jews material advantages in the enterprise of dealing in money. They loaned all their available funds at lucrative rates, and in many cases excited such opposition by their thrift resulting from money lending that they were expelled from many countries, as was the case in England in 1290. At present all nations recognize money lending as an honorable enterprise, but protect the borrowing class by limiting interest charges to reasonable rates. In most instances the legal rate is from five to six per cent., though rates ranging from seven to ten per cent. may be charged in case the contract so specifies. Contracts providing a rate of interest greater than that allowed by statutory law are not collectible in the courts.

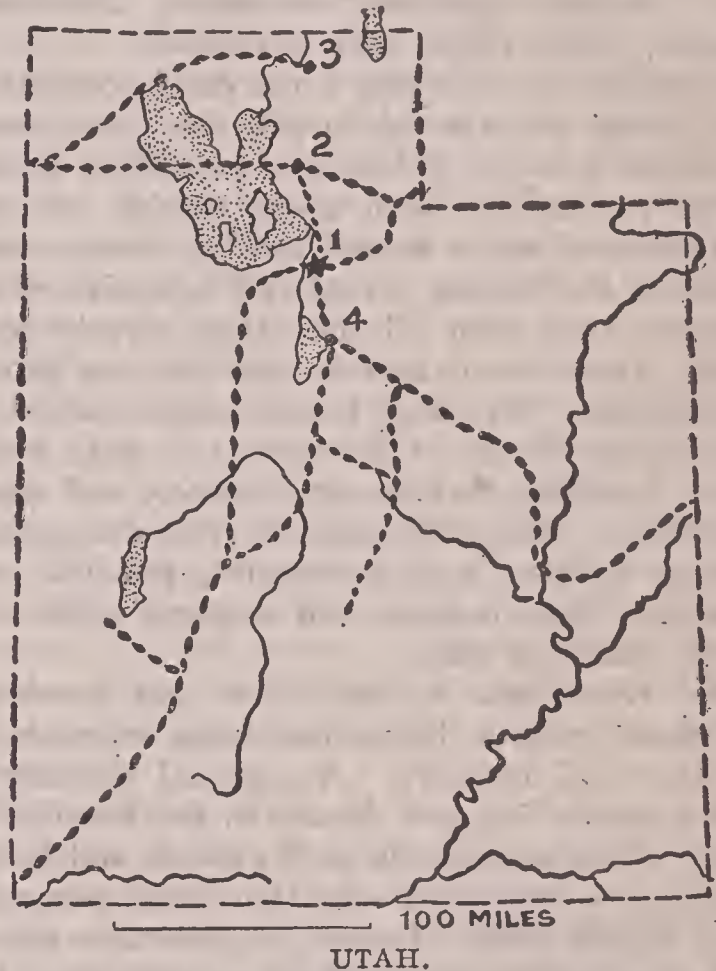
UTAH (ū'tā), a western State of the United States, popularly called the *Salt Lake State*. It is bounded on the north by Idaho and Wyoming, east by Wyoming and Colorado, south by Arizona, and west by Nevada. The length from north to south is 350 miles, the breadth is 280 miles, and the general shape is rectangular. All the boundaries are formed by lines of latitude and longitude. The area is 84,970 square miles, of which 2,780 square miles are water surface.

DESCRIPTION. The surface is diversified by high mountains, plateaus, and valleys, much of it being fertile, though arid. Utah occupies a favorable position in the great basin and through its center, from north to south, trend the chains of the Wasatch Mountains. These extend into groups and connected chains in various directions. Among the most important ranges are the Snow, Beaver, Thomas, Wah-Wah, Stansbury, Fremont, Wasatch, Raft River, and Uinta mountains. The principal peaks include Mount Hilgard, 11,460 feet; Mount Terrill, 11,600 feet; Wheeler Peak, 12,075 feet; Gilbert Peak, 13,690 feet; and Mount Peale, 12,930 feet.

The drainage is wholly into the interior lakes, which have no outlet to the sea, and into the Gulf of California by tributaries of the Colorado River. Chief among the rivers that belong to the Colorado basin are the San Juan,

Grand, Green, Virgin, and Uinta. Great Salt and Sevier lakes are remarkable for the extraordinary saltiness of their waters. The lakes are apparently the remnants of a vast inland body of fresh water that formerly covered the western part of the State. Great Salt Lake is the largest of the lakes. Into it flow the Bear River from Bear Lake and the Jordan River from Utah Lake. Sevier Lake, in the west central part, receives the drainage from the Sevier River. The Linear Plateau, in the southern part of the State, presents a variation from the more mountainous north and in this vicinity the Grand Cañon of the Colorado has its beginning.

The climate is pleasant and healthful, but the rainfall is insufficient to germinate and mature all the crops without irrigation. There is a



-1, Salt Lake City; 2, Ogden; 3, Logan; 4, Provo City. Dotted lines indicate the principal railroads.

wide range of difference in the temperature, from the pleasant valleys to the towering mountain peaks, and the exposed localities have sudden changes and great extremes in summer and winter. Salt Lake City has a mean temperature of 28° in January and 76° in July. The extremes range from 30° below zero to 112° above, but these figures are for the more elevated and exposed localities. Many of the mountains are capped with snow the entire year, hence form an important agency in preserving the moisture that is needed for irrigation. As a rule the snowfall is light. The

entire precipitation ranges from six inches in the southwest to seventeen inches in the vicinity of Salt Lake City.

MINING. The mineral wealth is important. Silver is the most abundant mineral and the annual output has a value of \$8,500,000. Gold takes rank next to silver and the annual yield is placed at \$5,250,000. In the production of copper Utah usually takes fifth rank. It likewise holds a high place in the production of salt. The State ranks third in the output of lead. Sulphur deposits of great value are worked in Millard and Washington counties and extensive fields of coal abound in Emery and Summit counties. Natural gas is found in large quantities in several parts of the State, especially in the vicinity of Salt Lake City, to which it is piped for use in the industries. Other minerals include granite, sandstone, limestone, gypsum, onyx, clays, and quicksilver.

AGRICULTURE. Farming is the chief occupation. The farms are owned largely by their occupants and average 212 acres. Irrigation is employed extensively with good results. In the cultivation of sugar beets Utah has fourth rank. Wheat is the leading cereal and is cultivated on a larger area than all the other cereals combined. Oats, corn, barley, and rye are grown successfully. Hay and forage crops exceed in acreage all others. Other crops include buckwheat, potatoes, flax, hemp, tobacco, and small vegetables. Many varieties of fruit are grown, such as grapes, apples, cherries, peaches, and apricots. Figs, lemons, and oranges yield well in the southern part.

The State has a vast area that produces nutritious grasses, hence has large interests in the live-stock industry. A material increase is shown within the past decade in the number of sheep, which are usually well graded, and in the quantity of the wool clip the State generally takes eighth rank. Large interests are vested in the cattle industry, both as an enterprise for obtaining meat and dairy products. Many large ranches are devoted exclusively to rearing horses, but as a rule the ranching is diversified in that a variety of animals are reared on the same ranch. Swine are grown profitably in sections where the climate is suitable for the cultivation of corn. Other domestic animals include mules, goats, and poultry.

MANUFACTURES. The materials for manufacturing purposes are varied and extensive. The mountains and plateaus contain forests of cedar and pine, while the lower altitudes are skirted by groves of aspen, box elder, willow, and cottonwood. The lakes yield catches for canning and carp culture has greatly extended

the fisheries. Beet sugar is manufactured on a large scale from native-grown beets, which produce profitably in the valleys, and much is done in canning and preserving fruits and vegetables. However, the larger manufacturing enterprises are connected with the mining industry and consist largely of the smelting and refining of ores. Other products include flour and grist, dairy products, confectionery, salt, packed meat, hardware, machinery, boots and shoes, clothing, and dried fruits.

TRANSPORTATION. Great Salt Lake is important for navigation, but none of the rivers is utilized for that purpose. The railroad lines include 1,895 miles. Among the principal lines are the Union Pacific, the Rio Grande Western, the Central Pacific, the Oregon Short Line, and the San Pedro, Los Angeles and Salt Lake. All the settled portions have more or less conveniences in the use of telephones, telegraphs, and other modern facilities. Salt Lake City is the principal railroad and commercial center and has a large jobbing and wholesale trade with points in the Rocky Mountain states. Minerals, wool, live stock, packed meat, and fruits are the leading exports.

GOVERNMENT. The constitution of Utah was adopted in 1895. It vests the executive authority in the governor, secretary of State, auditor, treasurer, attorney-general, and superintendent of public instruction, each elected for four years. Legislative authority is vested in the General Assembly, which consists of a senate and a house of representatives. The constitutional limit provides that the number of senators cannot exceed thirty, while the representatives cannot be less than twice nor more than three times the number of senators. The senators are elected for four and the representatives for two years, each in districts established by the Legislature. A supreme court of three or five judges has the highest judicial power. The judges of this court are elected for six years. District courts are maintained in judicial districts and the judges of such courts are elected for four years. Local government is administered by counties, municipalities, and townships.

EDUCATION. Originally the educational work was conducted largely through church organizations, but the present public school system was established in 1890. The rate of illiteracy is 3.1 per cent., based on the population ten years of age and over. The public schools are supervised under a State superintendent of public instruction, who is elected for four years and is aided by a board of education. In 1905 the Legislature enacted a law which permits the

school districts to consolidate and maintain elementary and graded schools. This legislation has tended to promote a closer gradation of the educational work in the rural communities. All the larger towns and cities have high schools, which are under the direct supervision of principals or superintendents. The higher education culminates in the University of Utah, which was founded at Salt Lake City in 1850. Normal instruction is given at the State University and at a branch normal school at Cedar City. Among the institutions of higher learning are the Agricultural College of Utah, at Logan; the Salt Lake Collegiate Institute, Salt Lake City; the Brigham Young College, Logan; the All Hallows' College, Salt Lake City; the Latter Day Saints' College, Salt Lake City; and the Brigham Young Academy, Provo City. About three-fourths of the inhabitants are allied with the Mormon Church, although all the leading Christian denominations are represented by organizations.

Ample provisions have been made for the unfortunate and incorrigible. Ogden is the seat of the State industrial school, Provo City has an insane asylum, and Salt Lake City has the State prison. An institution for the deaf, dumb, and blind is located at Ogden.

INHABITANTS. The inhabited portions are confined chiefly to the irrigated and mining districts, though ranches are maintained where grazing can be utilized profitably. About one-fifth of the inhabitants are of foreign birth. This element includes largely English, Swedes, Germans, and Danes. Salt Lake City, on the Jordan River, is the capital. Other cities include Ogden, Provo City, and Logan. In 1900 the State had a population of 276,749. This included a total colored population of 4,284, of which 217 were Japanese, 552 Chinese, 672 Negroes, and 2,623 Indians. Population, 1910, 373,351.

HISTORY. The region included in Utah was acquired by the Mexican cession in 1848. It was inhabited by the Ute or Utah Indians, hence its name. The early development of the State was due to the Mormons, who settled here under the leadership of Brigham Young in 1847. At that time the region was regarded a desert waste, but under the industry of the Mormons irrigation facilities were provided to redeem large areas of the land and, with the building of railroads and the development of mines, permanent prosperity was assured. A constitution was adopted and the region was named the State of *Deseret*, in 1849, but Congress refused to admit it as a State. The territorial government was established in 1850, when it

included a part of Wyoming, Colorado, and Nevada, but it was reduced to its present area in 1868. Polygamy was practiced for some time by a number of the Mormons, but the Edmunds bill of 1882 largely discontinued it, and subsequently plural marriages were renounced by the Mormon Church. In 1896 it was admitted as a State, since which time the growth of its institutions and industries has been continuous.

UTAH, University of, an educational institution at Salt Lake City, Utah, maintained for both sexes by the State. It was founded as the University of Deseret in 1850, but was closed for want of funds until 1867, when it was reopened. The present name was assumed under a new charter in 1894, when the government made a grant of 60 acres and the State appropriated \$300,000 to extend and enlarge its facilities. It maintains courses in the arts and sciences, mining, normal instruction, and preparatory branches. Admission is without examination, provided the students present a certificate from accredited schools. The faculty includes 35 instructors and professors and the attendance is 750 students. The university library has 25,000 volumes and the property is valued at \$375,000.

UTAH LAKE, the largest fresh-water lake of Utah, in Utah County, 30 miles south of Salt Lake City. It extends 25 miles from north to south, is 13 miles wide, and has an area of 152 square miles. Its altitude above sea level is 4,500 feet. The lake is situated in a productive region of the State and is surrounded by railway lines. Provo City and several other towns are on its shore. The lake has an abundance of fine fish. Its outlet is into Great Salt Lake by the Jordan River.

UTAHS, or Utes, a tribe of Indians of the Shoshone family, formerly found in the region now occupied by Utah, Colorado, and a part of New Mexico. They subsist largely by hunting and fishing, though some engage in agricultural and pastoral pursuits. The Utahs are known as a brave and warlike class of Indians, but those on the Utah reservation are making considerable progress in industrial and educational arts. The tribe numbers about 15,000, though only about 5,000 are confined to the reservations in Utah, the others being in New Mexico, Colorado, and adjoining states.

UTICA (ū'tī-kā), a city in New York, county seat of Oneida County, on the Mohawk River, 95 miles west by north of Albany. Communication is furnished by the West Shore, the New York, Ontario and Western, the New York Central, the Delaware, Lackawanna and Western, and other railroads. Several electric

railways furnish transportation to many parts of the State. Utica has a fine site, which rises gradually from the river, and the streets are well graded and paved. The surrounding region is a productive farming and dairying country. It has a large trade in cereals, fruit, merchandise, roses, cheese, hops, and live stock.

The city is well built of stone and brick. Among the noteworthy buildings are the county courthouse, the city hall, the Federal building, the public library, the Y. M. C. A. building, the Balliol School, the Faxton Hall Library, the German Library, and the State insane asylum. It has the Utica Orphan Asylum, the Masonic Home, the Home for the Homeless, and many fine churches and hospitals. Utica has taken high rank as an industrial center since the completion of the Erie Canal. Among the principal manufactures are cotton and woolen goods, butter and cheese, ironware, spirituous liquors, machinery, boilers, earthenware, knit goods, and clothing. In 1772 the first settlement was made at Fort Schuyler and six years later the name was changed to Utica. It was incorporated as a city in 1832. Population, 1910, 74,419.

UTICA, anciently a city of Africa, situated about twenty miles northwest of Carthage, near the present city of Tunis. It is thought that the Phoenicians founded it about 1101 B. C. and it rose rapidly into commercial importance. Carthage was founded nearly 300 years later and the two cities long defended themselves under an alliance against the Roman invasions. It submitted to Rome in the Third Punic War, but Carthage continued its opposition and was destroyed, thus giving the former important trade advantages after the Roman conquest. It became the capital of the province and remained the emporium of Roman trade until Caesar rebuilt Carthage in 44 B. C. On its site are ruins dating from Roman occupation, including walls of an amphitheater that had a seating capacity for 20,000, baths and cisterns, and an artificial lake used by the Romans for practice in the arts of naval warfare. With the decline of Rome, it fell into the hands of the Vandals, in 439 A. D., and was afterward taken by the Byzantine leaders. It was finally captured and destroyed by the Arabs in the 8th century. Utica is mentioned in history as the city where Cato suicided.

UTILITARIANISM (û-tîl-î-tā'rî-ān-îz'm), the system of philosophy which teaches that all moral conduct is to subserve utility. According to this view the standard of right and wrong is based upon the theory that the happiness of mankind is the ultimate end of both ethics and philosophy. It stands in contradis-

inction to the theories that the test of right and wrong is to be referred to some internal sense or sentiment, which is described as conscience, moral sense, or innate moral distinctions. Some writers speak of utilitarianism as the external or the objective standard of morality, since it makes utility, not internal feeling, the standard of action. As a doctrine it may be traced back to the Greek moralists, who identified the supreme good with happiness. However, it was not emphasized in England until stated by John Locke. Later it was more clearly defined by John Stuart Mill and accepted in the philosophies of John Spencer and Sir Leslie Stephen.

UTOPIA (û-tō'pî-ā), the title of a romance published by Sir Thomas More in 1516, in which he describes an imaginary island called Utopia. He represents that the island was discovered by a companion of Amerigo Vespucci. Upon this island everything was found perfect: the laws, the morals, and the politics. Here no private ownership of property was recognized, but all wealth belonged to the government, and the wants of all were supplied from the common source. All persons labored willingly to contribute to the common stock, all tolerated the religious opinions of others, all received the exact credit to which they were entitled, and, moreover, all were entirely satisfied with their state. The work was published in Latin, but was soon translated into English by Bishop Burnet. The sale of this work has been enormous, and there have been translations into many languages. It gave rise to the familiar epithet *Utopian*, a term commonly applied to visionary reforms in social and political affairs. "Looking Backward," a work published by Edward Bellamy, is quite similar in many respects to the "Utopia" of More.

UTRECHT (û'trēkt), a city of the Netherlands, capital of the province of Utrecht, 22 miles southeast of Amsterdam. It occupies an imposing site in a fertile region, being surrounded by beautiful fields, orchards, and flower gardens. The city has extensive railroad connections with other trade centers and additional transportation facilities are provided by two national canals. It maintains a fine system of public schools and is the seat of a musical college, a veterinary school, numerous churches, and the Cathedral of Saint Martin. The University of Utrecht was founded in 1623 and now has an attendance of 875 students, excellent botanical gardens, laboratories, and a fine library. Several bridges cross the canals. The streets are substantially paved and improved by gas and electric lighting, a number of fine monuments, and an extensive system of rapid tran-

sit. Among the manufactures are tobacco products, furniture, salt, metalware, carpets, chemicals, textiles, clothing, cordage, and musical instruments. It has an extensive market in live stock, fruits, grain, and dairy products. Utrecht ranks as one of the oldest cities of the Netherlands and dates from the period of Roman occupation. The United Netherland Republic was formed at Utrecht in 1579 and the peace of Utrecht was signed here in 1713. Population, 1906, 114,692.

UTRECHT, Treaty of, a celebrated peace treaty signed at Utrecht, in the Netherlands, on April 11, 1713, by which the ten years' war of the Spanish succession was concluded. The treaty was agreed to by Prussia, Savoy, England, Portugal, France, and other interested nations. Among the important features of the treaty are that the Hanoverian succession in England was recognized, that the King of Prussia was recognized in his title and received a part of Spanish Guelderland, that Newfoundland, Nova Scotia, Hudson Bay Territory, and several other French possessions were ceded to England, that Nice and Savoy were restored to

the Duke of Savoy, who received the title of king and became presumptive heir to the Spanish throne, and that France stipulated not to unite the crowns of France and Spain. The treaty recognized Neuchâtel as a possession of Switzerland and several other minor conditions were included.

UZ, a region mentioned in the Old Testament as the scene of the story of Job. It appears that Job resided in the country east of Palestine, near Edom, where he was visited by his friends Eliphaz the Temanite, Bildad, Zophar, and Elihu.

UZBEKS, Usbeks, or Usbegs, the name of a people of Turkestan. They belong to the Turkish branch of the Turanian race. Writers class them as the most progressive inhabitants of Turkestan, where they have their chief seats of influence at Bokhara, Khiva, and Khokan. Though some are nomadic, most of them have fixed homes and engage in agricultural and commercial pursuits. In religion they are rigid Mohammedans. They dwelt on the Jaxartes up to the 14th century, when they moved westward. The Russians place their number at 1,500,000.



V

VACUUM

V, the fifteenth consonant and the 22d letter of the English alphabet. The letter was derived from the Phoenician through the Greek and the Roman languages, corresponding to the Roman V. It represents a labial or labio-dental consonant sound and is formed by the junction of the upper teeth and the lower lip, as in *ov*, *eve*, and *vain*. The sound of *v* is produced in the same way as that of *f*, but differs from the latter in being voiced, while the sound of *f* is breathed. As a Roman numeral *v* is used to denote the same value as the Arabic 5 and when a dash is placed above it, as \bar{V} , it represents 5,000.

VAAL RIVER COLONY. See **Transvaal.**

VACCINATION (*văk-sĭ-nă'shŭn*), the art of introducing vaccine matter into the human system with the view of providing protection against smallpox, or to render that disease less severe. The vaccine matter generally used is the so-called vaccine virus, obtained from pustular eruptions on the skin of the teats and udders of cows having cowpox, an acute contagious disease. The common method is to cut the skin slightly with a clean lancet point, usually on the upper part of the arm, and then rub the vaccine matter over the skin containing the scratches. Vaccination pustules formed on another person answer the same purpose. Where the vaccination proves successful, inflamed pustules form the third day. Loss of appetite and slight headaches usually occur the eighth day, and the inflammation begins to decrease the tenth day. A scab forms after the pustules are dried up, which usually disappear the twentieth day and leave a slight scar. Jenner is the discoverer of vaccination.

Considerable disagreement has been common among medical men as to the value of vaccination, some alleging that it is no reliable means of protection, and instead recommend strict observance of sanitary and hygienic laws. It is

contended by others that successful vaccination either entirely prevents contagion or greatly lessens the severity of the disease. They recommend that a child be vaccinated at about the fourth month after birth and that subsequent vaccinations be made at an interval of six or seven years. Children are refused admission to the public schools in some countries unless they are previously vaccinated. In 1900 smallpox was epidemic in the United States, Russia, Mexico, France, Germany, and many other countries. It was proven quite conclusively that the disease was most general in sections where vaccination had decreased. Subsequently the health authorities of many cities in the United States ordered general vaccination. In 1901 the authorities of Constantinople made it compulsory to vaccinate, under penalty of a fine.

A notable instance of successful results in the value of vaccination as a protection against smallpox was reported from Porto Rico and the Philippines in 1908, where the disease was epidemic. The government of the United States performed 800,000 vaccinations in these islands and in four months abolished the disease. Formerly the death rate was 6,000 from smallpox, but in the year following the general institution of vaccination no deaths were reported from a large number of districts. This is in practical accord with the experience in Europe in the 18th century, when smallpox was as common as measles. Medical authorities place the death rate from the disease very high in that continent before the value of vaccination was discovered, as high as 15,000,000 in a quarter of a century.

VACUUM (*văk'ŭ-ŭm*), a space which is devoid of any material substance. Modern experience bears out the view that an absolute vacuum does not exist in nature. Even as practically applied, it is understood that ether

fills the space, termed the vacuum, from which the matter has been removed. The most perfect vacuum that could be obtained up to the last century was the space in a carefully filled barometer tube, called the *Torricellian vacuum*. It is now possible to remove all but about $\frac{1}{120}$ of the air in the receiver of an air pump. In case this is done the air remaining can be exhausted almost entirely by carbolic acid being injected and pumped out several times, after which all traces of remaining air may be removed by moistened caustic potash previously placed in the receiver. The presence of a quantity of sulphuric acid is quite essential in making these experiments. It is now possible to make an exhaustion so nearly complete that the matter remaining is not sufficient to allow an electric spark to pass through it.

VACUUM PAN, a closed metallic retort which is used for boiling down sirup and in making sugar. However, only a partial vacuum is formed within such a vessel, this being accomplished by connecting it with an exhausting apparatus. The use of the vacuum pan permits the liquid to evaporate and concentrate at a lower temperature and a lower atmospheric pressure than ordinarily. It likewise overcomes the danger of burning the sugar and shortens the operation. Vacuum pans may be used in the manufacture of any substance in which a low temperature is required.

VACUUM TUBES. See **Crookes Tubes.**

VALDAI HILLS (vål-dí'), an elevated region of hills in western Russia, about 125 miles southeast of Saint Petersburg. Within these highlands are the sources of the Volga, Duna, and Dnieper rivers. The general elevation is about 310 feet above sea level, but Mount Popovagora is 1,095 feet. Immediately west is Lake Ilmen. The region is well wooded and watered. Fine farms are located in the valleys and lower slopes, while the higher altitudes have fine grasses.

VALDIVIA (vål-dě'vê-ä), a city of Chile, capital of a province of the same name, near the mouth of the Calla-Calla River. It has a well-sheltered harbor at Port Valdivia, on the Pacific coast, about sixteen miles east, and is connected with interior points by railways. The streets are regularly platted, but the buildings are quite low. It has a large export trade in hides, lumber, cattle, and minerals. The place was founded by Pedro de Valdivia in 1551. Population, 1908, 10,452.

VALDOSTA (vål-dös'tà), a city in Georgia, county seat of Lowndes County, in the southern part of the State, on the Valdosta Southern, the Plant System, and the Georgia Southern and

Georgia railroads. The surrounding country produces sugar cane, corn, tobacco, hay, and vegetables. Among the noteworthy buildings are the county courthouse, the high school, the public library, and several churches. The manufactures include cigars, clothing, earthenware, and machinery. Among the general improvements are electric lights, telephones, waterworks, and sanitary sewerage. It was settled in 1859 and incorporated in 1860. Population, 1900, 5,613; in 1910, 7,656.

VALENCIA (vå-lën'shĭ-à), a seaport city of Spain, on the Mediterranean Sea, about 200 miles southeast of Madrid. It occupies a convenient site on the Guadalaviar River and has excellent railroad facilities. The streets are narrow and crooked in the older parts, but the newer quarters have broad and handsome thoroughfares and are provided with numerous modern improvements, such as gas and electric lights. It has an extensive system of electric street railways, street pavements, waterworks, and public parks. A broad quay, beautifully improved by avenues of trees, is located along the river. An avenue called the Alameda passes from the quay to the harbor on the Mediterranean. The city is surrounded by fine orchards and vineyards, and through it pass a number of canals and a network of pipes carrying the city water supply. Among the chief buildings is the La Seo Cathedral, a Gothic structure of the 13th century, and near it are a number of chapels. Other buildings of note include the customhouse, several secondary schools, and the university. Valencia is noted for its manufacture of tobacco products, which aggregate 145,000 pounds per year. Other manufactures include glass, leather, linens, silk and cotton textiles, pottery, soap, machinery, clothing, ironware, and musical instruments. It has a large interior and foreign trade in silk, spirits, cereals, and fruits. The fine climate and convenient transportation facilities make it a favorite summer resort. Valencia was a Roman city, but subsequently became a center of Gothic influence, and in 713 was captured by the Moors. In 1812 it surrendered to the French. Population, 1906, 218,804.

VALENCIA, a city of Venezuela, 30 miles south of the Caribbean Sea and about 82 miles southwest of Caracas. It has railroad connections with Puerto Cabello and is situated in a fertile farming and stock-raising region. The streets are regularly platted and substantially improved by pavements, sewerage, and waterworks. About eight miles east of it is Lake Valencia. The manufactures include cotton and woolen goods, pottery, machinery, cordage, to-

bacco products, and farming implements. Among the noteworthy architectural structures are a number of schools and churches, several government buildings, and numerous hotels and business establishments. It was founded by the Spanish in 1555. Population, 1908, 42,415.

VALERIAN (vā-lē'rī-ān), a genus of plants native to Europe, many of which are cultivated in all the continents. About 180 species have been described, including both annual and perennial plants. Most of these species have fleshy roots, woody fibers, and yield gummy and resinous substances. The alpine valerian is used for perfuming baths and as a substitute for spikenard. Several of the species are valuable for their medical property, which is derived from the root as a volatile oil, known as the *oil of valerian*. Preparations of it are used in treating hysteria, chorea, and nervous irritability. Cats are peculiarly attracted by the smell of valerian. Wild species are found in some parts of North America, especially in the swamps of New Brunswick, Michigan, and Vermont.

VALETTA (vā-lēt'tā), or **La Valetta**, a seaport city of Malta, capital of that island, situated due south of Sicily. It is strongly fortified and has a large and commodious harbor. The site of the city is on an elevated neck of land, about two miles long, and at its extreme point is a powerful lighthouse. The streets are platted with considerable regularity, crossing each other at right angles. They are improved with stone pavements, electric lights, waterworks, and several fine squares. Among the chief buildings are the governor's palace, the Cathedral of Saint John, and a number of schools and churches. It has several monuments erected to Italian leaders. The city has a library of 60,000 volumes and a university. The water supply is obtained by an aqueduct nine miles long. It is so named from John de la Valette (1494-1568), grand master of the Knights of Saint John, who successfully defended the island of Malta against the Turks in 1566. Among the industries of the city is shipbuilding. It has manufactures of wine, cotton and silk textiles, pottery, and clothing. It is the seat of a considerable trade in grain, coal, wine, and fruits. Population, 1906, 62,826.

VALHALLA (vāl-hāl'lā). See **Walhalla**.

VALLADOLID (vāl-yā-thō-lēt'h'), a city of Mexico, in the state of Yucatan, 88 miles southeast of Merida, with which it is connected by railway. It occupies a fine site in the center of a fertile region, which produces cereals, sugar cane, and tobacco. The noteworthy buildings include the city hall, the post office, the Fran-

ciscan convent, and the Jesuit College. Among the manufactures are cotton and woolen goods, utensils, tobacco products, clothing, and earthenware. The climate is the best found in Yucatan, hence it is a favorite place for invalids. Population, 1909, 15,206.

VALLADOLID, a city in Spain, capital of the province of Valladolid, 98 miles northwest of Madrid. It is situated on the Pisuerga River, a tributary of the Douro, and has railroad connections with the leading interior and seaport cities of the Iberian peninsula. The climate is genial and healthful, the sky is generally cloudless, and surrounding it is a region noted for its abundance of live stock, cereal crops, and vegetables. Its chief structures include the Plaza de Toros, or bull arena, having a seating capacity for 10,000 persons, and a number of schools, churches, hospitals, and public buildings. It has remains of several fine palaces. The streets are paved and otherwise improved, and within recent years many of the older buildings have given way to fine business blocks and beautiful residences.

Valladolid is noted as an industrial center. Among the principal manufactures are silk and cotton textiles, paper, jewelry, woolens, perfumery, pottery, clothing, and machinery. It has a large trade in live stock and grain, considerable quantities being transported by railway and by navigation on the Douro. Valladolid was known as *Pincia* in the time of the Romans. The Moors called it *Belad-Walid*, and after their expulsion it was occupied by Ordone II. of Leon. Charles V. improved it by constructing many beautiful buildings and palaces, when it had about 100,000 inhabitants. It began to decline in 1560, when Madrid became the only residence of the Spanish sovereigns. It still maintains a university, an institution that has flourished nearly six centuries. Population, 1908, 72,591.

VALLEJO (vāl-yā'hō), a city of California, in Solano County, on the Bay of San Francisco, 26 miles northeast of San Francisco. It is on the Southern Pacific Railroad and is an important shipping point. On Mare Island, near the city, is the most important United States naval yard on the Pacific coast. Among the principal buildings are the high school, the Carnegie library, the Sailors' Club House, the Orphans' Home, and the Saint Vincent's Academy. The surrounding country is farming and fruit growing. It has manufactures of ironware, machinery, pottery, lumber products, engines, sailing vessels, and farming implements. The municipal improvements include pavements, waterworks, and electric street

lighting. It has a growing trade in farm produce and merchandise. Population, 1910, 11,340.

VALLEY, a tract of land bordered by hills or mountains and usually drained by a stream. A valley is properly a strip of low land between hills or mountains, but in a larger sense the term is applied to the entire basin of a river, as the valley of the Nile and the valley of the Mississippi. Valleys are said to be *transverse* when they run across a range of mountains, and those that extend parallel to the principal ranges are termed *longitudinal*. Transverse valleys are usually narrow and have steep sides. Where they occupy high altitudes, as in the Alps, they are known as *passes*. The Simplon Pass of Switzerland and the Kabul Pass in the Himalayas are noted instances. On the other hand, transverse valleys in low altitudes are termed *water gaps*, of which the Delaware Water Gap is an instance.

Erosion is the chief agency in the formation of a valley. Where the rocks decay and are acted upon by the frost, the erosion is more rapid, especially if the running stream has a swift current. Valleys formed in this way were originally narrow and bordered by steep walls, but the lapse of time caused them to be widened so as to form level tracts on one or both sides of the stream. In some instances the cause of valleys is assigned to the upheaval and depression of the crust of the earth. Such action is said to be volcanic, but valleys formed in this way are usually much shorter than those resulting from the action of streams. The action of glaciers gives rise to glacial valleys, such as the fiords of Norway and the firths and lochs of Scotland. Many of such formations are due to the agency of glaciers in the remote past.

VALLEY CITY, a city of North Dakota, county seat of Barnes County, 58 miles west of Fargo. It is situated on the Sheyenne River, on the Northern Pacific, and on the Minneapolis, Saint Paul and Sault Sainte Marie railways. The surrounding country is fertile and produces large quantities of wheat, flax, and vegetables. Among the noteworthy buildings are the county courthouse, the high school, a number of churches, and a State normal school. The enterprises include flouring mills, grain elevators, and machine shops. Electric lighting, waterworks, and sewerage are among the public utilities. It has a large trade in farm produce and merchandise. Near the city is a large double-track viaduct of the Northern Pacific Railroad. This structure was built in 1906, at a cost of over \$1,000,000, has a height

of 164 feet, and is about 4,000 feet long. Population, 1905, 4,059.

VALLEYFIELD, a port city of Quebec, in Beauharnois County, thirty miles southwest of Montreal. It is situated on Lake Saint Francis, the Saint Lawrence River, the Beauharnois Canal, and the Grand Trunk and other railways. Opposite the city, on the north side of the river, is Coteau Landing. The chief buildings include a college, the cathedral, the public hospital, and the Windsor Hotel. Among the manufactures are cotton goods, flour and grist, paper, and machinery. The city has fine water power, electric lights, sewerage, and waterworks. Population, 1901, 11,055.

VALLEY FORGE, a village of Pennsylvania, in Chester County, 24 miles west of Philadelphia, on the Schuylkill River and the Philadelphia and Reading Railway. It is famous as the place where the American army of 11,000 men under Washington camped in 1777, after the battles of Brandywine and Germantown. The object of camping at this place was partly to protect Congress, which was then in session at York, Pa., and partly to be in a place where its defense would be aided by the hilly condition of the site during the winter. Want of sufficient clothing and food caused great suffering among the men, owing to the incapacity of the commissary department, and many died from hunger and cold. However, Baron Steuben, who had come from Germany to assist the Americans, rendered valued services by bringing the army up to a better discipline and greater efficiency for service. Washington abandoned the camp on June 18, 1778, and reoccupied Philadelphia.

VALLOMBROSA (vāl-lōm-brō'sà), a famous abbey of Italy, situated in a valley between the Apennines of Tuscany, about fifteen miles east of Florence. In the vicinity are fine groves of chestnut, fir, beech, and mulberry trees. It dates from 1038, when Saint Giovanni Gualberto founded a house of monks subject to the rule of Saint Benedict. The chief building was erected in 1637, but, as the monastery was suppressed in 1863, it is at present occupied by the Royal Academy of Forestry, which was opened in 1869. The abbey of Vallombrosa is mentioned by Milton in "Paradise Lost."

VALMY (vāl-mě'), a village of France, in the department of Marne, 35 miles southeast of Rheims. It is famous as the scene of a battle on Sept. 20, 1792, when a German army under the Duke of Brunswick made an attack upon the French under Dumouriez and Kellermann, but was repulsed. The engagement is frequently spoken of as the cannonade of

Valmy, owing to the bravery displayed by the assailants under a furious cannonade. It is classed as one of Creasy's "Fifteen Decisive Battles of the World," owing to the fact that it was the first triumph of the new republic established in France.

VALOIS (vāl-wä'), **House of**, an eminent dynasty of France. It was a branch of the Capetian dynasty, which possessed the throne from 1327 to 1589. The early monarchs of this line were able and valiant rulers. They successfully resisted the incursions of the English, established the supremacy of the crown over the nobles, and gave France an eminent position among the nations of Europe. Francis I. was one of the noted sovereigns of the house of Valois and was distinguished for his firm disposition and remarkable ability, but his successors were less fortunate and under their government the country became distracted by the rise of powerful nobles, internal dissent, and religious disturbances. Historically, the dynasty dates from 1285, when Philip III. assigned to his younger son Charles the county of Valois, a region now included in the departments of Aisne and Oisne. The Capet dynasty becoming extinct in 1327, the eldest son of Charles of Valois ascended the throne of France as Philip VI., thus founding the Valois dynasty. The sovereigns of the Valois line include the following: Philip VI. (1327-1350); John the Good (1350-1364); Charles V. (1364-1380); Charles VI. (1380-1422); Charles VII. (1422-1461); Louis XI. (1461-1483); Charles VIII. (1483-1498); Louis XII. (1498-1515); Francis I. (1515-1547); Henry II. (1547-1559); Francis II. (1559-1560); Charles IX. (1560-1574); and Henry III. (1574-1589). The dynasty was succeeded in the last mentioned year by the house of Bourbon.

VALPARAISO (vāl-pā-rī'sō), a city in Indiana, county seat of Porter County, 43 miles southeast of Chicago, Ill., on the Pennsylvania, the Grand Trunk, and the New York, Chicago and Saint Louis railroads. It is surrounded by a fertile farming and dairying country. The noteworthy buildings include the county courthouse, the high school, the city hall, and the Saint Paul's Academy. It is the seat of the Northern Indiana Normal School, an important educational institution of higher learning, having departments of normal training, law, engineering, music, languages, and business training. It is attended by about 1,500 students. The city has manufactures of flour, ironware, clocks, cigars, lumber products, clothing, machinery, and farming implements. It has a growing trade in farm produce, fruits, and merchandise.

The place was settled in 1826 and incorporated in 1856. Population, 1900, 6,280; in 1910, 6,987.

VALPARAISO, a city of Chile, on a large bay of the Pacific Ocean, 88 miles northwest of Santiago. It is finely located on the Bay of Valparaiso, on which it has a large and safe harbor, and ranks as the largest city and commercial emporium of the republic. Several railroads connect it with a number of cities on the Pacific coast and a transcontinental line furnishes communication with Buenos Ayres and other cities on the Atlantic seaboard. The chief buildings include the customhouse, the union railway depot, several fine churches and schools, and several institutions of secondary learning. It is the seat of a number of hospitals and charitable institutions, several seminaries, and a number of scientific and educational associations.

Valparaiso is one of the leading industrial centers on the Pacific coast of South America. The manufactures include tobacco products, clothing, earthenware, spirituous liquors, vehicles, sugar, machinery, and farming implements. Its interior and foreign trade is important, the commodities including chiefly lumber, minerals, live stock, hides, sugar, cereals, wool, and wine. A chain of forts constructed in 1866 defends the city. Among the general improvements are electric lights, waterworks, and electric street railways. A destructive earthquake visited the region in 1822 and again in 1906. In the latter year a thousand people were killed and 75,000 were rendered homeless. Valparaiso was founded by the Spanish in 1544. Hostilities between President Balmaceda and insurgents occurred at Vina del Mar, three miles northeast of Valparaiso, in 1891. In 1892 a force of Chileans made an attack upon the American ship *Baltimore* in its harbor, but the difficulties were adjusted by the payment of an indemnity. Population, 1908, 176,348.

VALUE (vāl'ū), in economics, the worth of an object estimated by any standard of purchasing power, such as the market price or the amount of money considered equivalent to the utility or cost of it. It has been defined as the estimate of the amount of sacrifice necessary to attain an object that may be desired. However, *utility* and *scarcity* are two fundamental factors that enter into the matter of determining the value of any object, and when they are considered together they constitute the so-called *law of supply and demand*. By utility is meant the qualities in objects that make them desirable. Any object that does not possess utility is not considered of value, since no one would care to make a sacrifice unless the object gratifies

some desire. Scarcity may be defined as the absence of an abundance, or as a limited supply when the demand is great, and under such conditions the value becomes proportionately higher. In general, value is spoken of as the price of an article and money is termed the *measure of value*. See **Wealth**.

VALVE (vǎlv) in mechanics, a movable piece in a tube, fitted to act like a door or gate to permit the passage of a liquid, whether in the form of gas, steam, water, or solutions. The valves are variously constructed, depending upon the uses they are to serve. In general, valves may be classed as those operated by hand, by independent mechanism, by the movement of machinery, and by the action of a fluid. *Sliding-valves* open parallel to the seat, *lift* or *puppet valves* rise perpendicularly, and *flap-valves* rotate in an opening. Pumps and steam boilers are fitted with *self-acting valves*, since the water or steam open or close them according to the pressure of the fluid upon their surface. Sliding-valves, such as are used in the cylinder of a steam engine, are controlled by some external force, the opening and closing having the effect of regulating the admission or escape of steam.

VAMPIRE (vǎm'pīr), a so-called demon of Southeastern Europe, which is believed by the superstitious to roam about at night in search of persons, whose blood it sucks. The superstition is of Eastern origin and still prevails among the more ignorant classes occupying the region tributary to the Lower Danube. The Lamias mentioned in Greek mythology are similar to the vampire. It was the common belief in the Middle Ages that persons who died under the ban of the church became vampires and were sent forth by the devil to devour the hearts and souls of those with whom they came in contact. New vampires were thought to spring from those killed by other vampires. Some believed that heretics and wizards became vampires at their death. To end the career of a vampire, it was necessary to discover its grave and, after disinterring the corpse, it was pierced with a thorn stake and burned. The belief prevailed that vampires were fond of the blood of both women and men, and that they were especially eager to secure subsistence by destroying youths.

VAMPIRE BAT, the name of a class of small bats, so called from their habit of obtaining subsistence by sucking blood from larger animals. They pierce the skin by a pair of prolonged teeth and usually attack the victim while asleep. The ears are large, the gullet is fitted only for the passage of liquid food, and the wings have a large expanse considering the size

of the animal. These bats are pests in some sections in that they attack domestic animals, such as cattle and horses, and have been known to fasten themselves to man during sleep. The common vampire bat is found in the region from Central America to Chile. However, several species of so-called vampire bats of South America are not blood-sucking but, instead, feed upon fruit.

VAN (vǎn), a fortified city of Asiatic Turkey, situated on the eastern shore of Lake Van, 138 miles southeast of Erzeroum. It is the chief city of the vilayet of Van, one of the most fertile regions of Asiatic Turkey. Lake Van is about 5,400 feet above sea level and at the city of Van has a depth of 80 feet, thus affording excellent anchorage for sailing vessels. The lake is 80 miles long and 40 wide and has an area of 1,350 square miles. It has no outlet to the sea and its waters are salty. Van is noted for its numerous bazaars, mosques, and Armenian churches, though the streets are not well paved and are quite narrow. Among the manufactures are cotton and woolen goods, earthenware, carpets, and implements. Many caravans visit the city, penetrating thence into Persia, Arabia, and Asia Minor. In the vicinity are many ruins dating from the time of Xerxes. The Asiatic people have a tradition that Semiramis founded Van, but it was named from Van, King of Armenia, who governed the region from 371 to 351 B. C. Population, 1906, 32,645.

VANADIUM (vǎ-nā'dī-ŭm), a metallic element found only in combination with other minerals, discovered by Sefstrom in 1830. It occurs in vanadinite, the vanadate of lead; in volborthite, a copper vanadate; and in a number of others. The metal forms a monoxide with oxygen and combines with platinum to form an alloy. It melts at a very high temperature. Vanadium is used chiefly with aniline as a dye, for a black pigment, and as the basis of a black ink.

VANCOUVER (vǎn-kōō'ver), an island off the Pacific coast of North America, lying west of British Columbia and northwest of the State of Washington. It is separated from the former by Queen Charlotte Sound and the Strait of Georgia and from the latter by the Strait of Juan de Fuca. The length from southeast to northwest is about 285 miles; width, from 15 to 70 miles; and area, 12,760 square miles. The surface is essentially a mountain range, with a number of fertile valleys and a narrow coast. Splendid forests are abundant in the valleys and mountains. The mountains rise to heights ranging from 3,500 to 6,975 feet. Mount Albert Edward, height 6,975 feet, is the highest summit. It has an abundance of drainage, but

the streams are small and unimportant. The shores are largely precipitous and rocky and the coasts are indented by numerous inlets.

Many islands abound off the eastern and western shores, most of which are rocky and well timbered. The chief minerals include gold, copper, iron ore, and coal, though the last mentioned is worked most extensively. Mining, lumbering, and fishing are the leading industries. Agriculture and stock raising are pursued successfully. The salmon fisheries are the most important, though other fish abound. It has a considerable fur trade, including the skins derived from the otter, marten, mink, beaver, sable, bear, deer, and seal. The chief soil products include cereals of all kinds, fruits of the Temperate Zone, and vegetables. Among the domestic animals grown chiefly are horses, sheep, cattle, and poultry. The excessive rainfall converts the short streams into torrents, especially in autumn and spring. Vancouver has a climate greatly tempered by the Pacific, its temperature seldom falling below 15° and rarely rising above 85°.

The island is so named from Capt. George Vancouver (1758-1798), who discovered it in 1792, though it had been visited by Juan de Fuca in 1592. Captain Cook surveyed a part of the coast, in 1778, and Captain Vancouver soon after prepared a map of it and of the waters separating it from the mainland. The island was long claimed by the United States, but it has been a British possession since 1846. In 1859 it was made a colony, but it was united with British Columbia in 1866, of which Province it still forms a part. Victoria, on the southern extremity of the island, is the capital of the Province. A railway extends from Victoria to Wellington and the coal fields in the vicinity of Nanaimo. Esquimalt, near Victoria, has a fine harbor and is a station of the royal navy. The inhabitants include 10,000 Wakash Indians.

VANCOUVER, the largest city of British Columbia, county seat of New Westminster County, sixty miles northeast of Victoria. It has a fine harbor on Burrard Inlet, an extension of the Strait of Georgia, and is the western terminus of the transcontinental line of the Canadian Pacific Railway. The site occupies a rolling tract of land, which rises gradually from the harbor. The streets are platted regularly and improved with substantial pavements. Intercommunication is by a system of electric railways, with which are connected lines that extend to Steveston, New Westminster, and other towns. Stanley Park is a fine public re-

sort and contains much natural scenery of great beauty, including a remnant of primeval forests, through which have been constructed fine roads and pathways. Near the entrance to the harbor is Siwash Rock, one of the most picturesque features of the rugged scenery that beautifies the channel between the city and the open sea. Other parks include East End and False Creek, both beautiful and popular public grounds. The business section lies near the harbor, extending for some distance along the margin of the channel, and beyond it is the residential part of the city.

Much of the architecture is of brick and stone and the larger structures are modern and substantial. The depot of the Canadian Pacific Railroad is centrally located near the harbor and is one of the largest buildings in the city. Other structures of note include the courthouse, the post office, the public library, the Vancouver and the Badminton hotels, and a number of fine schools and churches. It is the seat of Vancouver College, which is affiliated with McGill University at Montreal. Other institutions include Saint James's College, several hospitals, and the military station maintained by the gov-



ernment. The public schools are well organized and generally attended and carry courses from the primary grades to those usually provided in the high schools.

The harbor is sufficiently deep for the admission of the largest seagoing steamers. Regular steamship lines are maintained with Victoria, Seattle, and ports in South America and Asia. The surrounding country produces large quantities of fruits, cereals, lumber, and live stock, hence contributes largely to the trade in produce as well as in minerals and merchandise. It has extensive railroad machine shops. Among the manufactures are lumber and lumber products, furniture and glass, sugar and canned fruits, carriages and wagons, malt and distilled

liquors, clothing, brooms, vinegar, soap and cigars. The city has a large wholesale and jobbing trade, both inland and coastwise.

The site of Vancouver was an unbroken forest in 1885, when the officials of the Canadian Pacific Railway decided to make it their western terminus. Many buildings were erected immediately after this decision was reached and the town was platted the following year. A fire destroyed the larger part of it soon after, but it was rebuilt rapidly and has had a remarkable growth since. Population, 1908, 56,480.

VANDALS (văn'dalz), a brave and warlike people of ancient Germany, who were confined chiefly to the region between the Oder and Vistula rivers. In the 2d century A. D., they occupied the region of the Riesengebirge, in southern Germany, and in the following century joined the Goths in making incursions into the Roman province of Dacia. They were permitted by Constantine to make settlements in Pannonia, where they dwelt in peace for sixty years and became Arian Christians. In the 5th century they formed an alliance with the Alani, Suevi, and other Germanic tribes and entered upon a successful invasion of Gaul, where they held sway for three years. Subsequently they invaded the Spanish peninsula, and in 429 an army of 75,000 under Genseric crossed the Strait of Gibraltar into Africa. There they came in contact with the Roman army of Valentinian III., with whom they made a short truce, but Genseric conquered Carthage in 435. A peace treaty concluded with Rome recognized the authority of the Vandals over Northwestern Africa, Corsica, Sardinia, and part of Sicily.

The Vandals, still eager for conquest, invaded Italy in 455 and soon after captured Rome. On the death of Genseric, in 477, the leadership of the Vandals passed to his son, Hunneric, who warred against the Moors and persecuted the Catholics. Subsequent leaders were less energetic, owing largely to the influence of the tropical climate of Africa, and they were finally subdued by a Roman army under General Belisarius in 533, in the reign of Emperor Justinian. Gelimer, the last African leader of the Vandals, was captured in Numidia and in 534 was carried to Constantinople. The remaining remnant of the Vandal army was sent along with Roman soldiers to participate in the wars against Persia. *Vandalism* is a term used to express hostility to art and literary treasures and to describe destruction or defacement of property, the word originating from the practice of the Vandals. Several writers assert that some of the Berber tribes of North Africa are direct descendants from the

Vandals, basing their statements upon the circumstance that they have blue eyes and blonde hair.

VANDERBILT UNIVERSITY, an institution of higher learning at Nashville, Tenn., which owes its foundation to a gift of Cornelius Vanderbilt of New York. The first donation, made in 1873, amounted to \$500,000, but the entire gift of Mr. Vanderbilt was \$1,000,000. W. H. Vanderbilt, son of the founder, made gifts at various times that amounted to nearly half a million dollars. Later substantial contributions were made by Cornelius Vanderbilt, grandson of the founder, and by W. K. Vanderbilt. The institution has been the recipient of donations from other parties, notably from citizens of Nashville, including the gift of about \$100,000 made by Mrs. Mary J. Furman for the erection of a chemical laboratory.

Vanderbilt University opened its doors in 1875. At present it is organized in seven departments; namely, academic, engineering, biblical, law, medicine, dentistry, and pharmacy. Most of the university work is done on the campus, a tract of 80 acres in the western part of Nashville, which is far-famed for its beauty of situation. The campus is occupied by a number of university buildings, homes for some of the faculty, and athletic grounds. It has a well-equipped library with about 35,000 volumes. The university is noted for its high standard of admission and strict requirements for degrees. About 900 students are enrolled annually. The list of alumni numbers nearly 5,000. At present the total endowment exceeds \$1,500,000, while all the property has a valuation of more than \$2,500,000.

Vanderbilt University has exercised a wide influence over the institutions of the South in the matter of scholarship and in athletics. It has influenced the organization of the Southern Association of Schools and Colleges, which is intended to promote a high standard of college work with its requirements for admission. Another organization, the Southern Intercollegiate Athletic Association, was originated in this institution and has had a wide influence in promoting pure athletics in the colleges of the South. Every southern State is represented among the students, while only about half of the total attendance is from the State of Tennessee. Chancellor J. H. Kirkland, who has done much to promote the growth and influence of the institution, was elected to that position in 1893.

VAN DIEMEN'S LAND. See *Tasmania*.

VANILLA (vā-nī'lā), a genus of climbing orchids, which are native to the tropics. They supply the perfume and flavoring extract known

as *vanilla*. The plants spring from the ground and climb with twining stems on trees, usually to the height of fifteen to thirty feet, and in their upward growth produce fibrous roots that draw a portion of the plant food from the tree. Most species have a four-sided and juicy stem and fleshy leaves. These plants produce an abundance of deliciously fragrant, large flowers. The fruit, known as the vanilla bean, is a pod six to nine inches long, opening at the side, and in it are a number of oily seeds. Several species of the plant are cultivated in Mexico, whence a large portion of the vanilla sold in the market of Canada and the United States is secured.

Vanilla is cultivated in various parts of South America, the West Indies, and tropical Asia as a commercial product. The beans are gathered before fully ripe. They are treated under a complicated process of fermentation to develop the rich aroma and are afterward dried under protection from the sun. Vanilla beans exported for use in foreign countries are sealed in receptacles to prevent the odor from being dissipated. The process of extracting the aromatic flavor is quite complicated and the genuine extract is somewhat expensive. It is placed in carefully sealed bottles, in which form it is sold in the market. Adulterations are made by mixing the extract of the tonka bean, a product of a tree native to Guiana, with the vanilla extract. The product made in this way is similar in odor, though not so pleasant and far less enduring.

Vanilla is used to flavor confectionery, in culinary arts, in the preparation of liquors, and in medicine as a stimulant. Leaves of the vanilla plant are gathered in Florida and shipped to Europe, where they are employed to impart a fine scent to cigars and tobacco. The usual method of scenting is to lay the leaves among the newly made cigars, or in cutting portions of them with smoking tobacco.

VAN WERT (văn wěrt'), a city of Ohio, county seat of Van Wert County, 76 miles southwest of Toledo, on the Pennsylvania and the Cincinnati Northern railways. It is surrounded by a fertile farming country. The chief buildings include the county courthouse, the high school, the Brumback Library, and a number of fine churches. Among the manufactures are machinery, musical instruments, clothing, lumber products, and utensils. It has electric lighting and a system of waterworks. Population, 1900, 6,422; in 1910, 7,157.

VAPOR (vā'pēr). See **Evaporation**.

VARICOSE VEIN (vār'ī-kōs), the name applied to a vein that is permanently dilated. The cause of such a diseased condition is due to some obstruction to the return of blood

through the affected vein. In some instances the obstruction may arise through constant pressure, as in the case of a varicose condition of the veins of the lower limbs, which usually results from long continued maintenance of the upright posture. The disease sometimes obstructs the heart itself, or results from pressures of tumors. In some instances the disease is very annoying and painful, being frequently attended by a feeling of fullness and numbness. The treatment usually involves rest and bandages applied to the affected parts.

VARIETY (vā-rī'ě-tŷ), the name applied to a group of plants or animals that approach very near to each other in important characteristics. The term signifies a relationship less distinct than that implied by the word species. Some naturalists do not admit of the use of the word variety, except inside the circle of domesticated species, though they sometimes apply it where the stages of growth and sexual characteristics are similar. More recently the word *variation* has come into use. It has reference to the phenomena of structural or functional deviations from the type or form of the parent. This characteristic varies greatly in different species. For instance, the turkey shows no variation in Europe from the species in America. This is true of the guinea fowl, which has not departed from the African type since being naturalized in America. On the other hand, there is a marked variation in the dog when transported and reared through successive generations under the influences of widely different environments. Cultivated plants and domestic animals are peculiar for this property, giving rise to a great variety of forms that differ widely from the original stock.

VARNA (vār'nā), a city of Bulgaria, on the Bay of Varna, an inlet from the Black Sea. It is near the mouth of the Pravadia River, has an open harbor, and is connected by a railway with the Danube. The chief buildings include a gymnasium, the townhall, and a number of mosques and churches. It has a large trade in cereals, live stock, textiles, and dairy products. Population, 1906, 35,645.

VARNISH (vār'nish), a resinous solution of certain gums or resins, used by painters and cabinetmakers to produce a shining, transparent, hard coat on a surface. Varnishes are prepared by dissolving resinous substances, such as lac, copal, mastic, or anime, in fixed or volatile oils. The product secured is termed oil varnish or spirit varnish, the latter being prepared largely by a mixture of alcohol and oils. An excellent varnish is made of amber, but it dries slowly and is expensive. Copal is used more largely

than any other gum in preparing oil varnishes and is next in durability to amber. Canada balsam is employed in preparing crystal varnish for maps or drawings, being dissolved for that purpose in the purest oil of turpentine. Anime varnish, the product of an organic substance obtained by distillation from bone oil, is employed to some extent. While it dries quickly, it is liable to crack, owing to its lack of toughness. Common resin, dissolved under heat in turpentine or linseed oil, forms the varnish in general use. Its brilliancy is due to the addition of other substances. The ingredients of varnishes necessarily depend upon the purposes for which they are to be used, but the general constituents include asphalt, sealing wax, turpentine, shellac, rosin, copal, amber, mastic, linseed oil, oil of turpentine, benzoin, powdered glass, and dammar.

VASE, a vessel of an ornamental character, usually made of pottery, but sometimes of glass, stone, or metal. Vases were used extensively among the people of ancient times and throughout the ages have had very artistic forms. Many ornamental designs have come down to us from the Greeks, Etruscans and Romans. Throughout the Middle Ages vases of beautiful form and artistic design were produced in Europe, and many of these products are seen in the museums and other art collections. China and Japan take high rank in the production of these vessels in modern times, many of which are made of porcelain, usually colored and finely glazed. Artistic vessels of a high class are now made in many countries of Europe and America, the designs and workmanship comparing favorably with the better styles of Grecian vases, though the attention paid to work of this kind is not materially extensive. See **Pottery**.

VASELINE (väs'ê-lîn), a substance obtained in the purification of crude petroleum, consisting essentially of a mixture of paraffines. It is yellowish, translucent, and nearly odorless and tasteless. The chief uses of this product are in the arts, especially as a base in making pomade, ointment, and cold cream. It has considerable value as a lubricant and as a coating to protect steel surfaces and instruments from rust.

VASSAR COLLEGE, an educational institution at Poughkeepsie, N. Y., located near the Hudson River, 73 miles from New York City. It was founded by Matthew Vassar in 1861 and was the first well equipped institution for the higher education of women. In 1865 it was formally opened with 353 students. The preparatory department was abolished in 1888. Special schools of music and painting were maintained for a few years, but since 1892 the col-

lege has offered only a four years' course for the A. B. degree and a year of graduate work for the A. M. degree. The institution has 23 departments, a faculty of 95 members, and about 1,000 students. The original endowment of \$400,000 has been increased to \$2,500,000. In accordance with the wish of the founder, Vassar College is distinctly Christian in its aims and influence, but it is non-sectarian. A number of fellowships and scholarships are awarded annually. The buildings include the Thompson Memorial Library, one of the finest of academic libraries, containing about 60,000 volumes. Other buildings include the chapel, with a seating capacity of 1,500, the recitation hall, three laboratories, the museum for the scientific and art collections, an observatory, a gymnasium, an infirmary, six halls for residence, and seven houses for the president and professors. The farm and garden with the collage campus include about 900 acres. James Monroe Taylor, who has been an influential factor in building up the institution, was elected president in 1886.

VATICAN (văt'î-kān), the palace of the pontiffs at Rome, now the official residence of the Pope. It is situated on the Vatican Hill, whence its name, on the west bank of the Tiber, and immediately north of the Cathedral of Saint Peter's. Besides the papal palace, the buildings include the great library and museums, the court and garden of Belvidere, a series of chapels, and a number of immense reception halls. Pope Eugenius III. built the present palace in 1145-1153 and his successors enlarged it and added vast embellishments. It includes twenty courts of great beauty and has about 11,000 rooms of different kinds. The treasures stored within the buildings are of immense value, both historically and from a financial view. Many of the apartments are of unrivaled beauty and elegance. The Sistine Chapel, built by Sixtus IV., is noted for its fine music. The Pauline Chapel and the Capella Nicolina contain some of the grandest frescoes extant. These and the vast art galleries possess some of the finest works left by Raphael, Michael Angelo, and Perugino, besides master productions of other famous artists. Some of the most valuable collections in the world are stored in the museums, especially rare specimens of ancient statuary and stones bearing inscriptions relating to noted saints, scholars and sovereigns.

The statues of note include "Faun Playing on a Flute," "Mercury," "Diana, a Fighting Amazon," and "Bacchus Riding on a Tiger." Other noted sculptures in the Vatican are the originals of the groups known as "Laocoön and His Sons," "Ariadne," and the "Apollo Belvidere."

The famous Vatican Library, founded in 1378, has about 250,000 printed volumes, including 2,500 editions dating from the 15th century, and besides these are about 26,000 rare manuscripts. This library is in a building erected by Sixtus V. in 1588. More importance is attached to the contents of the buildings than to their architectural effect, though the entire group of structures with their fine gardens and monuments constitute a vast aggregation of wealth and artistic beauty, which is the chief attraction for tourists visiting Rome. The Vatican has been used by the popes as a place of residence since their return from Avignon in the latter part of the 14th century, and new popes are elected by the conclaves that meet here. It has been the only papal residence since 1860, when Rome became the capital of United Italy.

VATICAN, Council of, the ecumenical council convoked by Pope Pius IX. to meet in the Vatican on Dec. 8, 1869, and prorogued on Oct. 20, 1870. At the opening sitting 719 prelates were present and the attendance increased to 764 in the following year, the entire membership being constituted of dignitaries belonging to the Roman Catholic Church. Two so-called constitutions were adopted, one treating of the primary truths of the church, faith, revelation, and the connection between faith and reason, and the other of the primacy of the Roman see, in which the papal claim to authority over Christians was defined. The former was unanimously adopted in a session of 667 prelates and was confirmed by the Pope on April 20, 1870. Among the points of interest in this constitution is the one in which the claim is made that a jurisdiction over the whole church was directly conferred on Saint Peter, and that this primacy or jurisdiction rests in the line of Roman pontiffs, who are regarded successors to Saint Peter. The second constitution, which defines the personal infallibility of the Pope when speaking officially on doctrines of faith or morals, led to a long discussion and received the votes of 535 prelates, while two voted against it, and the remaining members were absent from the session held on July 18, 1870. The decree was promptly confirmed by the Pope. Though the council is technically still in existence, there have been no sessions since its prorogation, which had the effect of a virtual dissolution.

VAUDEVILLE (vōd'vil), the name applied to a kind of dramatic entertainment, so called from *Les Vaux de Vire*, the name of two valleys in Normandy. Oliver Basselin wrote a number of satirical songs relating to current events which he named vaudeville, and this term has continued to be applied to light plays that

are interspersed with dancing and comic acting. In the general vaudeville is a series of acting and singing. However, the different numbers are not closely related in style or subject.

VAUDOIS. See **Waldenses**.

VAULT (valt), an extended arch, or an arched roof, so constructed that the stones, brick, or other materials composing it sustain each other and support a weight, as in a bridge or building. The art of vaulting was practiced by the Egyptians, who constructed the semicircular arch, a form of vault extending from one end of an apartment to the other, which is still employed for various purposes. Vaults of this kind were common among the Romans, but in later years they added groined vaulting, that is, structures formed by two vaults intersecting at right angles. Groined vaulting was utilized extensively in bridging streams during the Middle Ages and more recently in various forms of temple architecture. The names now applied to different kinds of vaults include semicircular or cylindrical, groined, Gothic, and diagonal. A *surmounted vault* is one having a height greater than half its span and a *surbased*, less than half its span. Modern architecture presents many fine specimens of vaulting, but steel and iron are fast superseding both arches and vaults, especially in bridges, roofs, floors, and other parts of buildings.

VAUXHALL (vaks'həl), the name of a public garden in London, which was famous as a public resort for two centuries after the restoration in 1660. It occupied a place in Lambeth, near the manor or landed estate called Fulke's Hall, whence its name. The visitors at Vauxhall spent their time in various pastimes, largely of a loose character, thus causing the place to be mentioned by a number of novelists and dramatists. Thackeray's "Vanity Fair" makes frequent allusions to it.

VEDAS (vā'dāz), meaning inspired knowledge, the name of the sacred scriptures of the Brahmans, comprising the earliest system of philosophy which we possess. Though the date of the origin of these writings is unknown, it is fixed by most scholars within the period between 1600 and 1400 B. C. These writings are divided into four works or books, according to the time in which they were written, and include the *Rig-Veda*, *Yajur-Veda*, *Sāma-Veda*, and *Atharva-Veda*. All are held to be divinely inspired. The *Rig-Veda* is the oldest of the Vedas and the *Atharva-Veda* is the latest. *Trayi* is a title used to describe the first three, the term meaning three-fold. Since the Vedas vary greatly in time and authorship, they represent a general evolution of thought and worship from the simpler

forms to the more thoughtful and reflective, but the newer contain a greater complexity of rites. Each Veda is divided into three parts: the *Sanhita*, the *Brahmana*, and the *Jnana* or *Upanishads*. The *Sanhita* is a collection of hymns and prayers called *ganas*, or *mantras*, the *Brahmana* relates to rituals, and the *Jnana* comprises the philosophical portion. Monotheism, the doctrine that there is but one God, is the basic teaching of the Vedas, but a form of polytheism, the belief that there are more gods than one, is indicated, though only apparently, since the sun, moon, stars, fire, and the firmament are spoken of as the manifestations and attributes of the Deity.

VEDDAS (vēd'dāz), or **Veddahs**, a native race of Ceylon, occupying the eastern part of the island. They are a remnant of a primitive type of mankind and are small in stature, rarely more than five feet two inches in height. The men are skilled archers and spend much of the time in hunting and fishing. Their dwellings are primitive and the government is patriarchal. This race differs from the Singhalese, who constitute the predominating people of Ceylon. Intercourse between the two is very limited. The Veddas number about 2,225.

VEGETABLE (vēj'ĕ-tā-b'l), a name used interchangeably with the word plant, but applied in a more restricted sense to any plant that is used as an article of food. The familiar vegetables include plants that are grown as food products for their various parts, such as the leaves, roots, flower buds, and fruit. Carrots and turnips are valuable for their roots, while onions are grown for their bulbs and cauliflower for its flower buds. Cabbage and lettuce are cultivated for their leaves; potatoes, for their tubers; and beets, both for their roots and leaves. Beans and peas are grown for their seeds, which are eaten green or mature, while corn as a vegetable is eaten in an unripe condition.

Vegetables are important as food products for their starch, protein, and sugar, and the indigestible portions consist mainly of ash and fiber. The principal element is water, which is found in varying proportions, being about 58 per cent. in green beans and 95 per cent. in the cucumber. The watermelon contains less than one per cent. of protein, while others have a much larger quantity, being about 9 per cent. in the green bean.

Most vegetables have a small per cent. of fat, though it rarely exceeds one per cent., and the quantity of ash is correspondingly small. Nitrogen constitutes four per cent. of the onion, nineteen per cent. of green corn, and twenty-six per

cent. of the sweet potato. A mixed diet of vegetable and animal foods is usually recommended. Ordinarily the animal foods are consumed in larger quantities in cold countries, while the vegetable foods are used more extensively in the warmer zones.

VEGETARIANISM (vēj-ĕ-tā'rĭ-an-ĭz'm), the practice of living solely on vegetables, such as grain, fruit, pulse, and nuts. The term is used to describe both those subsisting with or without the addition of milk, butter, cheese, and eggs, but fish, fowl, and flesh are strictly excluded from the diet. The theory of vegetarianism is based upon the claim that man subsisted wholly on fruit in the period immediately following the creation, and that a vegetable diet tends to promote temperance and purity in thought and life. As a doctrine and practice it dates from the time of Pythagoras, who subsisted wholly on a vegetable diet. At present it is most strictly observed in India, where certain castes of the Hindus have practiced vegetarianism for ages. Vegetarians are opposed in their doctrine and practice by the physiologists, who generally admit that a theoretically perfect diet can be obtained from the vegetable kingdom, but hold that the stomach, teeth, and other organs are constructed in such a manner that a mixed diet is preferable. Besides, they assume that it is impossible to ascertain the diet of the first man and point to the circumstance that hunting was a favorite occupation at a very early stage, thus leading to the conclusion that the diet consisted to a considerable extent or exclusively of flesh.

VEII (vē'yī), a rival city of ancient Rome, in Etruria. It is not definitely known where this city was situated, but most writers assume that it occupied the site of Isola Farnese, twelve miles from Rome. In the time of Romulus, the founder of Rome, a struggle for supremacy began between the two cities. The contest continued under all the Roman kings, except Numa, and the result was generally favorable to Rome, which was rapidly gaining in population and commercial importance. A siege of ten years at last resulted in the fall of Veii in 396 B. C. When the Gauls conquered Rome, an attempt was made to rebuild Veii and make it the capital, but it never attained material importance, though both Caesar and Augustus planted colonies on its site. Numerous remains of the Etrurians from Veii are preserved at Rome.

VEIN (vān), a membranous tube or canal conveying blood to the heart, after it has been conducted from the heart through the arteries to the different parts of the body. The veins carry the dark or venous blood. As they do

not receive the direct impulse of the heart, they differ from the arteries in their walls being much thinner and less elastic. They are usually nearer the surface than the arteries, some of them coursing along under the skin, as in the back of the hand, where they may be seen. At their farthest extremity, where they are minute in size, they are formed by the venous capillaries, which receive the blood from the arterial capillaries, and they increase in size and diminish in number as they gradually pour into one another, forming the vena cava ascending and the vena cava descending, which discharge the blood into the right auricle. The *vena cava ascending* is a large vein through which the blood from the lower part of the body is returned to the heart, and the *vena cava descending* is a vein carrying the blood from the head and upper limbs to that organ. The veins form the so-called venous system. Each lobe of the lungs has a pulmonary vein by which the oxygenated blood is returned to the left side of the heart, after being received by them through the pulmonary artery. Among the diseases of the veins are phlebitis, an inflammation of their lining membrane, and varix, a dilatation of the vein structure, which is referred to or closely connected with varicose veins. The latter are veins in a state of permanent or abnormal distention.

VEIN, in geology, a narrow formation of igneous rock that occurs in vertical or inclined fissures, differing from the stratification in which it is found. The cause of veins may be assigned to heavy pressure upon molten rock, which is thus forced through openings in the crust of the earth. Veins that bear metal are usually termed *lodes*, which sometimes extend many hundreds of feet into the earth. Boulders frequently contain small veins. In a more general sense, the word vein is applied to a mineral formation that has a horizontal position, as a vein of lignite or bituminous coal.

VELOCIPEDA (vē-lōs'ī-pēd), the general name of any light vehicle that is propelled by the person or persons who ride upon it. The first vehicle of this kind was invented in 1817 at Mannheim, Germany, and was constructed chiefly of wood. It consisted of a wooden bar about five feet long and six inches wide, each end supported by a single wheel, and the rider sat astride on the bar and propelled the vehicle by the action of his feet upon the ground. While it did not come into general use, this machine was the forerunner of both the bicycle and the tricycle.

VELOCITY (vē-lōs'ī-tŷ), a term used in mechanics to express the rate at which a body

moves in space. It is said to be *constant*, or *uniform*, when the moving body passes over equal spaces in equal times, and it is termed *variable velocity* when the spaces passed over in equal times are unequal. *Average velocity* is the ratio of the whole distance passed over to the time required for such passage. Velocity is said to be *retarded* when a body passes through less space in each successive portion of time, and it is termed *accelerated* when the space passed over becomes greater during each preceding equal portion. Bodies whose movements through equal spaces are unequal at different periods are said to have a variable velocity. The velocity of a body is usually expressed at a given number of feet per second, or at so many miles per hour.

VELVET (vēl'vēt), a familiar pile fabric, which is made by passing the warp over wires so as to form a row of loops that project from the backing, and, when the wire is withdrawn, form an uncut or piled velvet. To make *cut pile*, the name of a kind of velvet used most extensively, a knife is passed along the groove on the top of each wire to cut the pile before the wire is withdrawn. The loops thus cut form a covering resembling a very fine but short fur. Velvet of the best kind is made entirely of silk, but inferior grades are obtained by weaving silk so as to form a face on a cotton or partly woolen basis. *Velveteen* is a fabric made of a mixture of silk and cotton. A similar product made of silk and wool is known as *plush*. It is thought that velvet was first manufactured in China, where fine grades are still produced, and it is not known when the first products were made in Western Europe. Rich and artistic textiles were made in Italy as early as the 12th century, whence the manufacture of velvets gradually extended northward. The chief seats of modern manufacturers of velvet textiles are at present in Crefeld, Germany, and in Lyons, France.

VENDETTA (vēn-dēt'tà), the name applied to the practice of individuals taking private revenge upon their enemies, especially upon those who have murdered a relative. This practice originated in Corsica and the name is from the Latin word *vindicta*, meaning revenge. When a murder has been committed, the relatives of the murdered man as well as the officers pursue the guilty party, and he is slain without process of law as soon as he is apprehended. The practice exists at present to a limited extent among peoples who are not highly civilized, but it has been very largely suppressed in Italy and Corsica.

VENEERING (vē-nēr'ing), the art of at-

taching thin layers of fine-grained wood to a less costly or ornamental material. The veneers are cut chiefly of such woods as mahogany, maple, and rosewood, and are commonly glued to the surface of fir or pine, thus giving the finished product the appearance of the more valuable material. Recent improvements in machinery have made it possible to prepare sheets as thin as paper, thus facilitating the economical use of the finer grades of woods. In fastening the veneers, the surface is roughened so as to take glue readily, and pressure is applied while drying. The surface is afterward polished and finished, as in dealing with other solid cabinet woods. Veneering is employed principally in making the more costly furniture and musical instruments. Thin sheets of ivory and other substances are used in some kinds of veneering.

VENEZUELA (vēn-ĕ-zwē'là), a republic in the northern part of South America, the third largest political division of that continent, being exceeded in size only by Argentina and Brazil. It is bounded on the north by the Caribbean Sea, east by the Atlantic and British Guiana, south by Brazil and Colombia, and west by Colombia. The length from northeast to southwest is 920 miles and the extent north and south is about 725 miles. It has an area of 593,943 square miles.

DESCRIPTION. Two chains of the Andes extend into the northern part from Colombia, the eastern branch of which is known as the Merida Mountains. These highlands attain elevations that range from 10,000 to 15,400 feet, while the western branch has summits from 2,500 to 4,000 feet above the sea. The southern section is traversed by two mountain chains, the Parima and the Pacaraíma, the latter forming a large portion of the boundary between Venezuela on the north and Brazil and Guiana on the south-east. The vast interior comprises the larger part of the Orinoco basin, which is formed by a series of plains or llanos of great fertility and luxuriant vegetable growth. Here are fine forests of palms, mahogany, black and white ebony, satinwood, rosewood, cinchona or Peruvian bark, and trees that yield sarsaparilla and other drugs. Wild animal life is represented in large numbers in many sections of the country and includes the jaguar, tapir, alligator, puma, monkeys, aquatic fowls, and birds of song and plumage.

The drainage is chiefly by the Orinoco into the Atlantic. This stream forms the great outlet for Venezuela and the central part of Colombia. It receives the inflow from numerous tributaries, which include the Apure, Meta, Caura, Caroni, and Casiquiare. The last men-

tioned connects the Orinoco with the Negro River, a tributary of the Amazon. The Orinoco is navigable throughout the country and many of its tributaries furnish transportation facilities for large vessels. Three inlets of considerable size indent the northern shore, including the gulfs of Paria, Triste, and Venezuela. Lake Maracaibo, in the northwestern part, is the largest inland water.

Venezuela is located wholly in the Northern Hemisphere, but the climate is tropical and the seasons are distinguished as the wet and dry. The lowlands of the northeast and central parts are within the warm belt, but the heat is tempered by the trade winds from the Atlantic. Here the mean temperature varies from 75° to 90° and the low and marshy lands are sometimes subject to epidemics of yellow fever. The section of country that has an altitude above 2,250 feet is temperate and the climate is salubrious and delightful. In the highlands that lie above 6,500 feet above the sea the climate is colder and the line of perpetual snow begins at an altitude of 14,000 feet. All the higher altitudes have a healthful climate. Rainfall is ample in all parts of the country and in the lowlands it is frequently excessive, causing a large part of the country to be flooded.

MINING. The country possesses much mineral wealth, but mining has not been developed to any great extent. Salt is obtained in the Araya peninsula, copper in the Aroa district, and iron, silver, copper, and granite are abundant in the mountains. Petroleum abounds in the states of Los Andes and Tachira. Largo la Brea, or the Lake of Pitch, is a remarkable basin and is about six miles long. It is situated near the Gulf of Paria, west of the island of Trinidad, and is famous for its extensive deposits of asphalt which is obtained in large quantities for street paving. Other minerals include coal, sulphur, tin, kaolin, and precious stones.

AGRICULTURE. Farming is the chief industry, but not more than one-third of the area is productive. Coffee ranks as the leading product and is closely followed in the yield by cacao, sugar cane, and fruits. Tobacco thrives in the lowlands, where cotton and indigo yield good returns, but these products are not cultivated extensively. Other products include vanilla, tonka beans, and many varieties of fruits. Great herds of cattle and horses are reared on the llanos. The country has large interests in raising mules and sheep. Goats, swine, and poultry are grown to some extent. It may be said in general that the methods of farming are primitive and that the breeds of live stock are not of a high grade.

MANUFACTURES. The manufacturing enterprises have not assumed extensive proportions and the output is intended more largely for home consumption than for exportation. The fisheries yield good returns for canning and curing. Some advancement has been made in the manufacture of cheese and in canning fruits. Most of the establishments are in the larger cities, where cotton weaving, tanning, wool spinning, and the manufacture of boots and shoes are carried on successfully. Among the general manufactures are furniture, sugar, pipe tobacco and cigars, clothing, spirituous liquors, earthenware, and machinery. Much of the capital employed in both manufacturing and mining is furnished by foreigners.

COMMERCE AND TRANSPORTATION. The exports greatly exceed the imports. They consist chiefly of coffee, cacao, cattle, hides and skins, balata gum, copaiba, and gold. The imports include chemicals, cotton and woolen goods, ironware, hardware, and machinery. Foreign trade is principally with the United States, France, Great Britain, Germany, and the Netherlands. Much of the trade is in the hands of German, French, Italian, and Spanish inhabitants.

At present the country has only 850 miles of railroads, but transportation is facilitated by its seaboard on the Atlantic and the Orinoco and other rivers. Communication is facilitated by 5,500 miles of telegraph lines and 425 post offices. A French cable supplies the need of communication with Europe. Interior transportation is largely by packed mules and wagons. A number of canals have been constructed as a means of utilizing some of the rivers and Lake Maracaibo for navigation.

GOVERNMENT. Venezuela is a constitutional republic and the constitution was amended with the approval of the people in 1904. Executive power is exercised by a president, who is elected for a term of six years. General legislative power is vested in the congress of two houses, the senate and the chamber of deputies. There are 26 members in the senate, two from each state. The deputies are elected by the states according to population. Both senators and deputies serve for terms of six years. The territories are under direct administration of the federal government. A national judiciary has jurisdiction to all cases relating to the nation and the territories. Each of the states has its own executive, legislative, and judicial officers. Local government is vested in subdistricts of the state and in the municipalities. The bolivar, valued at \$0.193, is the monetary standard.

EDUCATION. Attendance at school has been free and compulsory since 1870, but fully 75 per

cent. of the adult population cannot read and write. Elementary schools are maintained in all the populated districts. Caracas is the seat of the national university, and five other institutions of higher learning are maintained in different parts of the country. It has four normal schools, twelve federal colleges, and a number of private and parochial schools. A national museum and library are maintained at Caracas, which has a collection of 40,000 volumes. Music, military science, fine arts, technics, and industry are taught in a number of institutions. Roman Catholicism is the state religion, but general toleration in matters of faith prevails, though most of the Protestants are foreigners.

INHABITANTS. A large majority of the people are an admixture of native whites and Negroes. The inhabitants of pure white blood are not numerous. Spanish is the official and spoken language. Caracas, on the Caribbean Sea, is the capital. Other cities include Maracaibo, Valencia, Barcelona, and Barquisimeto. In 1906 the population was reported at 2,619,492. This included 52,500 of foreign birth and 325,000 Indians.

HISTORY. Columbus discovered the coast of Venezuela in 1498. The region was visited the following year by Vespucci, who named it Venezuela, meaning Little Venice. Spaniards settled at Cumana in 1520 and it remained subject to Spain until 1811, when it declared its independence. Subsequently it again came under Spanish dominion, but in 1813 it united with Ecuador and New Granada to form the republic of Colombia. In 1830 the states again separated, but Spain did not recognize the independence of Venezuela until some years later. The country has undergone a number of revolutions and civil wars, the troubles of 1854 leading to the emancipation of the slaves. Great Britain attempted to absorb a part of its eastern territory in 1895 by annexing it to British Guiana, but that country consented to submit the question to international arbitration on a demand made by President Cleveland.

A period of internal discord began at the close of 1897, when Ignacio Andrade was elected president. Threatened by a strong revolutionary party, the president fled and a provisional government was established, but hostilities continued until the early part of 1901, when Cipriano Castro was chosen chief executive. Another crisis was reached in 1902, when Great Britain and Germany blockaded some of the ports as a means of securing an adjustment of certain claims resulting from a violation of contracts with British and German citizens. The dispute was finally submitted for adjustment to the

court of arbitration at The Hague. International disputes continued to agitate the country throughout the administration of Castro, including serious complications with the Netherlands in 1908. The president sailed to Europe in the later part of the year to undergo an operation in France, but in the meantime the people rose against him and he was deposed. Although he attempted to return early in 1909, he was not permitted to land in Venezuela or in the islands of the West Indies.

VENICE (vĕn'is), a seaport city of northern Italy, on the northeastern shore of the Adriatic Sea, twenty miles east of Padua. It is situated on a number of islands in the Lagoon of Venice, a shallow sheet of water separated from the Gulf of Venice by a long sand bank, and is connected with the mainland by a railway viaduct about two miles long. The city is one of remarkable beauty, being built on 120 islands, and the different portions are connected by more than 400 bridges. The islands are only a few feet above the water and the buildings are mostly on piles constructed of stone. A great canal, the Canalazzo, divides the city into two parts. It is crossed by a number of magnificent bridges, of which the Rialto is the most beautiful, being provided with three apartments for passage and lined with decorated shops and counters. The streets of Venice are formed by the different canals, on which boats, called *gondolas*, carry the people, instead of carriages and street cars as in most cities.

Venice has an appearance of marvelous beauty at night, when the streets are beautifully lighted by gas and electricity, and the gondolas move about the canals in all directions. The piazza on the west side of Saint Mark Church is the most noted center of activity. In its vicinity may be seen large numbers of people pursuing business and amusements. Among the most noteworthy buildings is the Church of Saint Mark, built in 813, a fine structure in the Byzantine style with Gothic additions. Four bronze horses, most lifelike in appearance, stand over the door of the church. They were brought from Constantinople in 1205 and carried to Paris by Napoleon in 1797, but they were returned to Venice in 1815. Other beautiful buildings include the mint, numerous churches and schools, hospitals, asylums, and business houses and residences. It has manufactures of jewelry, velvets, silks, earthenware, sugar, laces, sailing vessels, clothing, dyes, glass, and machinery. The harbor is shallow but spacious. The city has a large export trade in rice, glass, colonial goods, and various manufactures.

Venice was founded in the 5th century by

refugees, who sought safety on the islands at the mouth of the Brenta from hordes of invaders under Attila. For several centuries little progress was made, owing largely to the fact that the surrounding country had been devastated by successive incursions of the barbarians from the north, but material growth and development of its industries began in the 7th century. In 697 Pauluccio Anafesto became the first Doge or Duke of Venice. Bridges were soon constructed to unite the islands, thus giving the different groups of buildings the appearance of a united city, and a profitable trade was stimulated by the Crusades in the period from 1096 to 1271. This was due principally to the circumstance that the northern part of the Adriatic is nearest to the region from which the Christians came who participated in the Crusades. Besides, the inhabitants of the surrounding country were friendly to the enterprise undertaken by the Crusaders. Thus a number of sandy and barren islands became the seat of a remarkable commercial life and the center of great wealth and enterprise.

Having developed rapidly in population and commercial enterprises, Venice secured control of the surrounding territory of the mainland. Constantinople was conquered by the Venetians in 1204, and large accessions of territory were obtained at the final division of the Byzantine Empire. In the 15th century the population of Venice numbered about 200,000 and its commerce was the largest in Europe. Though assailed by the Turks in the 17th and 18th centuries, it was able to resist the Moslem fleets, but it suffered a considerable decline. In 1797 Napoleon took possession of the city and made it a part of Austria. The Treaty of Pressburg annexed Venice and the territory of Venetia to Italy in 1806, but it was transferred to Austria in 1814, of which it remained a part until 1866. In the latter year it was annexed to the kingdom of Italy. Population, 1908, 163,684.

VENICE, Gulf of, an extensive inlet of the Adriatic Sea, forming the southeastern boundary of Venetia, a province of northern Italy. The extent is about sixty miles, from the delta of the Po to the mouth of the Tagliamento, and east of it is the shallow Lagoon of Venice and numerous islands. The northern extension is known as the Gulf of Trieste. The river's flowing into it include the Brenta, Adige, and Piave.

VENTRILLOQUISM (vĕn-tril'ō-kwiz'm), the art of speaking or producing tones in such a manner that the hearers are led to believe that the sounds come from a different source than from the person uttering them. It depends wholly upon practice and dexterity. The secret

of the art is in taking a deep inspiration, allowing the breath to escape slowly when speaking, and controlling the exhalation with the muscles of the palate and the larynx. This can be done without materially moving the lips, and the operator completes the illusion by engaging the attention of the hearers by various sleight-of-hand performances. The art is of great antiquity, being mentioned by both Jewish and Greek writers. Zera Simon and Professor Wyman are two Americans who attained a wide reputation on account of their skill in ventriloquism.

VENUS (vē'nūs), the most brilliant of all the planets. It is classed as one of the inferior planetary bodies, having its orbit between those of the earth and Mercury. The ancients called it *Lucifer*, or the *Morning Star*, when visible before sunrise, and *Hesperus*, or the *Evening Star*, when it shone in the evening after sunset. Its general appearance is the same as that of Mercury. The mean distance from the sun is about 67,212,000 miles. A complete revolution around the sun is made in 224.7 mean solar days; hence, the year is equal to about seven and one-half of our months. The diameter of Venus is estimated at 7,700 miles. While the density is about the same as that of the earth, the volume of the planet is about four-fifths as great. Venus being very much inclined from a perpendicular, the torrid and temperate zones overlap each other, the polar regions having at one solstice a frigid temperature and at the other a torrid. A complete revolution around the axis is made in about 23 hours and 21 minutes, the axis being inclined to the ecliptic at an angle of about 75°. Venus exhibits phases like the moon in the various positions relative to the earth and the sun, but it is not known to have a satellite. It is thought to have a dense, cloudy atmosphere, and not to be sensibly flattened at the poles. Both Venus and Mercury transit the face of the sun, but the former at longer intervals. However, its transits are much more important, owing to its position in the heavens being nearer to us. Herschel expressed the view that we never see the real body of the planet, but only its vapor-laden atmosphere. See **Transit**.

VENUS'S FLOWER BASKET, the name of a vitreous sponge, so called from its beautiful form and appearance. Several species of these sponges are found in the warm seas of Asia, especially in the vicinity of the Philippines and the East Indies. The skeleton of these animals resembles spun glass in appearance and the patterns found are often remarkable.

VENUS'S FLYTRAP, a plant native to North America, found along the sandy shores of North Carolina and elsewhere. It belongs to the family of sundews and is so named from its



VENUS'S FLYTRAP.

peculiar leaves, the upper portion of which are provided with hairlike feelers that are extremely sensitive to the touch. When small insects come in contact with this traplike formation, it closes down upon them quickly and absorbs the soft parts as a food. The leaves appear to lose a part of their power to act in this way, though they sometimes serve to catch two or three insects.

VERA CRUZ (vā'rā krōōs), a seaport city of Mexico, on the Gulf of Mexico, 198 miles east of the capital, with which it is connected by railway. The streets are regularly platted and paved with stone. It has secure fortifications and on the island of San Juan de Ulua, a short distance from the shore, is a well-protected castle. Most of the buildings are low and variously painted, but there are several substantial structures, including the cathedral, numerous other churches, and the customhouse. The harbor is of little importance, the only landing place being an open roadstead between the city and the castle. Among the manufactures are tobacco products, clothing, cotton and woolen

textiles, utensils, and machinery. It has electric and gas lighting, telephones, several parks, waterworks, and a tramway. Having a low site, the city is quite unhealthful. The imports consist principally of hardware, spirituous liquors, textiles, and machinery. Among the exports are sugar, leather, vanilla, cochineal, cereals, and live stock. Vera Cruz was founded by Cortez in 1520, but its growth dates from the 17th century. A French army captured the castle in 1838. It was likewise taken by General Scott in 1847. From 1862 to 1867 it was in possession of the allied army of France and Spain. Population, 1906, 31,044.

VERB, a word which expresses action, being, or state of being, and which serves to denote the principal part of what is stated about the subject. With respect to their use, verbs are either copulative or active. A *copulative verb* asserts the predicate of a proposition, or of the subject, as in the sentence, "Iron is hard." *Active* verbs are divided into transitive and intransitive verbs. A *transitive* verb requires an object to complete its meaning, as "The scholar learned his lesson;" and an *intransitive* verb does not require such an object, as "The grass grows rapidly." Verbs are termed *active* or *passive*, depending upon whether the subject acts or is acted upon, and a third class is known as *neuter* verbs, which imply being or condition. Verbs, with respect to their form, are either *regular* or *irregular*. The properties of verbs are *voice*, *mode*, *tense*, *number*, and *person*. Verbs which are used in the conjugation of other verbs are called *auxiliary* verbs. See **Participle**.

VERBENA (vēr-bē'nà), a large genus of flowering plants of the vervain family. They



GARDEN VERBENA.

have four-sided stems, opposite or alternate leaves, and flowers in racemes or terminal spikes. Seventy species have been described, most of which are native to America, and many

are prized in cultivation. The *nettle-leaved verbenas* is three to six feet high. It has long spikes with small white flowers. Other species are the *blue*, *garden*, *bracted*, and *Rocky Mountain* verbenas. They take the form of herbs in temperate climates and grow as shrubs or trees in hot countries. All the species are easily hybridized. Several of these plants yield medicinal properties. The *lemon grass*, a species of verbenas, yields the oil of verbenas.

VERMEJO (vâr-mă'hô), a river in South America, which rises in the Andes Mountains of Bolivia, and, after a general course of about 800 miles toward the southeast, enters the Paraguay about forty miles north of Corrientes. A large part of the middle course is through a swampy region, in which the channel is wide and shallow. The valley of the Vermejo is fertile and heavily timbered.

VERMES, or **Worms**. See **Worms**.

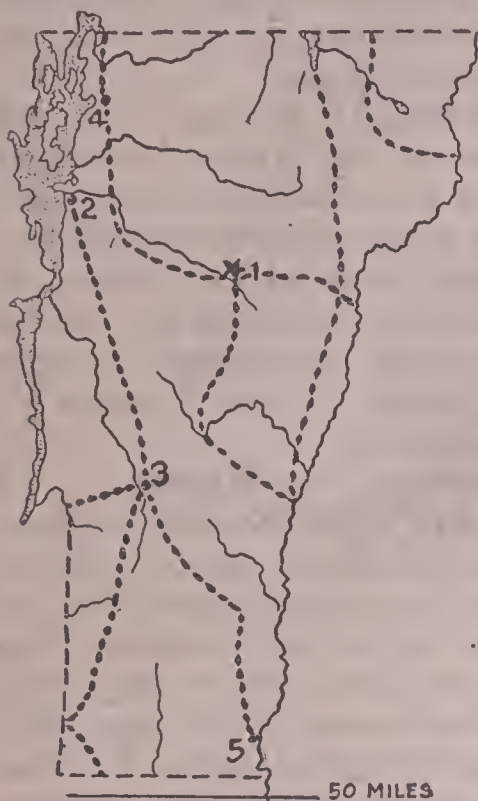
VERMIFORM APPENDIX (vēr'mī-fôrm äp-pën'dīks), a long and slender process of the caecum in man and some other animals, so called from its resembling a worm in form. This organ is situated in the right side of the lower abdomen, is from three to six inches long, and in most cases projects upward and inward. The function probably is unimportant, since the organ can be removed without impairing the system. In structure the vermiform appendix resembles the large intestine. See **Appendicitis**.

VERMILION (vēr-mīl'yŭn), a brilliant and durable pigment of a scarlet color. It is obtained from a mineral ore called cinnabar, or is produced artificially by grinding a mixture of mercury and sulphur for several hours and then digesting the black product with potassium hydroxide until the desired color is obtained. The ore cinnabar is of a blood-red color, and vermilion is obtained by grinding the product into a fine powder. Important mines of cinnabar are worked in California, Brazil, Spain, Austria, China, and many other countries. The cinnabar mines of Almaden, Spain, are the most famous and have been in successful operation for thirty centuries.

VERMONT (vēr-mōnt'), a State of the United States, one of the New England group, popularly called the *Green Mountain State*. It is bounded on the north by Quebec, east by New Hampshire, south by Massachusetts, and west by New York. Lake Champlain forms more than half of the western boundary, and all of the eastern border is formed by the Connecticut River. Most of the islands in Lake Champlain belong to Vermont, including Grand and LaMotte islands. The length from north to south is 158 miles

and the width at the northern boundary is 90 miles, but it gradually narrows to 40 miles at the southern extremity. The area is 9,565 square miles, including 430 square miles of water surface.

DESCRIPTION. Much of the surface is mountainous. The State is divided into two nearly



VERMONT.

1, Montpelier; 2, Burlington; 3, Rutland; 4, Saint Albans; 5, Brattleboro. Principal railroads are shown by dotted lines.

equal parts by the Green Mountains, which trend north and south, and in the northern part a second range branches off toward the northeast. Ranges of hills traverse the State in various directions, but no part of it is greatly elevated, and the general altitude ranges between 500 and 1,000 feet. Mount Mansfield, the highest peak, has an elevation

of 4,390 feet. The

lowest land is in the vicinity of Lake Champlain, where the altitude is about 100 feet above sea level. Fine forests are abundant, even to the summits of the highest mountains.

The drainage is largely into the Connecticut, which separates the State from New Hampshire, and into Lake Champlain, a fine body of fresh water forming a large part of the boundary between Vermont and New York. Among the chief streams within the State are the West and the White, flowing into the Connecticut; and the Missisquoi, the Lamoille, the Winooski, the Otter, and the Poultney, flowing into Lake Champlain. The southwestern part is drained into the Hudson River by several small streams and the Black River in the north drains into Lake Memphremagog, which forms part of the Canadian border. Small lakes are found in many parts of the mountainous sections.

The climate is marked by sudden and extreme changes and a large amount of snow falls in the winter. All seasons of the year are bracing and healthful. The climate is milder in the vicinity of Lake Champlain than in the more elevated parts of the State, but that body of

water is frozen over a part of the winter. In summer the temperature ranges from 60° to 92° and in winter from 10° to 45°. The extremes are 30° below zero in winter and a summer heat of 98°. All parts of the State have adequate moisture, with a rainfall of 32 inches in the south and 40 inches in the north.

MINING. Granite is the chief mineral product, but the State has deposits of copper, lead, slate, and small quantities of gold and silver. Marble of a fine grade is quarried at Proctor and the quality, both in whiteness and durability, is in competition with the marble of Carrara, Italy. Large quantities are obtained for construction and monumental purposes. Copper is mined in the eastern part of the State, in the vicinity of Ely. Slate is quarried chiefly in Rutland County and Barre is celebrated as the center of large quarries that produce a fine grade of gray granite. Clays of a superior quality are abundant. Other minerals include manganese, iron, asbestos, and soapstone.

AGRICULTURE. About 80 per cent. of the area is included in farms, which average 142 acres. The largest portion is devoted to the cultivation of hay and forage, about 1,050,000 acres. The acreage of these products greatly exceeds that of all other crops combined. The leading cereals include oats, corn, barley, buckwheat, and rye. Farming is generally conducted with great care so as to utilize the soil to the best advantage. Commercial fertilizers are employed to a considerable extent to enrich the land and modern machinery is used generally upon the farms.

Dairy farming is especially noteworthy and more than half the cattle are dairy cows. Butter and cheese of a fine quality are produced, and the product is shipped largely to markets in Boston and other commercial centers of the East. Horses of good breeds are grown for the market, but the number of heads is much less than that of cattle. Other domestic animals include sheep, swine, mules, and poultry. Both farming and the animal industry are diversified in every part of the State, and nearly all of the farms have a variety of domestic animals and a varied line of crops.

MANUFACTURE. Butter, condensed milk, and cheese together represent the most important manufacture, when considered from the standpoint of value for the past several years. Lumber and timber products usually rank second, but in value are nearly equaled by the output of marble and stone works. Other lines of manufacture include monuments and tombstones, paper and wood pulp, flour and grist mill products, cotton and woolen textiles, hosiery and

knit goods, and foundry and machine shop products. The general manufactures include cigars, hardware, furniture, sugar, and farming machinery. Many of the mountain streams furnish power for operating machinery, especially such as is usually run by electricity.

TRANSPORTATION. The State has 1,125 miles of railroads. The principal lines include those of the Boston and Maine, the Grand Trunk, and the Central Vermont. Additional transportation facilities are furnished by the Connecticut River and Lake Champlain. Numerous electric lines are operated in the cities and some of the rural districts. The highways are usually in a good state of repair.

GOVERNMENT. The present constitution was adopted in 1793, but it has been amended several times by conventions and by the people. Executive authority is vested in the governor, lieutenant governor, secretary of State, treasurer, and auditor of accounts, each elected by the people for two years. The Legislature is constituted of the senate with 30 members and the house of representatives with 246 members. Each town and city within the State has a representative in the lower house, while representation in the senate is based upon districts according to population. The members of both branches are elected every two years. A supreme court of seven judges is at the head of the judicial system, which includes courts in each county and justices of the peace in the towns. Each probate district has a probate court. Local government is administered by the counties, municipalities, and towns.

EDUCATION. State aid is given to maintain the public schools, but local funds and taxes are the chief means that are utilized to support the educational work. Many of the schools in rural districts have been combined and pupils are transported to centrally located buildings. In 1906 the Legislature enacted several measures which are important to the general advancement in educational work. These measures include a system of district supervision, which is now in successful operation and has been the means of stimulating interest in educational work among the pupils and teachers. Under these laws much has been done to classify and broaden the work in the high schools throughout the towns and cities of the State.

Three public normal schools are maintained, at Castleton, Johnson and Randolph, but additional normal training is given in several high schools and colleges. Foremost among the higher institutions is the University of Vermont, which is located at Burlington. The Middlebury College is located at Middlebury; the Nor-

wich University, at Norwich; the Home for Friendless Boys, at Westminster; the Vermont Academy, at Saxton's River; the Brigham Academy, at Bakersfield; and the Goddard Seminary, at Barre. Waterbury and Brattleboro have hospitals for the insane. Windsor is the seat of the State prison, Rutland has a house of correction, and Vergennes has an industrial school. A home for disabled soldiers is maintained at Bennington.

INHABITANTS. The State has the smallest per cent. of urban population among the North Atlantic states. However, it has no large cities, although it is important as a manufacturing State. The inhabitants consist chiefly of people who are of British descent. In 1900 they included 44,747 foreigners, of whom 25,540 were Canadians. All the leading religious denominations are represented. In numerical order they take rank as follows: Methodists, Congregationalists, Baptists, Roman Catholics, and Episcopalians. Montpelier, on the Winooski River, is the capital. Other cities include Burlington, Rutland, Saint Albans, Brattleboro, Barre, Saint Johnsbury, and Bennington. Population, 1910, 355,956.

HISTORY. The region included in Vermont was first visited in 1609 by Samuel Champlain, who explored the lake bearing his name. In 1761 the first settlement was made at Bennington. The district was claimed by both New York and New Hampshire and the governors of both states granted title to the same lands, thus causing a conflict of titles. New York obtained a decision of the king favorable to its claims in 1764, but the people of Vermont resisted. They organized militia and remained independent by making a military defense. Ethan Allen and Seth Warner became the leaders of a company known as the Green Mountain Boys, and with them the claims of New York were resisted until 1789, when that State recognized the independence of Vermont. It was admitted as a State on March 4, 1791, New York receiving at that time \$30,000 for its claims. The admission of Vermont was the first to take place after the thirteen original states had been formed into a constitutional Union. Vermont was a battle ground in the Revolution. The battles of Crown Point, Ticonderoga, and Bennington engaged many of its citizens.

Vermont was more democratic than any other New England State in the early history, having comparatively few wealthy people. The university was founded in 1791 and schools became generally established soon after. Montpelier was located in the central part in 1808. Saint

Albans was a base of operations in the Fenian operations of 1866 and 1870. Although the State adopted constitutional prohibition of the liquor traffic in 1852, this measure was repealed in 1902 and a local option law was enacted the following year. In 1908 the Legislature established district supervision for the public schools and several other measures in the interest of education.

VERMONT, University of, a coeducational institution of higher learning at Burlington, Vt. It was founded in 1791 and the Vermont Agricultural College was incorporated with it in 1865. The first class graduated from it in 1804. The departments include those of liberal arts, sciences, commerce and economics, medicine, and mechanical and electrical engineering. Entrance is based upon examination or certificates issued by accredited schools. The University library contains 67,500 volumes. It has a faculty of 70 instructors and professors and an attendance of 600 students.

VERNIER (vē'nī-ēr), a contrivance for subdividing the divisions of graduated arcs or scales into minute parts, so named from Peter Vernier of Brussels, who invented it in 1631. The apparatus consists of two scales, one movable and sliding along the side of the other, which is fixed. On the movable scale are ten divisions, which are equal to either 9 or 11 divisions of the fixed scale. In the one case they are numbered from 0 to 10 forward, or in the same direction with the numbering of the fixed scale, while in the other case the reading of the vernier scale is backward, or in the opposite direction from that of the fixed scale. The scale of inches divided into tenths will exemplify the use of the vernier in obtaining readings of tenths of these subdivisions, or of hundredths of inches. In the case of the vernier scale of 10 parts, equal to nine-tenths of an inch, it is obvious that the moving of the vernier one-tenth of one of the divisions of the fixed scale will bring the division of the vernier marked 1 into coincidence with a line of the fixed scale, and similar combinations are made by the multitude of movements that are possible. Two or three verniers, usually arranged at equal divisions of the circle, are attached to many astronomical and geodetical instruments.

VERONA (vē-rō'nà), a city of northern Italy, in the province of Venetia, 68 miles west of Venice. It occupies a fine site on the Adige River, near the Tyrolese Alps. The surrounding country is noted for its rich landscape scenery and general fertility, producing cereals, silk, and fruits. A line of substantial walls surrounds the city. These walls were begun by

Emperor Gallienus, in 265 A. D., and were completed by Charlemagne. It has modern fortification outside the old walls, the whole works of defense making the place one of the most strongly defended in Southern Europe. Verona is the center of a large trade and has extensive interests in manufacturing enterprises. It is the converging center of a number of important railroad lines. Among the manufactures are cotton and silk textiles, woolen goods, hosiery, hats, pottery, jewelry, earthenware, and machinery. Fruit and stock culture are important industries in the surrounding country. Large quantities of wine and preserved fruits are produced in the vicinity. It has an important trade in cereals, sausages, cattle, and dairy products.

Verona has many beautiful buildings, among them the Scaligeri Palace, dating from 1370, a fine cathedral consecrated by Urban III. in 1187, and palaces built by the Pompei and Canossa families. It has numerous churches, convents, and educational institutions. The history of the city dates from the time of the Romans, under whom it became a prosperous commercial center. Constantine captured it in 312, Theodoric in 489, and Charlemagne in 774. Its subsequent history is that of northern Italy, passing to the kingdom of Italy in 1866. Within recent years a number of substantial improvements have been made, such as the construction of electric lighting and rapid transit, the building of macadam and asphalt pavements, and the extensions of the gardens, parks, and public thoroughfares. Population, 1906, 76,128.

VERSAILLES (vē-sālz'), a city in France, capital of the department of Seine-et-Oise, ten miles southwest of Paris, with which it is connected by railway. Tourists regard it one of the handsomest cities of Europe, having long and straight streets, beautiful gardens and parks, and many fine adornments. It is noted rather for its pleasure than industry. The fine improvements and beautiful situation have caused it to be made the residence of many foreigners. The city has few manufactures and little more than local trade. It may be said that Versailles dates from the time of Louis XIII., who maintained a country villa here, which he made his residence while hunting and rustivating. Louis XIV. spent large sums of money in building the Palace of Versailles and in embellishing the city. Later he made it the permanent seat of his court. Interior alterations and decorations were made by Louis XV., who spent large sums of money to beautify the palace, and the city continued to be a court residence down to the Revolution of 1789. The palace was converted

by Louis Philippe into a museum, in which form it still exists. The palace is 1,400 feet long and is decorated within and without by beautiful forms of architecture. In the museum are collections of paintings and statues from the time of Clovis to the present. Among the most imposing paintings are those of Horace Vernet, illustrating the career of Napoleon.

Versailles was made the headquarters of the German army in October, 1870, and in its palace King William I. was proclaimed emperor of Germany in 1871. It was the seat of the French government from 1871 to 1879 and the headquarters of the army during the Commune. The Treaty of Versailles, signed in 1783, recognized the independence of the United States. In visiting France it is very desirable to witness the beauty of Versailles. Among the prominent features are some of the largest and finest fountains in the world, grand statuary, beautiful monuments, and costly paintings. In the vicinity are extensive orchards, orange groves, and gardens of flowers. The water supply is carried by a canal 200 feet wide and a mile long. This canal is lined on both sides by avenues of beautiful trees. The construction of electric lights and street railways has added much to the beauty and convenience of the city. Population, 1906, 54,820.

VERSE, a line of poetry, consisting of a certain number of accented and unaccented syllables. The ancients established thirty short syllables as the maximum length of the verse and counted a long syllable equal to two short ones. However, in lyric poetry the verse often exceeded this length. In modern poetry each verse is marked theoretically by one chief stress and a slight pause is regularly assigned at the end. Lines that do not end in rhymes constitute blank verse. In popular use the word verse is often used instead of stanza. Poetry in a collective sense is frequently referred to as verse.

VERTEBRATA (vēr-tē-brā'tà), the highest branch of the animal kingdom, so named from having numerous joints in the spine, or backbone. Animals that belong to this division have jaws that move vertically and not laterally. The skeleton has many bones with ends suitable for jointed limbs. The brain is inclosed within a skull, which gives form and protection to the organs of hearing, sight, smell, and taste. With the brain is connected a nerve tube, known as the spinal cord, which passes through the spine, and from it run series of nerves to the skin, muscles, and other organs of the body. The lungs, heart, and stomach as well as other im-

portant organs are in the upper part of the thorax, which is formed by the sternum, the ribs, the diaphragm, and the portion of the spinal column to which the ribs are attached.

Vertebrates have a complicated digestive system, which is divided into the oesophagus, small intestine, liver and pancreas, and large intestine. Various glands secrete fluids that are essential in the process of digestion. Respiration is facilitated by lungs in animals that breathe air and through gills in the water-breathing types. Circulation of the blood is carried on by means of the heart, arteries, veins, and capillaries, and the blood is red through the presence of red blood corpuscles. The body is protected by the skin and double protection is furnished in many cases by hair, scales, and feathers. In vertebrates the sexes are usually separate.

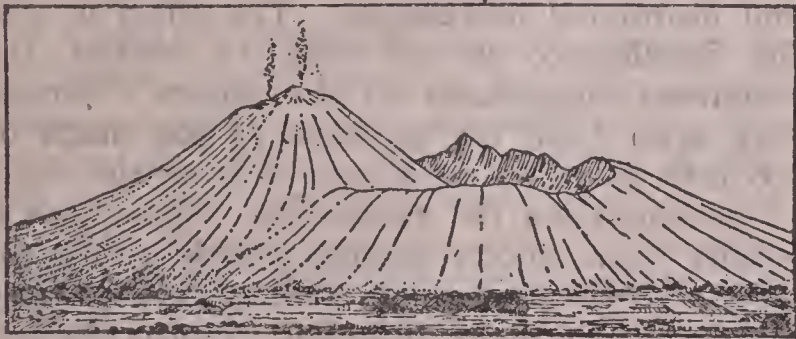
VERTIGO (vēr'tī-gō), or **Dizziness**, a symptom of some forms of cerebral disturbances, usually attended with obscurity of vision and disordered movements. The effect is that the intelligence is not able to correct the erroneous suggestions of the senses. Vertigo may arise from the presence of too much or too little blood in the brain, or from the effect of poisons upon the circulation. Sometimes it results from objects passing swiftly across the field of vision, as water falling rapidly from a great height, or by ascending to unaccustomed heights. Persons who are subject to epilepsy and paralysis have frequent attacks of vertigo. It usually acts as a symptom of the approach of an attack in these diseases.

VERTUMNUS (vēr-tūm'nūs), a divinity of ancient Rome, worshipped as the deity who presided over changes and transformations, especially the blooming and bearing of trees and other plants. It was possible for him to assume any shape he pleased. He fell in love with Pomona, the goddess of the fruit of trees, who became his wife. Gardeners offered garlands and buds to him on the 23d of August.

VERVIERS (vâr-vyâ'), a city of Belgium, in the province of Liège, fifteen miles southeast of Liège. It is finely located on the Vesdre River and has good railroad facilities. The noteworthy buildings include the Church of Saint Remacle, the public library, the city hall, and the central railroad station. Verviers is noted for its extensive manufacture of cloth, the annual product of which has a value of \$15,500,000. Other manufactures include confectionery, machinery, soap, leather, chemicals, ironware, dyes, and clothing. It is a modern city, having well-platted streets, substantial pavements, gas and electric lighting, and an extensive system of rapid transit. Formerly it

was strongly defended by stone works, but its fortifications were destroyed by Louis XIV. of France. Population, 1906, 48,735.

VESUVIUS (vē-sū'vī-ūs), a famous volcano in Italy, situated near the Bay of Naples, about ten miles east of the city of Naples. The mountain rises from the plain of Campania. It has a circumference of 30 miles at its base and rises 4,225 feet above the level of the sea. The surrounding plain is about 2,200 feet above the sea, thus making the pyramidal cone 2,025 feet above the adjacent country. In ancient times it had but one peak, but now there are two distinct summits, known as Somma and Vesuvius. Monte Somma is a precipice forming the wall of an ancient, prehistoric crater greater than that of the present volcano, and the mountain is thought to be only half as high as in former times, its upper half having been blown away by a colossal eruption of which no historical record remains. The cone lies south of Monte



MONTE SOMMA AND THE CONE OF VESUVIUS.

Somma, from which it is separated by a valley known as Atrio del Cavallo, and at the western end of the valley is an observatory, at which the eruptions and indications of disturbances are studied. The distance across the cone is 2,000 feet and it slopes inward to a depth of 500 feet, forming a cup-shaped crater. Tourists may ascend to within a short distance of the mouth of the crater by a cable railway, where they secure a fine view of the surrounding country, and may study the substances brought up by volcanic eruptions, which include forty different minerals.

Though earthquakes and eruptions have taken place in the region of Vesuvius at various times since the beginning of the historic period, it has been densely populated for more than twenty centuries. The earliest recorded symptoms of activity occurred in 63 A. D., but it is reasonably certain that vast disturbances took place at a much earlier period. Pompeii and Herculaneum, two cities near the base of Vesuvius, were buried by an eruption in 79. Excavations made in modern times have established the fact that lava was not emitted during this eruption, but that the inundation took place by reason of the steam given off by the mountain becoming

condensed into rain, which mixed with the light volcanic dust and flowed down the slope, thus covering the surrounding region with a pasty mud. Numerous eruptions have occurred since then. The presence of internal fires gives evidence of constant activity. In 1036 a vast discharge of liquid lava flowed from the crater. It is estimated that the great eruption of 1631 destroyed 18,000 lives. In 1794 a vast stream of lava 1,210 feet wide destroyed the town of Torre de Greco. Other noted eruptions occurred in 1855, 1861, 1872, 1879, 1885, 1903, and 1905. The more recent earthquake in the vicinity of Messina, in 1908, was accompanied by extensive eruptions from Vesuvius. On the slopes of Vesuvius are fine gardens and orchards, producing grapes, oranges, lemons, apples, and vegetables.

VETCH. See **Tare.**

VETERINARY (vē'tēr-ī-nā-rĭ), the branch of medicine that treats of the diseases and injuries of domestic animals and relates to their medical and surgical treatment. The practice of veterinary medicine and surgery is of considerable antiquity, treatises on that subject having been written by Hippocrates and other Grecians. However, the schools which teach veterinary science as an exclusive branch are of modern institution, the first on record being built at Lyons, France, in 1762. Shortly after similar schools were founded in various parts of Europe, or veterinary faculties were added to institutions already established. The first institution of that kind in England was founded in London, in 1791, and the first in Germany, at Berlin, in 1792. The leading veterinary schools in Germany have been raised to the position of university rank, especially those at Berlin and Hanover.

In the United States, veterinary science is taught mostly in private institutions, though some of the State institutions have departments devoted to that science. Chairs in veterinary medicine are maintained in Cornell College and Harvard and Pennsylvania universities. Special schools of veterinary medicine are located in Minneapolis, New York, and a number of other cities. Questions relating to veterinary science are referred by the government to the Department of Agriculture, being under the direct charge of the Bureau of Animal Industry. This is true likewise of Canada, where the veterinary director-general and live stock commissioner is an officer under the Department of Agriculture. The literature relating to the practice is very extensive, especially in the French, German, English, and Latin.

VETO (vē'tō), a Latin term, meaning **I**

forbid, applied in civics to the power vested in one branch of the government of the state to negative the resolutions of another branch, or to the constitutional right of the chief executive to forbid or refuse to approve a legislative enactment. In Rome the tribunes of the people had power to stop any measure of the senate deemed injurious by pronouncing an *interdicto*, meaning *I interdict*. The laws of Poland, passed in 1652, vested the right of intercepting legislation in each individual deputy of the imperial diet, who entered his protest by issuing a *nie pozwalam*, signifying *I do not permit it*. In the United States the power to veto legislative enactments is vested in the President and in the governors of the several states. In various other offices it extends to officials having executive powers, such as the mayor of a city. The veto power in the United States is qualified, not absolute, for the reason that after it has been exercised a rejected measure may become a law by two-thirds of the members of each branch of the legislative body voting for its passage, when it is said to be passed over the veto of the executive.

In Great Britain the sovereign may veto a bill of Parliament, but that power has not been exercised since 1707, when assent to a bill regulating the militia in Scotland was refused by Queen Anne. In Canada, when a measure has passed both houses of Parliament, it is submitted to the Governor General for his signature. This official may reserve it for the consideration of the colonial secretary, if he considers that it interferes with imperial interests. The imperial government may disallow any such measure within two years. The governments of all nations recognize the right of veto in the sovereign, or some specially constituted body, but the veto power is greatest in the more autocratic governments, as in Russia, Turkey, and China.

VEVAY (vē-vā'), or **Vevey**, a town of Switzerland, in the canton of Vaud, ten miles east of southeast of Lausanne. It is finely situated on the northern shore of Lake Geneva, at the mouth of the Veveyse River, and is famous as a health resort and residence of foreigners. A railway line passing along the shore of Lake Geneva furnishes transportation facilities. Among the noted buildings is the Church of Saint Martin, which contains the tomb of Broughton. It has a number of excellent schools. A fine bridge crosses the Veveyse. The surrounding country is noted for its fine orchards, vineyards, and beautiful climate. It has manufactures of wine, condensed milk, and watches. Population, 1906, 12,980.

VIADUCT (vī'ā-dūkt), a structure for carrying a road across a deep valley or a ravine, differing from a bridge in that the piers are the most prominent features in its construction. Formerly viaducts were made largely of wood or stone, but now they are constructed chiefly of iron and steel. In most cases heavy foundations are made of concrete or stone, upon which the piers of steel rest, and the stringers are likewise of steel. Several short spans usually make up a viaduct and the piers are shaped in the form of towers. The longest viaduct in the world is at Boone, Iowa, constructed in 1901 by the Chicago and Northwestern Railroad Company, as a means of crossing the Des Moines River. It has two tracks, is 185 feet high, and has a length of 2,685 feet. A similar viaduct crosses the Des Moines River at Fort Dodge, Iowa. Other noted viaducts include those at Valley City, N. D.; across the Pecos River, in Texas; and at Gokteik, Burma. See **Bridge; Valley City**.

VIA MALA (vē'ā mā'lā), a remarkable gorge in Switzerland, situated in a portion of the canton of Grisons called Hinterrheinthal (Farther Rhine Valley). The walls of the gorge are 1,350 to 1,600 feet high, forming a narrow space between, and at the bottom flows the Hinter Rhine. Formerly the gorge was called the Lost Gulf, owing to the difficulty experienced in reaching it, but a fine road was built along its sides in the early part of the last century. The roadway crosses and recrosses the narrow gorge from side to side by bridges fully 400 to 625 feet above the river. This roadway is necessarily narrow, since it was required to blast the hard rock with powerful explosives, but it is one of the grandest and most beautiful passageways in Europe. The region is visited by many tourists.

VIBURNUM (vī-būr'nūm), a genus of shrubs and small trees of the honeysuckle family, which embraces about eighty species. The branchlets are opposite, the leaves are entire or serrate, the buds are naked, and the flowers are axillary or in terminal clusters. The fruit is a dry or fleshy drupe, having one seed. Twelve species of viburnum have been catalogued in North America, including the arrowwood, hobble bush, sweet viburnum or sweet berry, and dockmakie or maple-leaved viburnum. The last mentioned grows to a height of six feet and in appearance resembles young maples. Several species yield medicinal properties and a yellow dye is obtained from the branches. A species known as *viburnum lentago*, or the *wayfaring tree*, is native to the warmer parts of Europe and Asia. It is planted as an ornamental shrub

for its small, white flowers and handsome leaves. The *laurestinus* is a species with evergreen leaves and clusters of rose-colored flowers. It is valued as a plant for house decoration.

VICAR (vik'ēr), an official in some of the Christian churches, or the term applied to a person who serves as deputy to another. In the Church of England a vicar is a priest of the parish, the revenues of which belong partly to another body or corporation. Such a priest is supported by the lesser tithes or a special endowment. A vicar-general in the Roman Catholic Church is a priest who acts as the deputy of a bishop in the government of the diocese, but his duties are confined to matters that do not demand full episcopal functions. The Pope assumes the dignity of vicar of Christ on earth.

VICENZA (vê-chên'tsa), a city of Italy, capital of the province of Vicenza, forty miles northwest of Venice. It is situated on the Bacchiglione River and is surrounded by a farming and fruit-growing country. The city is well built, has railway facilities, and is lighted by gas and electricity. The chief buildings include the townhall and a number of famous churches, including the cathedral and the Church of Madonna del Monte. It has a public library of 54,500 volumes, an art academy, and several fine

to the Lombard League, which opposed Frederick Barbarossa. In 1404 it became subject to Venice, but is now an integral part of Italy. Population, 1906, 45,678.

VICHY (vê-shě'), a town of central France, in the department of the Allier, about sixty miles northwest of Lyons. It occupies a fine site on the Allier River and is surrounded by picturesque hills covered with vineyards and orchards. Vichy is noted for its numerous mineral springs, whose waters are strongly impregnated with various saline substances. It has commodious hotels and summer villas and is famous as a summer resort, its health and pleasure seeking visitors often numbering many thousands annually. The waters are bottled and sold in the market. Fine baths are maintained at the hotels for the accommodation of visitors. Soda is the leading constituent of the water, which ranges in temperature from 40° to 115° Fahr. Persons suffering from indigestion, gout, chronic catarrh, and other ailments find the application of the water of lasting benefit. The value of these springs was known to the Romans. Many remains of marble baths dating from Roman occupation have been found in the vicinity. Population, 1906, 15,524.

VICKSBURG (viks'bûrg), a city of Mississippi, county seat of Warren County, 44 miles west of Jackson. It is on the Mississippi River, a short distance below the mouth of the Yazoo, and has communication by the Yazoo and Mississippi Valley and the Queen and Crescent railroads. The principal buildings include the county courthouse, the Charity Hospital, the Cherry Street College, the Federal building, and the Saint Aloysius College. It has well-paved streets, public waterworks, sanitary sewerage, and electric street railways. The national cemetery contains 16,727 graves. The manufactures include cotton-seed oil, oil cake, machinery, lumber products, boots and shoes, carriages and wagons, saddlery, clothing, and tobacco products. Vicksburg was settled in the early part of the 19th century and was incorporated in 1840. It was strongly fortified in 1861 and attempts to capture it were made by the Federal forces under Sherman and Farragut in 1862. Since it was the only strong position on the Mississippi in the hands of the Confederates, General Grant conducted a siege against the city until July 4, 1863, when it surrendered with



MAP TO SHOW THE VICKSBURG CAMPAIGN.

schools. The manufactures include woolen goods, leather, straw hats, musical instruments, and machinery. In the 12th century it belonged

31,600 men and 60,000 muskets. Population, 1900, 14,834; in 1910, 20,814.

VICKSBURG CAMPAIGN, the name of a

series of operations in the Civil War of the United States, the purpose of which was to capture Vicksburg, Miss., and ultimately secure control of the Mississippi. In December, 1862, General Grant, aided by General Sherman, began the campaign with an army of 48,000 men. The former advanced against the city by land, while General Sherman descended the river, but was repulsed at Chickasaw Bluffs on the 20th. This temporary defeat caused the campaign to be abandoned until January, 1863, when General Sherman proceeded to attack the Confederates at Haines's Bluff, while McPherson and McClelland planned to cross the river from the west side under protection of the gunboats under Commodore Porter.

A preliminary victory was won by the Federals at Port Gibson in April and as a result the lines of the Confederates were contracted. Grant and Sherman won a victory at Champion Hill and the Big Black River in May, and the Confederates under Pemberton were compelled to retreat into Vicksburg. Grant undertook to capture the city by assault in May, but, failing to do so, he decided to begin a siege. He held a position on the center, while Sherman was on the right and McClelland on the left. Porter held the Federal base of supplies along the Yazoo River. A lack of supplies and disease made it necessary for Pemberton to surrender, which he did after withstanding a siege for 47 days. The surrender took place on July 4, 1863, the day following the Federal victory at Gettysburg.

VICTOR (vik'tēr), a city of Colorado, in Teller County, about six miles southeast of Cripple Creek, on the Midland Terminal, the Florence and Cripple Creek, and other railroads. It is surrounded by a productive gold and silver producing region, to which it owes its prosperity. The features include the high school, the public waterworks, and picturesque mountain scenery. Among the industries are bottling works, lumber mills, smelters, and ore-sampling works. It has a large trade in merchandise. The place was platted and incorporated in 1894. Population, 1900, 4,986.

VICTOR, the name of three popes and two antipopes of Rome. See **Pope**.

VICTORIA (vik-tō'ri-à), a city in Texas, county seat of Victoria County, on the Gaudalupe River, 95 miles southeast of San Antonio. It is on the Southern and the San Antonio and Aransas Pass railroads. The surrounding country is a fertile region. Among the principal buildings are the county courthouse, the city hall, the high school, the Nazareth Seminary, and the Saint Joseph's College. It has manu-

factures of cotton-seed oil, dairy products, cigars, and machinery. The municipal improvements include waterworks and sanitary sewerage. Population, 1900, 4,010.

VICTORIA, a seaport city of Vancouver Island, capital of British Columbia, on the northern shore of the Strait of Juan de Fuca. It has communication by electric railways and by the Esquimalt and Nanaimo Railroad. Regular lines of steamers are maintained with the city of Vancouver, Seattle, and other ports on the Pacific. Esquimalt, about three miles distant, with which it is connected by an electric railway, has a fine harbor. The streets are wide and regularly platted, crossing each other at right angles. They are improved by substantial pavements, drainage and sanitary sewerage, and electric lighting. The municipality has a fine system of public waterworks.

Victoria has extensive commercial interests with the Orient and Australasia. The manufactures include flour, chemicals, earthenware, hardware, soap, leather, lumber products, ships, spirituous liquors, and machinery. Among the notable buildings are the customhouse, the post office, the government house, the city hall, the Anglican and Roman Catholic cathedrals, and the Anglican Woman's College. It has a number of excellent public schools, hospitals, orphanages, and private institutions of higher learning. The place was originally a trading post of the Hudson's Bay Company, but was platted in 1852 and incorporated as a city in 1862. Owing to the fine climate and interesting scenery, it is popular as a resort for tourists. Population, 1909, 34,640.

VICTORIA, a State of the Commonwealth of Australia, situated in the southeastern part of the continent. It is bounded on the north and northeast by New South Wales, east by the Pacific Ocean, south by the Pacific Ocean, Bass Strait, and Indian Ocean, and west by South Australia. Bass Strait separates it from Tasmania. The length from east to west is 448 miles and the general width is about 235 miles. It has an area of 87,884 square miles, hence is the smallest State in the Commonwealth.

DESCRIPTION. An irregular range of mountains traverses the State from west to east, forming the southern extension of the Great Dividing Range. Most of the surface consists of unwooded plains, and the northwestern part belongs to the region of the Great Plains. The Australian Alps are in the eastern part, from which numerous chains trend in various directions, and toward the west they merge into the Grampians. Mount Bogong, height 6,512 feet, and Mount Hotham, height 6,075 feet, are the

highest peaks of the Australian Alps within the State. Mount William, height 5,590 feet, is the most elevated summit of the Grampians. Ranges known as the Pyrenees and the Hume Range extend in ridges between the Australian Alps and the Grampians. Belts of timber extend along the streams and scattered groups of trees characterize the undulating plain. The varieties of forest trees are very numerous, including the eucalypti or gum trees, the oak, honeysuckle, cherry, acacia, and allied species. In most of the regions that have timber the trees are widely apart and the surface is quite free from underbrush, thus affording a good growth of grasses.

The drainage belongs to two systems, one sloping toward the south and the other forming a part of the Murray valley. Most of the streams are short and not navigable. The Murray forms the larger part of the boundary between the State and New South Wales and receives the inflow from the Owens, Goulburn, and Campaspe rivers. Among the streams flowing toward the south are the Mitchell, Tambo, Taylor, Yarra, and Wannon. Port Philip Bay, with an area of 870 square miles, is an important inlet from Bass Strait. Numerous small lakes with saline waters are found in the northwestern part and these have no outlet to the sea.

Though sudden changes occur in the condition of the atmosphere, the climate is generally healthful and agreeable. The extremes of temperature range from 32° to 110° and the annual average is about 58°. January is the warmest and July the coldest month. Ice sometimes forms in the coldest part of July, but it disappears before the sun reaches the meridian. The year may be divided into two seasons, the hot, dry season, extending from October to March, and the moist, cool season, from April to September. Rainfall is heaviest in the eastern part, where it is from 30 to 50 inches, but it decreases gradually toward the northwest, where it does not exceed 10 to 14 inches. Drouths are not infrequent in this section.

MINING. The State has extensive deposits of minerals and has yielded about two-thirds of the gold obtained in Australia. The annual output of gold averages about \$15,750,000. Granite, iron, coal, copper, tin, lead, and zinc are obtained in considerable quantities. Precious stones of much value occur in the mountains, especially garnet, ruby, agate, topaz, and sapphire. Mining is conducted by modern methods, chiefly with machinery and British capital, and the exportations are extensive.

AGRICULTURE. Farming is a more extensive

enterprise in Victoria than in any other State of the Commonwealth. This is due to the fact that the rainfall in the southern and eastern parts is normally certain and that a large portion of the State has soil of much fertility. Wheat is grown on nearly half of the cultivated land and is the leading crop. Both oats and wheat are raised to some extent for hay, and, when grown for that purpose, they are cut green. However, the yield of oats is large and this cereal takes rank as the second crop of importance. Other farm products include barley, rye, vegetables, and fruits. Grapes are cultivated very extensively, yielding large quantities of the finer species. The sheep and wool industry has improved materially with almost every decade, and correspondingly large interests are vested in rearing cattle and horses of a fine grade. Other domestic animals include mules, swine, goats, and poultry.

MANUFACTURES. The manufacturing enterprises were retarded in their development to some extent by the profitable investments in mining and farming, but they are now in a state of healthful growth. Many of the industries are connected with the mines, especially in smelting and machine shops. Other enterprises include flour and grist mills, clothing and textile factories, potteries and brickyards, vintages, breweries, metal works, creameries, and cheese factories. The fisheries furnish considerable material for curing and canning. Large quantities of fruit are canned for exportation. Among the general manufactures are saddlery, hardware, cigars, preserved meats, and utensils.

TRANSPORTATION. The State has 3,750 miles of railroads in operation, and electric railways are operated in the larger cities and many of the rural districts. All of the railroads are owned and operated by the government under a commissioner. Most of the lines are in the central part of the State, but the system is connected with those of New South Wales and South Australia. The trade is largely with Great Britain, but considerable foreign trade is carried on with France, Germany, and the Netherlands. Among the exports are wheat, wool, gold, butter and cheese, live stock, hides, and preserved meats. The imports consist chiefly of clothing, machinery, and metal wares. In the volume of trade Victoria ranks next to New South Wales. Melbourne and Geelong, both on Port Phillip Bay, are the leading ports.

GOVERNMENT. The State has government similar to that of the other members of the Commonwealth. Its chief executive is a Governor appointed by the British crown. Legis-

lative authority is vested in the Parliament, which consists of a legislative council and a legislative assembly. The former has 35 members elected for six years, and the latter has 68 members elected for three years. A property qualification is required to permit voting for members of the upper house, but such is not the case when voting for members of the assembly. Local government is administered in subdivisions corresponding to the towns and counties of Canada. The government has fostered the extension of transportation facilities and encouraged the development of the material industries.

EDUCATION. Elementary and secondary schools are maintained under the direction of the State. Attendance upon school is compulsory and free between the ages of six and thirteen years. Practically all the adult population above the age of fifteen years is able to read and write. The larger part of secondary instruction is in the hands of private and denominational interests. Melbourne has a fine university, with which are connected a museum, a library, an observatory, and zoölogical and botanical gardens. Other higher institutions include several colleges, normal schools, technical institutes, schools of agriculture and horticulture, and schools of mines.

INHABITANTS. The inhabitants consist largely of Europeans and their descendants. About three-fourths of the people are Protestants. Among the leading denominations are Anglicans, Roman Catholics, Presbyterians, Wesleyans, and Episcopal Methodists. Melbourne, in the south central part, is the capital. Other cities include Ballarat, Geelong, Sandhurst, Williamstown, Footscray, and Hamilton. The population in 1906 was 1,231,940. This included about 9,250 Chinese and 550 natives.

HISTORY. Captain Cook visited the coast in 1770 and George Bass made explorations in 1798, discovering Bass Strait. Lieutenant Murray took possession of Port Phillip Bay in 1802. The first permanent settlement was made by the Henty family on Portland Bay in 1834, after which whale fishing and sheep raising began to develop. The region was incorporated with New South Wales in 1835 and was formally opened for settlement the following year. Melbourne was platted in 1837 and soon developed trade with the interior. It was separated from New South Wales in 1850 and the colony of Victoria was organized the following year.

A large number of immigrants came to the colony in 1851, when gold was discovered. Within ten years the population increased to 540,322. Melbourne became a city in 1856 and

soon obtained a large interior and foreign trade, while Geelong, on the opposite side of Port Phillip Bay, became an important trade center. The colony rapidly developed its agricultural, mining, and stock-raising interests, making it the most prosperous and densely populated of the Australian provinces. With the building of railroads to all sections and the navigation of the Lower Murray, settlements and trade were carried to the interior points. The people, being generally in favor of Australian federation, ratified the federal constitution by a large majority in 1898. A general strike of laborers occurred in 1907, but it was finally settled by arbitration.

VICTORIA, a genus of plants that resembles the common water lily, so named in honor of Queen Victoria. A species known as *Victoria regia* is the largest of the water lilies. The leaves of this plant are nearly round and have a diameter of five or six feet, floating on the surface of the water, and the flowers are about fourteen inches in diameter. These flowers are quite fragrant, have a rose color, and appear among the leaves upon prickly stalks. Several species are found in the northeastern part of South America, especially in the swamps and lagoons lying between the Amazon and the Orinoco. They have been brought to Europe and North America for cultivation in hothouses, where they are admired for their large size.

VICTORIA CROSS, a naval and military decoration of Great Britain, which was instituted by royal warrant on Jan. 29, 1856, and bestowed for conspicuous bravery and devotion to the country in the presence of the enemy. It is open to all officers and men of the regular and reserved forces, and is a much coveted decoration. The Victoria Cross originated in connection with the Crimean War. It consists of a bronze Maltese cross, bearing the figure of the crown surmounted by a lion, and on the scroll below are the words, *For Valour*. The decoration is accompanied by a pension, and holders are entitled to add the letters V. C. to their names.

VICTORIA FALLS, an extensive cataract of South Africa, in Rhodesia, on the Zambezi River. It is located a few miles below the confluence of the Kwando and the Zambezi, about 225 miles northwest of Bulawayo, and excels the Niagara both in height and in the volume of water. The Zambezi flows over a broken and brush-covered plateau and is a mile wide some distance above the point where it plunges into a chasm 400 feet deep, but this chasm is not more than 300 feet in width at the bottom,

A dense cloud of vapor rises above the falls, hence the native name *Mosi-wa-Tunya*, meaning roaring smoke. The famous Victoria bridge of the Cape-to-Cairo Railway crosses the river just above the falls. It is the highest structure of the kind in the world, being 420 feet above the water, and is 600 feet long. It is constructed of steel and affords a fine view of the falls.

VICTORIA NYANZA (*nyän'zà*), an extensive fresh-water lake of Africa, the largest of the great equatorial lakes, lying directly under the Equator and about 400 miles from the Indian Ocean. It is about 3,500 feet above sea level and has an area of 26,250 square miles. The waters are not excessively deep, but it has a number of deep bays, and near its shores are a number of fertile islands. Sesse, in the northwest, and Ukerewe, in the southeast, are the largest of these islands. Captain Speke, an African traveler, discovered the lake in 1858. It is now considered the source of the Nile, the overflow passing through the White Nile into Lake Albert Nyanza, about 100 miles northwest. The discharged water forms in its course three cataracts, known as Ripon, Karuma, and Murchison falls, the last named having a descent of 120 feet. The southern half of Victoria Nyanza belongs to German East Africa and the northern half to British East Africa. In its vicinity are extensive forests and an abundance of animal life. It has fine fisheries.

VICUÑA (*vě-kōon'yä*), a species of llamas found in South America, immediate in size between the alpaca and the llama. It has a long and slender neck and is covered with a short, curled wool. The color is a rich brown, but patches of white occur on the legs and on the shoulders. These animals ascend great elevations in the Andes and are usually seen in small herds. They are wild and difficult to approach. The Indians entrap them by constructing a circle of stakes nearly a mile in circumference.

VIENNA (*vī-ěn'nà*), in German *Wien*, the capital and largest city of Austria-Hungary, on the Danube River, near the foothills of the Wiener Wald, the eastern extremity of the Alps. It is 330 miles southeast of Berlin, has a temperate climate and an annual rainfall of 24 inches, and is about 562 feet above the sea. The city is the converging center of a large number of important railroads and through it passes the Danube Canal, an extensively improved branch of the Danube River, into which the Wien, a small stream, carries its waters. It is a well-built and handsome city, having straight and spacious streets, fine squares, and numerous public parks. In the number of its

large and handsome modern buildings Vienna ranks with any of the European capitals. It is officially divided into ten municipal districts. The older part is known as the inner town, and lies almost exactly in the center of the others. That portion is still the most aristocratic quarter.

In the inner town are the principal hotels, many of the embassies and legations, government offices, and the palace of the emperor. The other districts include Leopoldstadt, Landstrasse, Wieden, Margarethen, Mariahilf, Neubau, Josefstadt, Alsergrund, and Favoriten. Leopoldstadt is the chief commercial center and has many Jewish inhabitants. Alsergrund contains the military hospital, the municipal asylum, and an extensive general hospital. The principal manufacturing industries are carried on in Neubau, Mariahilf, and Margarethen, and the chief officials have their seat in Landstrasse. Ringstrasse, which encircles the inner city, is the finest street of the city and takes rank with the most beautiful thoroughfares in the world. Among the larger buildings are those of the government, including the fine imperial palace, the houses of parliament, the courts of justice, the customhouse, and the modern palaces of the archdukes and others of the nobility. Other noteworthy structures include the city hall, the Hofburg Theater, the municipal library, the Cathedral of Saint Stephen, the Chamber of Commerce, the Imperial Opera, the Albertina Library, and the central railroad station. Schönbrunn, the imperial summer residence, is about two miles from the city.

Vienna is the intellectual center of Austria-Hungary. It contains many famous churches and religious associations, numerous schools and institutions of secondary learning, and a fine university. It has the Vienna Conservatory of Music, the Polytechnic Institution, the Austrian Museum of Art, and the Military Geographical Institute. The imperial library has 900,000 volumes and about 25,000 manuscripts, and in connection with it is one of the finest imperial museums of Europe. Besides well-organized kindergarten and elementary schools, the city has a military institution, an agricultural academy, a conservatorium of music, many commercial colleges, numerous Protestant and Roman Catholic theological seminaries, and various institutions of science, art, industry, and technical learning. The noted monuments include one to Schiller, in Schillerplatz; one to Joseph II., in Josephplatz; one of Goethe, near the Palace of Justice; one of Schubert, in the Stadt Park; one of Beethoven, near the Academic Museum; and one to Prince Eugene, in Burgplatz. Fine speci-

mens of paintings by Dürer, Rubens, and other masters are in the picture gallery of the Belvedere Palace, formerly a residence of Prince Eugene. The regalia of Charlemagne and other imperial treasures are stored in the treasury.

The streets of Vienna are paved substantially and provided with all the modern facilities. It has gas and electric lighting, an extensive electric street railway system, waterworks, sewerage, and well-organized police and fire departments. Whether the visitor desires to attend the Cathedral of Saint Stephen, containing the tombs of Frederick III. and Prince Eugene of Savoy, or view the other beautiful churches, the palaces, monuments, or public parks, it is possible to reach them all by modern rapid transit, carriages, or cabs. Like Paris, the city is remarkable for the extensive use of bicycles and automobiles upon its streets. Vienna is not only the center of art and education in Austria, but of its manufacturing and commercial industries. The extensive system of railways and navigation on the Danube facilitate a large interior and export trade. Among the manufactures are leather, soap, cotton and silk textiles, paper, woolens, carriages, velvet, musical instruments, embroidery, porcelain, firearms, machinery, sailing vessels, boilers, and engines. The meerschaum pipes, musical instruments, and bent-wood furniture made in Vienna are exported in large quantities.

The site occupied by Vienna was originally a part of the Celtic settlements of Europe. A military post, called Vindobona, was established here by the Romans, and it was the place where Marcus Aurelius died in 108. When the barbaric tribes occupied the territory of ancient Rome, it was taken by the Huns under Attila, but its growth dates from the time of the Crusades, when it became the center of a considerable trade. The Hapsburgs made it their capital in 1276, after which it passed into history as the scene of many memorable military contests. In 1477 the Hungarians besieged it unsuccessfully. It was defended successfully against the Turks under Sultan Solyman the Magnificent in 1529 and a second Turkish invasion in 1683. Under Ferdinand I. it became the seat of the German emperors. The Congress of Vienna assembled here on Nov. 1, 1814, to organize the affairs of Europe after the first overthrow of Napoleon, but the escape of that military leader from Elba, in 1815, broke up the conference, although its acts were formally sanctioned by the powers on June 9, 1815. A large majority of the inhabitants are Roman Catholics. About 75,000 Jews reside in the city. German is the spoken language. Population, 1907, 1,999,912.

VIENNA, Congress of, a convention of the leading nations of Europe, held at Vienna, Austria, in 1814. It was called for the purpose of settling the affairs of Europe after the wars of Napoleon and convened on Sept. 30, 1814. Among the countries represented were Austria, England, France, Prussia, Portugal, Russia, Sweden, and Spain, but representatives were present from all the larger countries except Turkey. The rulers who attended in person included Emperor Francis of Austria, Alexander I. of Russia, and Frederick William III. of Prussia. Among the chief adjustments of territory were included the annexation of Lombardy and Venice to Austria; the erection of Belgium and Holland into a kingdom under William I.; the annexation of Savoy and Piedmont to the kingdom of Sardinia; the retention of Malta and Helgoland by Great Britain, of which the Hanover dynasty was given dominion; the retention of Naples, by Murat; the establishment of a constitution for Germany; and the annexation of Swedish Pomerania, a part of Saxony, the Rhine province, and the duchy of Posen to Prussia. Additional provisions included that Norway should be retained by Sweden, that Denmark and Lauenburg should be united, that the duchy of Warsaw be made a part of Russia, and that Cracow be erected as a free state under the protectorate of Austria, Prussia, and Russia. In February, 1815, Napoleon suddenly escaped from Elba. This caused the congress to disperse immediately, but its provisions were carried out after the fall of Napoleon in that year. The treaty was finally signed on June 9, 1815.

VIENNA, University of, an institution of higher learning in Vienna, Austria, one of the most celebrated of Europe. It was founded by Duke Rudolph IV. in 1365, but its period of prosperity began in 1384, when a theological faculty was added. The Jesuits obtained control of it under Ferdinand II., in 1623, when it was greatly enlarged by the addition of numerous buildings, and it has since maintained a high position, especially for its medical department. The institution now has faculties of medicine, theology, law and political science, and philosophy. With it are affiliated a number of museums, seminaries, colleges, medical clinics, and laboratories in art and science. Maria Theresa founded its library in 1775, which now contains 600,500 volumes. The attendance averages 6,125 students, many coming from abroad.

VILLAFRANCA (vël-lä-frän'kä), a town of northern Italy, nine miles southwest of Verona, on the Tartaro River. Formerly it was strongly fortified and played an important part in the

military movements of Southern Europe. The Austrians under General Radetzky defeated the Sardinians under King Charles Albert at Villafranca on July 25, 1848, and the Italians were defeated here by the Austrians on Jan. 24, 1886. The Treaty of Villafranca, concluded July 11, 1859, between Francis Joseph of Austria and Napoleon III., terminated the Italian war and conveyed Lombardy to Victor Emmanuel of Sardinia.

VILLEIN (vil'lin), the name of a particular kind of feudal serf, who occupied a middle position between the freeman and the menial serf. Some writers call all the peasants of the Middle Ages, whether free or unfree, villeins. According to others, all free peasants were termed villeins to distinguish them from those bound to the soil. The term had a local significance in some sections, where the villein occupied a portion of land at the will of the landlord, but he was required to perform menial labor. Usually the villeinage descended in regular succession from father to son, but later the villeins were permitted to occupy the lands only as a consideration for performing work in a satisfactory manner. After the serfs of this class acquired their freedom, they still continued their services as a condition of the tenure, but they came to be known as *half* or *full* villeins according to the size of the plat of ground held by the individual. The former had reference to about fifteen and the latter to thirty acres, while a tract of 120 acres was known as a *hide*. See **Serf**.

VILLI (vil'li), the small conical projections of the mucous membrane of the small intestine. They contain some muscular fibers and each villus has an artery, a vein, and one or more capillaries. The function of the villi is to absorb the nutritious matter from the digested food, which is taken up by the lacteals situated immediately back of the villi. The lacteals, during intestinal absorption, become distended with a whitish or bluish fluid called chyle. Small tubes run from each villus into larger ones lying in the mesentery. These tubes terminate in firm roundish bodies called mesenteric glands. Threadlike tubes lead from these glands to a larger tube, the thoracic duct, situated in front of the vertebral column. This duct is from eighteen to twenty inches long, has numerous valves opening toward the neck, and discharges into the left subclavian vein.

VILNA (vil'nä), a city of Russia, in the government of Vilna, about 470 miles southwest of Saint Petersburg. It has good railroad facilities, is surrounded by a fertile farming and dairying country, and is the center of a large trade in grain, live stock, and timber. The chief

buildings include the Cathedral of Saint Stanislaus, the Cathedral of the Holy Virgin, the Church of Saint Nicholas, the city hall, the public library, the university, and several synagogues. The university has a fine museum of antiquities, an observatory, and botanical and zoölogical gardens. Among the principal manufactures are leather, soap, earthenware, farming implements; lumber products, clothing, and machinery. The streets are paved substantially. They are lighted with gas and electricity and traversed by electric street railways. The municipality has extensive systems of waterworks and sewerage. About one-fourth of the inhabitants are of Jewish descent. Vilna was founded in the 10th century and was annexed to Russia in 1795. Population, 1906, 168,427.

VINCENNES (vin-senz') a city of Indiana, county seat of Knox County, on the Wabash River, 100 miles southwest of Indianapolis. It is on the Baltimore and Ohio Southwestern, the Evansville and Terre Haute, the Cleveland, Cincinnati, Chicago and Saint Louis, and other railroads. The surrounding country is fertile, producing grain, hay, and vegetables. Among the noteworthy buildings are the county courthouse, the high school, the public library, the Vincennes University, the Cathedral Library, and the Saint Rose Female Academy. The manufactures include furniture, flour, farming implements, woolen goods, clothing, machinery, and earthenware. It has a growing trade in cereals, live stock, and merchandise. Vincennes is the oldest city of Indiana. It was settled in 1702 by the French. From 1801 to 1816 it was the capital of Indiana. It was chartered as a city in 1856. Population, 1900, 10,249; in 1910, 14,895.

VINE. See **Grape**.

VINEGAR (vin'ê-gēr), an acid liquid obtained from an alcoholic liquid, usually cider or wine, used as a condiment and a preservative. In countries producing large quantities of wine, it is obtained from inferior grades of wines by acetous fermentation, but it is produced largely from malt. Malt vinegar contains four to six per cent. of acetic acid. It has a reddish-brown color and is quite highly esteemed. Crabs or sour apples are used largely in the manufacture of vinegar, but the product has neither the strength nor the flavor of the product made from wine.

Large quantities of *cider vinegar*, a grade deemed best in general household use, are made in the cider districts, especially in the regions growing large quantities of apples, pears, and peaches. Sugar is usually added to a very acid cider, thus giving the product a finer flavor and a less acid taste, but the cider made of a better

grade of fruit is simply the fermented juice. The processes of making cider from fruit and malt are quite similar, the expressed juices being placed in casks about three-quarters full and exposed to the air at a temperature of about 70°. If the proper amount of air and warmth, two essential conditions, are supplied, fermentation takes place rapidly. After the vinous fermentation has taken place, the vinegar is filtered, cleared, and drawn off into casks.

White vinegar is made by distilling either malt or wine vinegar and has about the same essential principles as the vinegar from which it is derived, but contains four to seven per cent. of acetic acid. *German vinegar* is made by passing malt or fermented wort over wood shavings in the presence of air. Vinegar may be obtained from all liquids which are capable of undergoing vinous fermentation. The cereals used extensively at present include rye and corn, a bushel of the latter yielding about four gallons of vinegar. The leading vinegar-producing region includes Missouri, New York, Ohio, Pennsylvania, Michigan, California, and Ontario. Vinegar is adulterated by adding sulphuric and sulphurous acids, which may be detected by boiling a quantity to which chloride of calcium has been added.

VINLAND, or **Wineland**, the name applied to that part of North America which was visited by the Vikings of Norway. In 986 this region was visited by Bjarne Herjulfson while on his way to Greenland, and Leif Ericson made an expedition to it in the year 1001. He named the country Vinland, owing to the abundance of wild grapes found at the time. It is not certain to what region the name has reference, but it is usually applied to the coast lying between Delaware and Nova Scotia. Some writers applied the name Vinland in particular to New England, while Nova Scotia is termed Markland and Newfoundland is called Helluland. These three names appear to have been applied by Leif Ericson to regions corresponding to the sections mentioned. Remains of an old mill at Newport and the Dighton Rock have been assigned in popular belief to the Norsemen, who are supposed to have formed settlements in America, but it is more probable that the former was erected by early English settlers in Rhode Island and that Indians located and inscribed the latter.

VIOL (vī'ül), an ancient stringed musical instrument, the forerunner of the modern violin. It was constructed similar in shape to the violin and was furnished with six or more strings, the tones of which were regulated by being brought into contact with frets placed at regular in-

tervals along the neck, for which purpose the fingers were used as in the violin. A bow was used to play the instrument. Three kinds of viols were in use, known as the treble, the tenor, and the base. The last mentioned was sometimes called *viol da gamba*, from the fact that it was held between the legs of the performer. It has been superseded in modern times by the violoncello.

VIOLET (vī'ò-lèt), a large genus of herbaceous plants, which are found in most parts of the globe, including about 200 well-marked species. The species native to North America are usually low herbs, either stemless, as the *common blue violet* and the *bird's-foot violet*, or with short leafy stems, as the *dogtooth violet*, and the *Canada violet*. The flowers are solitary, or rarely in pairs, growing at the end of slender axillary flower stalks.



COMMON BLUE VIOLET.

Most species have flowers of irregular form, with five sepals prolonged at the base and five petals, the larger one occurring at the lower part and provided with a spur. Many of the violets are blue, and the typical violet of literature is always so. Some have fine fragrance and some are scentless. The species range in shades from the deepest blue to yellow and white. The *common sweet violet* and the *violet tricolor* are popular species and are grown extensively in gardens. Others include the *hooded violet*, *larkspur violet*, and *leafy-stemmed violet*. The pansies grown in flower gardens are a variety of the violet tricolor and are obtained by propagation. They are generally popular for cultivation in gardens.

VIOLIN (vī'ò-līn'), the most important modern stringed instrument of the viol class, having four strings of catgut. It is played with a *bow*. The lowest string is covered with silver-copper wire and the bow is strung with horsehair. A hollow wooden *body*, usually of pine, maple, or sycamore, forms the larger part of the instrument, and to it is attached a solid wooden *handle* or *neck*. The strings are fast-

ened to a *tailpiece* at one end of the chest or body, passing over a small wooden or bone *bridge*, and kept in tune and position by a series of *keys* at the end of the neck. Two *f* holes, so called from their similarity to the shape of that letter, are cut in the upper side of the body. The hairs of the bow are charged with rosin, thus producing the sound as the bow is drawn across the strings. The different notes of the musical scale are produced by stopping the strings with the fingers of the left hand against the finger board on the handle, thus shortening the vibrating portion. Nearly all the different parts of violins are fastened together with glue. It is noteworthy that the finest violins were made about 200 years ago, and some of them have a value at present ranging from \$1,500 to \$3,000.

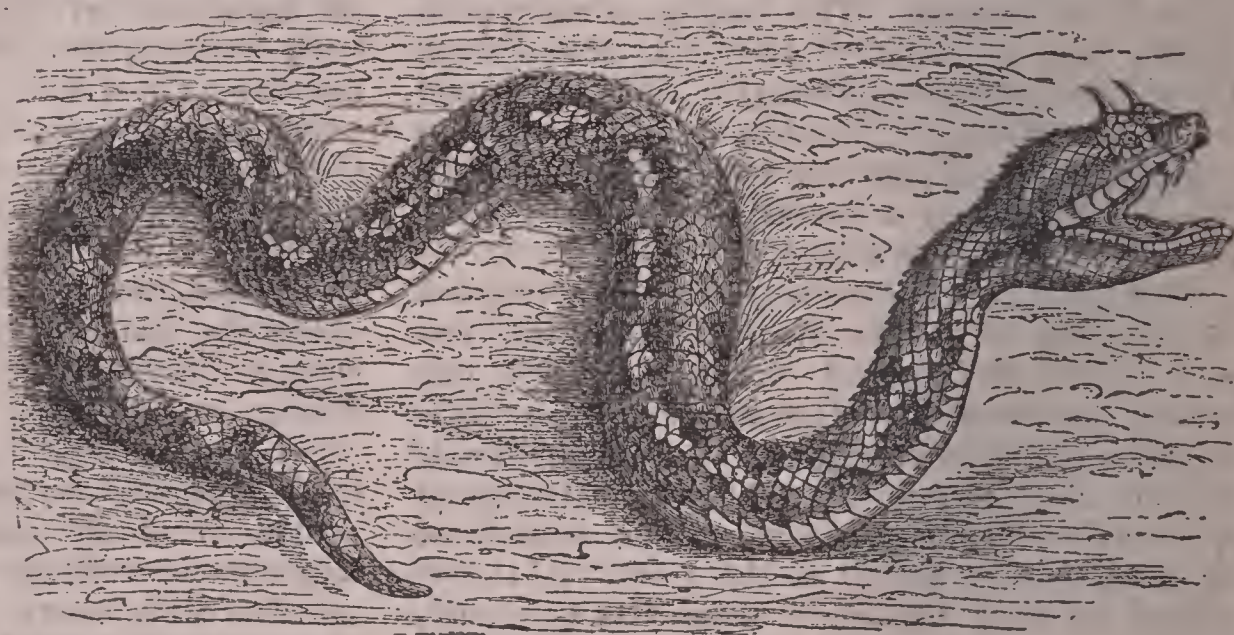
Various characteristics of a violin determine the quality of its tone, including the varnish, the fineness and thinness of the wood, the sounding holes, the curvings and arches, and the seasoning of the materials. The precise cause of the superiority of the older instruments has never been satisfactorily explained, neither has it been possible to construct instruments either equal or superior to them. Violins of the highest quality come from Italy, especially from Cremona, Milan, Venice, Brescia, and Mantua. Stradivarius, a native of Cremona, was the greatest of all violin makers. Jacobs, Klotz, and Stainer were the most eminent among the Germans, Vuillaume among the French, and Fox and Forrest among the English.

The violin originated from the *viol*, a stringed musical instrument of the Middle Ages, having from five to seven strings and being played with a bow. It was considerably smaller than the violin and resembled the guitar in having the finger board divided by frets. An instrument larger than the violin, but resembling it, is called a *violoncello*. The Anglo-Saxons called the violin a *fythel*, hence it is frequently called a *fiddle*. The climate of Italy is especially adapted to the making of excellent violin strings, but the largest manufactures of violins are now in Germany and France. Among the eminent players on the violin are

Schnittelbach of Lübeck, Louis Spóhr (1784-1859), Ole Bull (q. v.), and Luigi Boccherini (1740-1806).

VIOLONCELLO (vē-ō-lōn-chě'lō), a musical instrument of the violin family, which ranks immediately between the viola and the double base, being an octave lower than the former and an octave higher than the latter. The performer holds the instrument between the knees. It has four strings, the two lowest covered with silver wire, and is played upon by a bow. The instrument is tuned in fifths, A, D, G, and C, and is eminently rich and expressive in tone.

VIPER (vī'pēr), a venomous serpent native to the Old World, including two or three species which differ slightly in color. The appearance is similar to the rattlesnake of America, but there are no rattles on the tail, and they have no teeth in the upper jaw aside from the two



HORNED VIPER.

hollow poison fangs. The best known species include the *common viper*, or *adder*, of Europe; the *horned viper*, or *asp*, of Africa; and the *Russell*, a small viper of India. In Western Europe the common viper is the only poisonous snake. It has a brownish-yellow color, marked with black triangular spots, and its bite is not specially fatal, but it is quite painful and frequently produces fever and sickness. Vipers are viviparous animals, their eggs remaining within the body until fully incubated. Most species are good swimmers, but they generally inhabit dry woods and heaths. They feed on small birds, frogs, mice, and insects. The common viper of Europe is about two feet long, but the species native to India attain a length of five to six feet. The *black viper* of North America is an allied species.

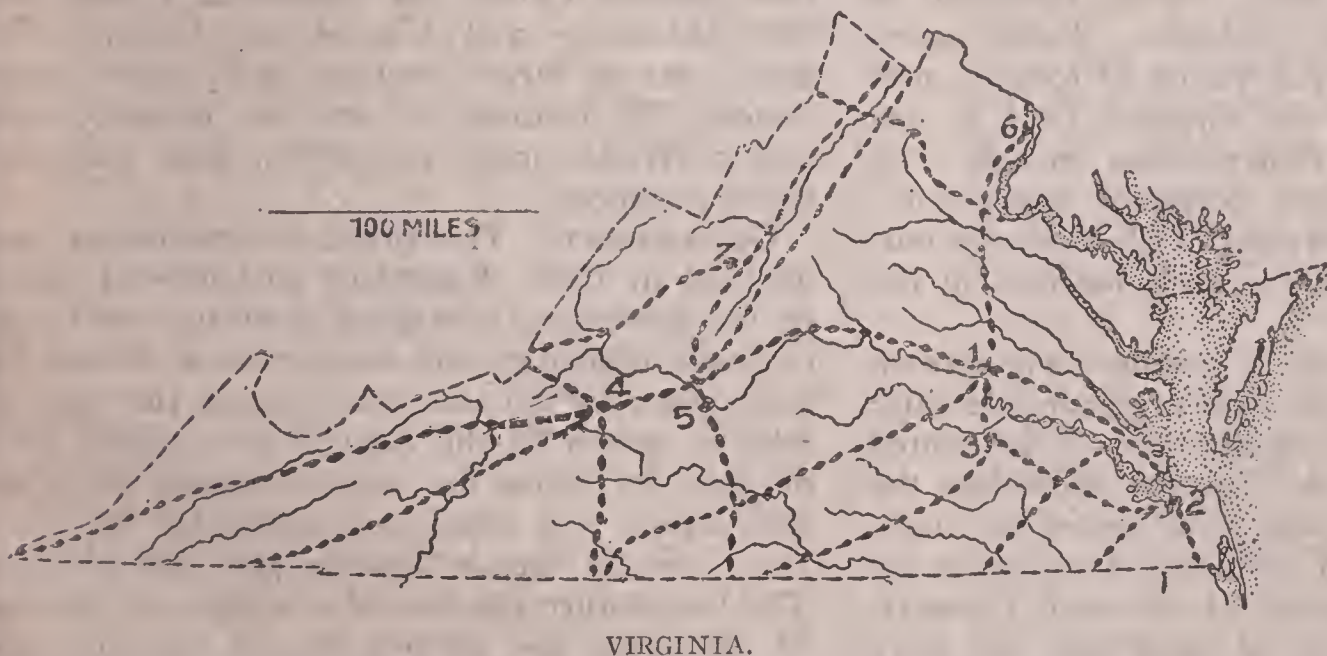
VIREO (vīr'ē-ō), or **Greenlet**, a family of insect-catching birds. They are restricted to the American continent and range from Canada to Paraguay. About sixty species have been enumerated, including many birds of rare plumage and beautiful song. The representative species are about six inches long, with an alar extent of ten inches. The predominating color is dull green and yellowish, the bill is conical, and the nostrils are overhung by membrane. They build their cup-shaped nest of tough fiber of the inner bark of plants, instead of the more brittle grasses, and suspend it from the twigs of bushes and trees. The nest is lined with soft materials, such as wool and soft grasses, and the parts are carefully glued together with saliva. Most species are migratory, visiting the higher latitudes in May and returning in the fall to the tropical regions. The species common to Canada and the United States include the *warbling vireo*, the *red-eyed vireo*, the *yellow-throated vireo*, the *blue-headed vireo*, and the *white-eyed vireo*.

VIRGINIA (vēr-jīn'ī-à), one of the original thirteen states of the United States, popularly called the *Old Dominion*. It is bounded on the north by West Virginia and Maryland, east by Maryland, Chesapeake Bay, and the Atlantic Ocean, south by North Carolina and Tennessee, and west by Kentucky and West Virginia. In shape it is a triangle, the apex being in the north. The southern boundary is a straight line 438

plain. In the western part are ranges of the Appalachian highlands, with summits that approximate altitudes of 5,700 feet. There is a general rise toward the northwest, the eastern part being low and more or less undulating, but rising in a series of belts until the highlands are reached. The tidal shore line, which is about 1,500 miles long, rises from a few feet to fully 75 feet above sea level. Among the mountain ranges of Virginia are the Blue Ridge, the North Allegheny, the Clinch, and the Cumberland mountains. Rogers Mountain, on the western border, has an elevation of 5,719 feet and is the highest summit in the State. The Cumberland mountains form the boundary between Virginia and Kentucky, and immediately west of the Blue Ridge is the famous valley of the Shenandoah. This valley is bounded on the west by the Alleghenies, in which are numerous limestone formations, including the famous Natural Bridge.

The greater part of the drainage belongs to the Atlantic coast plain. On the border between Virginia and Maryland is the Potomac, which drains the northern and eastern section of the State. It receives the inflow from the South Branch and the Shenandoah and flows into Chesapeake Bay by an extensive estuary. Among the streams that drain directly into Chesapeake Bay are the Rappahannock, the York, the Mattaponi, and the James, which receives the inflow from the Appomattox. The Staunton

flows into the Roanoke, which crosses the line into North Carolina and discharges into Albemarle Sound. About one-seventh of the State is drained by the Great Kanawha, the Holston, and the Clinch rivers into the Mississippi system. Deep gorges and numerous waterfalls characterize the rivers that flow through the mountainous section, and the streams that furnish drainage toward the east have



1, Richmond; 2, Norfolk; 3, Petersburg; 4, Roanoke; 5, Lynchburg; 6, Alexandria; 7, Staunton. Chief railroads are shown by dotted lines.

miles long, and the greatest breadth from north to south is 192 miles. It has an area of 42,450 miles, which includes 2,325 square miles of water surface.

DESCRIPTION. The eastern part belongs to the Atlantic coast plain, which includes the tide-water country and a portion of the Piedmont

escarpments to which navigation extends in the larger rivers. A portion of the State lies east of Chesapeake Bay and is organized into the two counties of Accomac and Northampton.

The climate is generally healthful, though sudden changes in temperature are frequent in the northwestern part. In the highlands the sum-

mers are cool and pleasant, but the higher altitudes have cold winters. The extremes in temperature range from 8° below zero in winter to a summer heat of about 98° in July. In the eastern part the climate is much warmer and more uniform. Here the thermometer seldom falls below 10° and the maximum heat of summer is from 98° to 104°. All parts of the State have an abundance of rainfall, which ranges from 48 inches in the eastern part to about 35 inches in the Shenandoah Valley. Snowfall is abundant in the higher altitudes, but disappears on the early approach of spring.

MINING. The mineral deposits consist chiefly of coal and stone. At present about 4,825,000 tons of coal are produced annually, being a material increase the last five years. A large part of the product is used in manufacturing coke. Iron takes rank as the principal metal, and the output in tons is about one-eighth that of coal. Limestone, granite, gravel, and clays are abundant. Slate of a good quality is quarried in the Piedmont plain, and the mines of anthracite and bituminous coal are chiefly in the western part. Mineral waters obtained in Virginia yield large returns. Other mineral products include salt, ocher, lead, gold, silver, gypsum, manganese, zinc, and precious stones.

AGRICULTURE. Fully 78 per cent. of the area is included in farms, which average 118 acres. In the production of peanuts the State usually holds first rank. Corn is the leading cereal and the most important crop. It is followed in acreage by wheat, hay, and oats. Large interests are vested in the cultivation of tobacco, and a fine grade known as Virginia Leaf is exported extensively. Other crops include rye, buckwheat, cotton, peas, potatoes, sweet potatoes, and fruits. Vegetables of all kinds are cultivated extensively for the early markets in the North.

The interests in stock raising have grown without intermission through every decade since the Civil War. This circumstance is accounted for by the fact that the farmers appreciate the utility of mixed farming as a means of maintaining the fertility of the soil. The largest investments are represented by the cattle industry, both in the production of meat and the dairy products. Horses of a good grade are grown for domestic use and for export. Other farm animals include sheep, mules, swine, goats, and poultry. The better class of grazing land is in the western part, where clover and blue grass flourish.

MANUFACTURES. Noteworthy progress has been made in the quantity of the manufactures produced within the last decade. The output

has more than doubled in value within the last twenty years. This is accounted for by the fact the State has much material to promote this enterprise, such as coal, iron, cotton, tobacco, lumber, and cereals. Tobacco products stand at the head of the list. They are followed closely by the output of flour and grist-mill products, lumber and timber products, and the manufactures derived from foundries and machine shops. Tanning is an extensive enterprise, owing to a large supply of oak bark within the forests of the State. Among the general manufactures are coke, canned fruits, cotton and woolen goods, cured and canned fish, spirituous liquors, quarry product, machinery, locomotives, railway cars, and farming implements. The oyster industry of Chesapeake Bay is an important factor among the industries. Richmond and Norfolk are the leading manufacturing cities.

TRANSPORTATION AND COMMERCE. The Atlantic Ocean and Chesapeake Bay afford fine harbors, and the rivers that discharge into the latter have extensive tide-water estuaries. One of the finest harbors along the Atlantic coast is on Hampton Roads, at the entrance of the James River into Chesapeake Bay. The State has 3,950 miles of railroads. Among the principal lines are the Chesapeake and Ohio, the Southern, the Atlantic Coast Line, the Baltimore and Ohio, the Norfolk and Western, and the Seaboard Air Line. Additional transportation facilities are provided by the James River, the Dismal Swamp Canal, the Kanawha Canal, and the Albemarle and Chesapeake Canal. The State has a large interior and ocean trade. Among the leading exports are tobacco, coal, cotton, fruits, iron, vegetables, and manufactured products.

GOVERNMENT. The present constitution was adopted in 1902. Executive authority is vested in the governor, lieutenant governor, secretary of State, treasurer, and auditor, each elected for four years by popular vote, except the auditor, who is chosen by the Legislature. Other State officials, including the superintendent of public instruction, are appointed either by the Governor or by certain boards and commissions. The Legislature consists of a senate and a house of delegates, the former chosen for four and the latter for two years. Membership in the senate cannot be less than 33 or more than 40, while the delegates in the house are limited to not less than 90 or more than 100. The supreme court of appeals consists of five judges and the State is divided into judicial districts, each of which has a judge elected for eight years. Lower courts, including justices of the peace, are chosen in the towns and cities. Local govern-

ment is under the administration of the towns, cities, and counties.

EDUCATION. The public school system maintained at present was established in 1870, when ample provisions were made for the education of youth. A superintendent of public instruction, who is elected by the General Assembly for four years, has control of the educational work, but is assisted as a member of the board of education by the Governor and the Attorney-General. This board has been an important factor in enlarging the educational facilities, since it has general supervision of the school fund and may remove, with the consent of the senate, any county or city superintendent. All the schools, except the primary departments, are required to be in session at least five months. Although separate schools are maintained for white and colored children, all have equal educational privileges. Illiteracy among whites is reported at 11.1 per cent. and among colored inhabitants at 44.6 per cent., but these figures are based on the population of ten years of age and upward.

Virginia has a large number of institutions of higher learning, some of which have been noted from an early date in the history of the country. Foremost among these are the University of Virginia, at Charlottesville; the College of William and Mary, at Williamsburg; the Richmond College, at Richmond; and the Washington and Lee University, at Lexington. Other institutions of higher learning include the Emory and Henry College, at Emory; the Randolph-Macon, at Ashland; the Virginia Union University, at Richmond; the Roanoke College, at Salem; the Hampden-Sydney College, at Hampden-Sydney; the Bridgewater College, at Bridgewater; the Saint John's College, Tidewater; and the Virginia Medical College, at Midland. Normal instruction for teachers is provided at the State Female Normal School, at Farmville; the Virginia Normal and Collegiate Institute, at Petersburg; the College of William and Mary, at Williamsburg; and the Hampton Normal and Agriculture College. Staunton has an institution for the deaf, dumb, and blind. Laurel is the seat of an industrial reform school for white boys. Insane asylums for whites are located at Marion, Staunton, and Williamsburg. Petersburg has an insane asylum for Negroes. The State penitentiary is situated at Richmond, which city likewise has a soldiers' home. A State farm is maintained to employ convicts, this enterprise having proved very satisfactory.

INHABITANTS. Virginia has a small number of foreigners, only 19,461. There has been a noticeable increase in the urban population, owing to the material advancement in manufacturing

enterprises. Richmond, on the James River, is the capital and largest city. Other cities include Norfolk, Petersburg, Roanoke, Newport News, Lynchburg, Portsmouth, Danville, Alexandria, Manchester, and Staunton. In 1900 it had a total population of 1,854,180. This included 660,722 Negroes. Population, 1910, 2,061,612.

HISTORY. Virginia was so named in honor of Queen Elizabeth, the virgin queen. The colonial history is of remarkable interest, especially because of its prominent connection with the early development of America. Sebastian Cabot explored its shores in 1498 and Verrazano visited the region in 1524. Sir Walter Raleigh subsequently surveyed the coast, and a grant of the land was made to the London Company in 1706. The first permanent settlement of the English in America was made at Jamestown on May 13, 1607, and here also met the first representative assembly. Negro slavery was introduced in 1619, when a Dutch man-of-war brought twenty slaves to the colony, and afterward a large slave trade was conducted by the English. Virginia was prominent in protesting against the legislative measures of Great Britain, especially the Stamp Act, and furnished such noted men as Jefferson, Washington, Madison, the Lees, and Henry in the Revolutionary period. It was a noted battle ground of the Revolution. At Yorktown, on the York River, occurred the surrender of Cornwallis in 1781.

Many citizens of Virginia supported the Union in the War of 1812 and the Mexican War of 1846-1847. In 1859 John Brown made his famous raid at Harper's Ferry, but the citizens of the State did their utmost to avoid the Civil War by calling a peace convention. An ordinance of secession was finally passed on April 27, 1861, which was ratified by a popular vote on May 23, 1861. Richmond was the capital of the Southern Confederacy and the State was the scene of many great battles, thus causing it to suffer more than any other State in the armed contest. Lee surrendered on Virginia soil, at Appomattox Court House, in 1865, and the State was readmitted Jan. 26, 1870. Since the war it has increased rapidly in wealth and population. The constitution adopted in 1902 has for its purpose the reform of elections, limiting the right of franchise somewhat. In 1907 the Jamestown Tri-Centennial was held at Norfolk, near the mouth of the James, to commemorate the first English settlement in America. Seven natives of Virginia have become President of the United States.

VIRGINIA, a city of Minnesota, in Saint Louis County, 54 miles northwest of Duluth. It is on the Great Northern, the Duluth and Iron

Range, and other railroads, and is surrounded by a productive iron-mining country. The principal buildings include the public high school, a number of churches, and many business and office buildings. It has a large trade in merchandise and lumber. Extensive interests are vested in machine shops and industries connected with mining and shipping iron ore. Electric lights, sewerage, and a system of waterworks are among the public utilities. Population, 1905, 6,056; in 1910, 10,473.

VIRGINIA, University of, an institution of higher learning at Charlottesville, Va., the home of Thomas Jefferson, who founded it. The institution was chartered in 1819 and opened for instruction six years later. It maintains departments of law, medicine, agriculture, academic instruction, and engineering. In addition it has a number of closely affiliated schools. The property under its control has a valuation of \$1,375,000, and the library contains a fine collection of 60,000 volumes. It has a faculty of 100 members and an attendance of about 800 students. Until 1904 the chairman of the faculty was the chief officer, but in that year Edwin Anderson Alderman was elected to the presidency.

VIRGINIA CITY, a city of Nevada, county seat of Storey County, 52 miles southeast of Reno, on the Virginia and Truckee Railroad. It was long noted as the largest and most important of the State, but subsequently declined in population. The noteworthy buildings include the county courthouse, the high school, the Miners' Union Library, and many fine churches. It has systems of electric lighting, waterworks, and sanitary sewerage. The famous Comstock mines are near the city. It was first incorporated in 1864. In 1880 it had a population of 10,917; in 1890, 8,511, and in 1900, 2,695.

VIRGINIA CREEPER, a plant of the vine family, which climbs by rootlets as well as by disc-bearing tendrils. In some regions it is called *American ivy* and *woodbine*. It differs from the poison ivy in having five-parted leaves, while the latter has three-parted leaves. Its greenish flowers are not conspicuous and are followed by dark blue berries, while the leaves assume a bright scarlet color in autumn. The plant is cultivated as an ornamental creeper on the fronts of houses, old walls, and over lattice work, its growth often reaching heights of thirty to fifty feet. An allied plant has been introduced from Japan, but is less hardy in the northern part of the United States and Southern Canada. It has three-lobed leaves, which densely cover the walls of buildings.

VIRGIN ISLANDS, an island group of the

West Indies, lying east of Porto Rico and comprising about 35 islands. They are of volcanic origin, but the soil is generally fertile and the climate is similar to that of Porto Rico. Among the principal productions are sugar, salt, ginger, molasses, rum, cotton, turmeric, and many varieties of fruit. Saint Thomas, Saint Croix, and Saint John are the most important. These islands belong to Denmark and have an area of 118 square miles. Virgin Gorda, Anegada, and Tortola, being British, are governed from the colony of the Leeward Islands. Roadtown, on the south side of Tortola, is the capital and seat of local government. The British possessions have an area of 55 square miles and a population of 5,612. Columbus discovered the group, in 1494, and Tortola has been British since 1666. The entire group has an area of 270 square miles and a population of 43,688.

VIRGINIUS MASSACRE, the name given to the capture of an American merchant vessel by the *Tornado*, a Spanish man-of-war, on Oct. 31, 1873. The *Virginus* was employed in conveying arms and men to aid the Cubans in an insurrection, which was the cause of the capture. Four Cubans were found on board and were immediately executed, along with Captain Frye and 52 persons, including the crew and passengers. The Spaniards released the vessel and the passengers who were permitted to live. Those on board started for New York City, but the boat was abandoned off Cape Fear. This incident caused considerable trouble, but diplomatic negotiations were instrumental in averting war.

VIRUS (vī'rūs), the name applied in medicine to fluids produced by diseased conditions or morbid processes in animals. In popular use the term is applied to the lymph used in vaccination, but physicians restrict it to the fluids that arise in such diseases as smallpox and measles. Virus is capable of developing disease when transmitted to other animal bodies.

WISE, a tool that has two jaws constructed so as to hold tight any material while work is done upon it. The jaws are fitted with a screw or lever, by which the movable jaw may be pressed tightly against the fixed jaw, thus holding secure the material upon which work is to be done, as in filing. Carpenters, machinists, and others use vises in their workshops. See **Screw**.

VISHNU (vīsh'nōō), the second person of the divine trinity of the Hindus, the complete trinity consisting of Brahma, the creator; Vishnu, the preserver; and Siva, the destroyer. He is mentioned in the early writings of the Vedas as a manifestation of the sun, but in the epic poems known as the "Rámáyana" and the "Máhábhá-

rata" a higher rank is given him in the divine essence. His office is to preserve and to do this he his to make ten descents to earth, called *avatars* or *incarnations*. Nine of these have already occurred, but the tenth is still looked for with much confidence. His first descent was to warn the righteous king Manu to save the sacred Vedas from an approaching deluge; the second, to support the world while the sea was disturbed; the third, to raise the submerged world; the fourth, to destroy an impious king; the fifth, to restore supremacy of the gods; and the sixth, to wash away the sins of the world. The seventh appearance of Vishnu was in the form of Rāma, the hero of the "Rāmāyana;" the eighth as Krishna; and the ninth as Buddha. It is held that the tenth appearance will be as Kalki, or the White Horse, when he shall destroy the wicked and vouchsafe bliss to the righteous. Vishnu is represented in painting and statuary as having four arms, holding in each hand some symbolic object. At other times he is shown seated on a throne, or as riding on a being in the form of half man and half bird. The worship of Vishnu is largely among the middle classes.

VISIBLE SPEECH, a system of symbols to represent the articulate utterances of the organs of speech. It is based upon an exhaustive classification of the possible action of the organs involved in speech. Since these organs are alike in all persons and the movements in uttering sounds are the same, visible speech is in the form of a universal language. Every letter in the system of letters, as well as every modification of the different characters, has an organical significance. The purpose of visible speech is to enable people of different languages to become able to communicate with each other and to facilitate communication among the deaf and dumb. Visible speech is an entire revolution in the method of communication, since it consists in a form of writing, and is thus based upon the actual movement of the organs of speech. It was devised by Alexander M. Bell, who lectured and wrote extensively upon the subject.

VISIGOTHS (vīz'ī-gōths). See **Goths**.

VISION (vīsh'ūn). See **Eye**.

VISTULA (vīs'tū-là), a river of Europe, which rises in northern Austrian Silesia and flows toward the northwest into the Baltic Sea, its waters passing into the Gulf of Dantzic. It courses through western Poland and eastern Germany. The length is 675 miles, of which 550 miles are navigable. The Vistula has falls of 200 feet in Silesia. Among the chief cities on its banks are Cracow, Warsaw, and Dantzic. Its tributaries include the Bug, San, and Brahe.

Canals connect it with the Oder, the Dnieper, and the Niemen.

VISUAL SENSATION, the name applied to the phenomenon of sight which causes the sensation upon the vision to be of greater duration than that of the stimulus. Such a sensation may be noticed in a flash of light, which lasts longer than the time occupied by the light vibration acting on the retina. A single sensation is occasioned when two flashes occur near each other. To prevent fusion in the case of a strong light, the interval between the two must be more than one-thirtieth of a second, while in a faint light it must be more than one-tenth of a second. This is due to the fact that it is easier to distinguish differences of brightness between two faint lights than between two of great brilliancy, as between a dip and a wax candle, on the one hand, and two bright electric lights, on the other. Many double stars seen with small telescopes appear as single ones, and that two stars exist can be proven only by the more powerful instruments. When the distance between two stars subtends an angle less than sixty seconds, most people see them as one. Sensations of color depend on the wave length of the rays falling on the retina in a given time, as well as on the amount of white light falling on the same retinal area at the same time. The colored light sensations are diluted by the white light. Red, green, and violet are the three primary colors which cause retinal sensations.

VITEPSK (vē'tyěpsk), or **Vitebsk**, a city in Russia, capital of the government of Vitepsk, 342 miles west of Moscow. It is finely situated on the Duna River, has good railroad facilities, and is surrounded by a fertile farming and dairying region. The features include the city hall, the government house, the church of Saint Michael, and the Cathedral of Saint Nicholas. Among the manufactures are tobacco products, furniture, sugar, and clothing. It has a large trade in farm produce, live stock, and timber. Formerly the place belonged to Poland, but it became a part of Russia in 1772. A large part of the inhabitants are Jews. Population, 58,880.

VITORIA, or **Vittoria**, a city of Spain, capital of the province of Alava, 30 miles south of Bilboa, on the Zadorra River. A large part of the place is not well improved, having narrow and gloomy streets, but the newer section contains many fine buildings and charming plazas. Among the principal buildings are the city hall, the governor's palace, the poorhouse, and the Cathedral of Santa Maria de Vitoria. Formerly the inhabitants were dependent entirely upon local enterprises, such as the manufacture of earthenware, leather, woolen textiles,

and malt liquors, but the construction of railroads has enlarged these enterprises and promoted a growing trade. Vitoria has figured more or less prominently in several wars, especially in 1813, when Wellington gained a decisive victory over the French at this place. Population, 1906, 33,864.

VIVISECTION (vĭv-ĭ-sĕk'shŭn), the practice of cutting the living body of animals for the purpose of making physiological or pathological investigation. Vivisection on the lower forms of animal life has been the means of acquiring nearly all the knowledge we possess of the physiology of the human body. It was employed by Galen in 150 A. D., when he discovered that the artery contained blood instead of air as was formerly supposed. In 1628 William Harvey, by means of vivisection, learned that the blood passes from the heart through the arteries and returns again to the heart by means of the veins, in fact that the heart is the organ which propels the blood. Since that time vivisection has been employed very extensively, but it is condemned on the ground of cruelty in some countries, especially as sometimes practiced in the secondary schools.

Modern medical practice is based very largely upon the study of conditions of health and disease and the effect of medicine through vivisection. In most cases the operations are performed under anaesthetics, but where no cutting more severe than a superficial venesection is desired, the operations are done without anaesthesia. In 1907 the Royal Commission on Vivisection reported that 46,073 experiments were performed within that year in the United Kingdom, a majority of which were concerned in studying cancer, tuberculosis, rabies in dogs, and the effect of various drugs upon the heart and nerves. Vivisection is practiced extensively in the veterinary colleges in France and the United States, but in most countries a license is required from government officials to carry on such investigations.

VIZIER (vĭz'yĕr), or **Vizir**, a title given to high officials in Mohammedan countries, especially in the Ottoman Empire. The term was first used as a title of the prime minister and was conferred by Amurath I. on General Timur-tash in 1386. Now the grand vizier is the highest officer in Turkey, next to the Sultan. In Turkey he is known as the *visier-azam*, or the *sadr-azam*.

VLADIVOSTOK (vlă-dyĕ-văs-tôk'), a city of Asiatic Russia, on the Gulf of Peter the Great, an inlet of the Sea of Japan. It is near the Korean frontier and forms the eastern terminus of the Trans-Siberian Railway. The har-

bor is well sheltered and commodious, ranging in depth from 30 to 75 feet, but the intense cold of winter makes it icebound for a number of months. The city is the chief naval station of Russia on the Pacific, having naval workshops and strong battery defenses, and its extensive transportation facilities make it a commercial center of importance. It has two naval schools and several institutions of secondary learning. The citizens maintain scientific and educational societies and excellent elementary schools. It is the seat of a number of churches and hospitals. Vladivostok is important as the center of extensive machine shops and dry docks. Among the manufactures are lumber products, utensils, cured fish, and implements. Population, 1908, 39,450.

VOICE, the sound produced by the vocal organs of a man and nearly all higher vertebrate animals. The larynx is the organ of voice in man. It consists of the expanded upper end of the trachea, or windpipe, and is connected with the hyoid bone or cartilage. An opening, the glottis, connects the larynx with the pharynx. Within the framework of the larynx are two thin, elastic bands, extending from front to rear, called the *vocal cords*. They are not really cords, but merely elastic membranes projecting across the opening. The membranes spread apart and leave a V-shaped orifice when not in use, and through it the air passes to and from the lungs. The edges approach each other when the cords are tightened, thus bringing them within one-hundredth of an inch of each other. When air is expelled or driven out through the glottis or opening between the vocal cords, they are thrown into vibrations and cause corresponding vibrations in the current of air. It will be seen from this that sound is produced in the same manner as by vibrations of the strings of a violin or the tongues of an accordion, though the vocal cords are scarcely an inch long.

Vocal sound is made only when the cords are less than one-tenth of an inch apart, and the different tones of the voice depend upon the width of the opening and the tension of the cords. When the cords are short, tight, and closely in contact, the higher tones of the voice are produced, while the opposite conditions cause the lower tones. Loudness depends on the strength of the expiratory current, and quality depends chiefly on the physical structure of the cords. The female voice has a higher pitch than that of the male, this being due to the circumstance that the cords of the latter are longer. At about the age of fourteen years the larynx of boys enlarges and the cords grow proportionately longer and coarser; hence, the

voice becomes about an octave lower and is said to *change* or *break*. The voice changes somewhat in old age, this being due to the muscles that move the cords losing their elasticity. Soprano, tenor, and baritone voices depend respectively on the length of the cords, but all voices are modified to some extent by the form of the throat, mouth, nose, teeth, and lips. While many animals have voice, man alone has speech, which differs from voice in that it is a modulated form through whose agency ideas are expressed.

Though commonly associated with voice, speech may be effected without the voice, as in whispering, which is speech without the employment of the vocal cords. It is effected principally by the tongue, teeth, and lips modifying the expiratory current. *Lisping*, *stammering*, and *stuttering* are due more largely to the organs that modify speech than to the vocal cords, especially stammering, which is caused by irregular action of the nerve centers. The faculty of speech is natural, but it may be greatly improved by careful exercise. Vowel and consonant tones make up the two classes of articulate sounds. The vowel sounds are generated in the larynx. They consist of pure vocal tones, modified by the pharynx, mouth, and lips, and attain a nasal quality when the back entrance to the nostrils is not closed. The consonants are formed above the vocal cords, *labials* being made by the lips, *linguals* by the tongue, and *dentals* by pressing the tongue against the teeth. The strength of the voice depends on the resonance of the chest, lungs, and larynx, as well as on the vibration of the vocal cords.

VOLAPÜK (völ-ä-pük'), an artificial language invented for international use in 1878 by Johann Martin Schleyer, a German priest of Constance, Switzerland. He was a diligent student of philology and was acquainted with fifty different languages. The name Volapük means *world speech* and was compounded from two words in the new language, *vol* meaning world and *pük* meaning speech or discourse. It was the aim of the author to construct a language which would be free from irregularities in grammar, orthography, pronunciation, and syntax, thus making the new language regular and easy to learn.

In Volapük the sounds are represented by 37 letters. To the five pure vowels are added the German *umlauts*, which are placed over a, o, and u, thus ä, ö, and ü. The chief advantage is that the language may be learned in a few weeks. Much progress in the study of Volapük has been made in France, Switzerland, Germany, and in some sections of the United States. The inventor

of the language published a grammar and dictionary of it in 1880 and about 2,000 books have been written in that dialect. A number of periodicals are published in it. Many national and international associations have been organized to extend its use. However, more recently it has been displaced to some extent by Esperanto. See **Esperanto**.

VOLCANO (völ-kā'nō), a mountain which has an opening and during a period of activity throws out heated matter from the interior of the earth. The opening, which may be either on the top or the side of the mountain, is called the *crater*. Volcanoes are of somewhat different shapes, but the crater is always surrounded by a conical deposit of ejected matter, usually in more or less concentric layers. The ejected matter consists of enormous quantities of volcanic ashes and lava, which are forced from the interior of the earth through a pipe or vent. Three classes of volcanoes have been recognized, including the *active*, the *intermittent*, and the *extinct*. The nature of these is explained by the names given to each. At the beginning of an eruption vast quantities of vapor escape through the crater, which, on cooling, condenses and forms dense clouds and afterward falls in torrents of rain. Large quantities of gases accompany the vapors, usually sulphurous acid gases, and later melted rock or lava and ashes are ejected with great violence.

The lava thrown from volcanoes is generally of a dark color and its texture is hard, but sometimes porous and spongy materials sufficiently light to float on water are ejected in large quantities from the vent. The flow of the lava depends upon its heat and the slope of the mountain side. Frequently it has a forward movement of ten miles per hour, but its velocity lessens as an upper crust forms and retards the rapidity of the flow. Many volcanic islands were formed entirely by lava streams. It is assumed that Iceland and the Hawaiian Islands were produced by lava emitted from numerous volcanic cones. Ashes or cinders are thrown with great violence from the craters of most volcanoes and, when falling directly back to the mountain, aid in rearing the cone. Heavy showers of ashes are the most destructive of the materials ejected, since they pile up in enormous drifts, as was the case in 79 A. D., when Pompeii and Herculaneum were entirely buried. The ashes are sometimes carried hundreds of miles by the wind, and their fall is frequently accompanied by heavy rains, caused by the ejected vapor of water.

It is not definitely known how many volcanoes exist, but good authorities place the number at

672, of which 270 are active. Of the active volcanoes, 95 are on the coasts of continents and 175 are on islands. Volcanoes form various groups of mountains, or appear as isolated conical elevations. To the latter class belong Vesuvius, Etna, and the peak of Teneriffe. They occur frequently in a continuous line. The most notable volcanic region of America extends from southern Chile to northwestern Alaska, though the active volcanoes are largely in the tropical region, including Popocatepetl, Orizaba, Cotopaxi, Pinchincha, and Jorullo. A line of similar



VOLCANO BULUSAN, PHILIPPINES.

extent passes from the Moluccas, along the eastern part of Asia, through Kamchatka, and by way of the Aleutian Islands into Alaska. This region includes many active cones, especially in the Philippines, of which the volcano Bulusan is a representative. The volcanic region of Europe and Asia is confined largely to the Mediterranean, passing from the Caspian Sea to the Azores, and embracing the Grecian Archipelago and the southern peninsulas of Europe. Isolated volcanic groups occur in divers regions, such as those of Madagascar, the Hawaiian Islands, Iceland, and Mauritius.

Many volcanic regions are submerged by the sea, though it is much more difficult to observe their action than that of those located on the land areas. Large volumes of smoke and great flames issued from the Pacific Ocean near Unalaska, an island of the Aleutian group, in 1796, and subsequently a volcanic crater was raised above the level of the water. Sailors visited the region in 1802 and found the surface highly heated. This particular volcano is now several thousand feet in height and has a circumference of three miles. Several instances of the total disappearance of islands are on record. They became submerged through volcanic action, as was the case in Java in 1772, when a mountain totally disappeared. Earthquakes usually accom-

pany volcanic action, and both are attributed to the same cause; namely, the contraction of a cooling crust. It is thought that the materials of the interior are crowded into a smaller space as the heated earth cools and the crust contracts, thus causing the highly heated gases or vapors to exert sufficient pressure to form craters, from which the lava and other materials are thrown.

VOLE, the name of a genus of rodents which belong to the same family as the muskrat and the lemming. The name is not used extensively in America, where similar animals are popularly called *field mice*. Several species of these animals are found in Europe and America. The *field vole*, known locally as the *short-tailed field mouse*, is about the same size as the common mouse, but has a stouter body and the tail is somewhat shorter. Another familiar species is the *water mole*, known in some sections as the *water rat*. It is about the size of the brown rat, has strong hind legs and blackish or dark brown fur, and feeds chiefly on vegetable food. It is called water mole from its living in burrows near streams and lakes. A species known as the *bank mole* has a rusty-colored fur and the tail is quite short.

VOLGA (völ'gà), the largest river of Europe, which is situated entirely in Russia. It rises in the Valdai Hills and, after a general course of 2,400 miles toward the southeast, enters the Caspian Sea near Astrakhan by seventy mouths. The Volga basin is estimated at 550,000 square miles and includes the heart of European Russia. Among the chief tributaries are the Oka and Kama. On its banks are the thriving cities of Astrakhan, Saratov, Samara, Kazan, Novgorod, Kostroma, Simbirsk, and Tsaritsyn. The Volga is navigable almost its entire distance and is connected by an extensive system of canals with the Baltic, Black, and Polar seas. The basin is a highly productive region. The fisheries include those of the sturgeon and salmon, large quantities of which are exported.

VOLT, the practical unit of electro-motive force, or potential difference, so named from Alessandro Volta, the inventor of the voltaic cell. The pressure is about equal to that produced by the common bluestone cell, usually employed in telegraphy, or a pressure sufficient to cause a flow of one ampere per second against a resistance of one ohm.

VOLTAIC PILE (völ-tä'ik). See **Galvanic Battery**.

VOLTMETER (völt'mē-tēr), an instrument for measuring electro-motive force. Sev-

eral instruments of this kind are in general use, but the most common form is a galvanometer arranged so volts may be read directly by means of a pointer and a scale. It has a movable coil mounted on jeweled bearings, and the coil is kept in position by fine spiral springs. In some types the movement of the pointer depends upon the movement of a piece of soft iron on a coil, while in others it is influenced by the movement of one coil with respect to the other. The difference of potential is measured in some voltmeters by the effect of heat upon a long platinum wire, the heat being due to the passage of a current. See **Galvanometer**.

VOLUNTEER (völ-ün-tēr'), a citizen who enters the military service of his own accord, or who in the time of war offers his service to the country. The name volunteers is applied in most armies to those men or officers who offer to take part in an assault of peculiar danger, as in an attempt to capture a powerful battery or to storm a fortress. Such enterprise is often called the *forlorn hope* and the survivors usually receive promotion or are specially awarded. The attempts to wrest Jerusalem from the Mohammedans, known as the Crusades, included the largest number and one of the most famous instances of volunteer service for a laudable purpose. In 1794 and in 1803, when 400,000 men were under arms, the British volunteered to repel a threatened invasion of the French. Another notable example may be cited in the large number of volunteers who joined the German armies to accomplish the overthrow of Napoleon in 1813-1814 and resumed their occupation after that purpose was consummated. During the Civil War in the United States, from 1861 to 1865, there were 2,656,533 men in the Federal service and the greater number of these were volunteers. Practically all the men added to the service in the United States at the time of the Spanish-American War were volunteers.

VOLUNTEERS OF AMERICA, a religious movement started in 1896 by Ballington Booth, son of William Booth. The promoter of this organization was previous to that time commander in America of the Salvation Army and he and his wife, Maud Ballington Booth, withdrew from the regular organization on account of not approving certain orders promulgated by General Booth. It is organized similar to the general form of organization in the army of the United States and the purpose is to promote religious, charitable, and educational work. In 1908 it had 680 corps, or societies, in the United States, to which country it is chiefly confined. Both indoor and outdoor

meetings are held, prisons are visited, destitute are aided by lodging and the obtainment of work, and Christian literature is distributed. A special feature is to enlist the attention of convicts who are released from prison. Persons of this class usually are lodged until work is found for them.

VOMITING (vöm'it-ĭng), the act of ejecting some of the contents of the stomach, through its own spasmodic contraction, by way of the mouth. It is usually preceded by a feeling of nausea, a free flow of saliva in the mouth, and frequently by a headache and free perspiration. The immediate cause is a contraction of the abdominal muscles, assisted by the active coöperation of the muscular walls of the stomach, while the diaphragm affords a firm surface against which the stomach is pressed by the abdominal muscles. An overloaded stomach, entrance of poisonous substances into that organ and some diseases and conditions of the body are among the chief causes of vomiting. It frequently accompanies seasickness. Those suffering with this ailment should lie down to rest. Mild stimulants, a small quantity of soda, or an external application of mustard at the pit of the stomach often furnish relief. Some animals, as the lama and the vultures, eject the contents of the stomach as a means of defense against their enemies.

VORONEJ (vâ-rô'nyësh), or **Voronezh**, a city of Russia, capital of a government of the same name, about 360 miles south of Moscow. It is situated on the Voronej River, a tributary of the Don, and has railroad connections with the Sea of Azov. The noteworthy buildings include the military school, the post office, two cathedrals, a public gymnasium, and the central railroad station. It has systems of public lighting and waterworks. Among the manufactures are woolen and linen goods, clothing, earthenware, leather, soap, and machinery. It has a large trade in farm produce and sugar. Its extensive distilleries and tobacco factories are among the largest in Europe. The city was founded in 1586. It was strongly fortified by Peter the Great. Population, 1907, 91,414.

VORTICELLA (vôr-tĭ-sĕl'lâ), a genus of infusorians found both in fresh and salt water. They are very numerous and many forms are microscopic. The head is bell-shaped and is fixed upon a stem, which is capable of being extended and contracted greatly. Around the mouth, or oral disk, are many long cilia and these are constantly in motion to draw in food. This motion causes a movement of the water at the mouth and is spoken of as the *miniature*

whirlpool of the vorticella. Formerly the name was extended to a large group that live in colonies, but these have been separated from the true vorticellas and are now regarded as other genera.

VOSGES (vōzh), a mountain range of Europe. It is situated north of the Jura Mountains and forms a part of the boundary between Germany and France. The range is twenty to fifty miles wide, has valuable forests, and affords fine pasturage. Most of the peaks are rounded and are generally called *ballons*. Ballon de Guebwiller, height 4,688 feet, is the highest peak. The region has valuable deposits of copper, lead, salt rock, silver, and coal. The Moselle, Saar, Saone, Ill, Meurthe, and Lauter rivers rise in the Vosges. A department of France, lying west of the Vosges Mountains, is called Vosges and has an area of 2,270 square miles.

VOTE, a formal expression of the will in regard to some question submitted for decision, as in enacting laws, passing resolutions, or electing officers. Every organized assembly has special rules governing the mode of voting. Most questions of importance are submitted by assemblages to a *roll-call vote*, in which each member responds to his name and states the side of the question that he favors by his vote. Other modes include the *viva voce*, in which the members utter the aye or no in response to the question; the *rising vote*, where the members indicate by standing whether they favor the affirmative or negative side; and the *division*, in which the members voting form different sides to be counted by tellers. Voting at public elections is by a ticket or ballot, on which the candidates' names are printed, and each voter indicates by an arbitrary mark the particular candidates favored, as in the Australian ballot system.

VOTING MACHINE, a mechanism used for automatically recording and counting votes. Devices of this kind have been suggested to prevent repeating and other frauds in elections. The first experiment with a machine of this kind was made in 1892, when certain town officers were elected in New York. The following year several states passed laws permitting the use of voting machines, some at local elections and others at all elections, the adoption to be optional with local boards. It was found that the machines were not only effective in overcoming fraud, but permitted voting with facility and the result was known immediately upon the close of the polls.

Many forms of voting machines have been devised and patented. In the common style of

machine it is customary to have a ballot on the plan of the Australian ballot, and the voter who enters the booth may so manipulate a keyboard that the candidates for which he wishes to vote are indicated by a *cross*, or X, which appears to the left of the printed name. In addition there are keys for voting *yes* and *no* on amendments or special propositions submitted. Another form is to press a button, after turning an indicator to point to a particular candidate, when the machine will register the vote, and the mechanism is so constructed that it is locked until turned to the next list of names under a particular office, the arrangement being in alphabetical order.

A device known as the *Standard Voting Machine* was used in many cities of New York in the general election of 1900 and since that time. It is about four feet square and ten inches deep and stands about six feet above the floor, being supported by legs. A bar projects from the upper corners so as to form the support for a curtain that constitutes a booth. The lever is thrown by the voter in such a manner that the curtain closes behind him so as to isolate him from others in the same room. He may elect to vote a straight ticket, in which case he pulls a knob over the party named and directs all the pointers to indicate that ticket. On the other hand, he may vote a mixed ticket by moving the pointer back from over the name that does not suit him and, instead, indicate his preference by moving the pointer to the opposing candidate. Having fully adjusted the pointers to indicate the exact candidates for which he wishes to vote, he operates the lever, thus casting his vote in secrecy and opening the curtain, which has the effect of locking the mechanism and placing it in condition for the next voter.

VOWEL (vou'el), or **Vocal**, an articulated sound which is made with the vocal organs open, hence consists of pure tone only. The vowels in the English alphabet are represented by the five letters *a, e, i, o, u*, and sometimes *w* and *y*. They differ from consonants in that the latter sounds are made by the vocal organs being obstructed in the process of articulation, or are mere emissions of breath articulated by the lips, tongue, teeth, and palate. See **Consonants**.

VULCAN (vūl'can), in Roman legends, the god of fire and of metals. He was the son of Jupiter and Juno, but, being deformed at birth, his mother dropped him into the sea, where he associated with the sea gods for nine years. After returning to Olympus, he became involved in a quarrel between Jupiter and Juno and was banished from the seat of the chief gods to the island of Lemnos. There he became cele-

brated as a worker of metals by means of fire, and is reputed the maker of a scepter for Jupiter, weapons for Hercules, and the armor borne by Achilles. He failed in winning the favor of Minerva, and became united in marriage to Venus. The worship of Vulcan never became widespread among the Romans, though they retained a temple to his honor at Rome. He ranked among the twelve great gods of Olympus, whose gilded statues were arranged consecutively along the walls of the Forum. He corresponds to the Greek Hephaestus.

VULGATE (vŭl'gāt), the most celebrated translation of the Bible into the Latin language, which, in its revised version, is the accepted standard of the Roman Catholic Church. Saint Jerome had been engaged to correct the *Itala*, an older Latin translation, and while at work formed the plan of making an entirely new version of the Scriptures. He commenced his labor about 383 A. D. and completed the entire work in 405. In the 9th century this translation entirely superseded the Latin version of the 2d century. The Council of Trent, while in its fourth session, on May 27, 1546, declared the Vulgate to be a standard in all sermons, expositions, and public lectures. Pope Clement VIII. made a revision of the Vulgate in 1592-1593, and this work is the basis of the modern Douay version, completed in Douay, France, in 1609.

VULTURE (vŭl'tŭr), any one of a class of birds of prey, being distinguished by a bare head and for the habit of feeding on carrion. These birds are confined largely to the warmer climates, where they are useful as scavengers to consume the carcasses of animals. In all species the neck is strong, the head is quite level on the top, and the flight is elevated. The large size of the feet and strong legs enable them to walk with comparative ease. The head and neck are destitute of feathers, the beak is elongated, and the upper mandible is considerably curved at the end. They differ from most birds of prey in that the female is smaller than the male and

from the eagles in that they do not carry the food to the young, but swallow the carrion and feed the nestlings from their crop. Vultures have an extraordinary development of the senses of sight and smell, thus enabling them to locate carrion with comparative ease at a long distance.

The *turkey buzzard*, a species of vulture widely distributed in the warmer parts of America, is a gregarious bird and collects in flocks, both while flying and in the consumption of food:



COMMON VULTURE.

The body is over two feet long, the color is brownish-black, and the extended wings measure about six feet from tip to tip. An allied species known as the *carrion crow* is abundant in Central and South America. The *California vulture*, found only west of the Rocky Mountains, is the largest bird of prey in North America. Its general color is shining black above; with bands of white on the wings, which measure about ten feet when extended. The head and bare neck are orange-yellow and red. Species native to Eurasia and Africa include the *griffon*, *Egyptian*, and the *cinereous* vultures. The *lammergeier* of Europe and the great *condor* of South America are noted species.



W

WADAI

W, the 23d letter of the English alphabet. It is formed of two V's and has the value of double u. Its use dates from the time when *u* and *v* had not been formed into two separate elementary sounds, one into a vowel and the other into a consonant. The name is *double u* and its oldest form was *uu*, as in *wulfheard*. When used at the end of a word or syllable, it is either silent, as in *row* and *low*, or has the power of a vowel and modifies the preceding vowel, as in *now* and *curlew*. It is silent when initial and followed by *r*, as in *wrong* and *write*. In chemistry, it is the symbol for *tungsten*, from the German *Wolframium*.

WABASH (wə'bāsh), a city in Indiana, county seat of Wabash County, on the Wabash River, 42 miles southwest of Fort Wayne. It is on the Wabash and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. The noteworthy buildings include the county courthouse, the public library, the high school, the Masonic Temple, the Memorial Hall, and the Woman's Orphan Home. Among the manufactures are flour, clothing, furniture, earthenware, farming implements, cigars, and machinery. The surrounding country is agricultural and has deposits of natural gas. Gas and electric lighting, waterworks, pavements, and sanitary sewerage are among the improvements. The place was settled in 1837 and chartered as a city in 1866. Population, 1900, 8,618; in 1910, 8,687.

WABASH, a river of the United States, which rises in western Ohio and after a general course toward the southwest joins the Ohio. In the lower course it forms the boundary between Indiana and Illinois. It is navigable about 300 miles. Among the chief tributaries are the Tippecanoe, Embarras, Little Wabash, and White rivers. The total length is 550 miles. It is connected with Lake Erie by the Wabash and Erie Canal. The cities on its banks include Covington, Peru, Lafayette, Wabash, Logansport, Vincennes, and Terre Haute.

WACHT AM RHEIN (vägt äm rin), *Die*, a famous German patriotic song, known among English speaking people as *The Watch on the Rhine*. The words were written by Max Schneckenburger and the music was composed by Karl Wilhelm. In 1840, when a French army threatened the left bank of the Rhine, the song was written and immediately became popular. Wilhelm's music, which is for men's voices, was first sung in 1854.

WACO (wä'kō), a city of Texas, county seat of McLennan County, 95 miles northeast of Austin, on the Waco and Northern, the Missouri, Kansas and Texas, the Texas Central, and other railroads. It is finely situated at the junction of the Brazos and Bosque rivers. The surrounding country is noted for its extensive production of grain, live stock, cotton, and fruits. Among the principal buildings are the Federal post office, the county courthouse, the public library, the Baylor University, Paul Quinn College, the Add-Ran Christian College, the Douglas-Shuler School, the Waco Natatorium, and the Academy of the Sacred Heart. The streets are substantially paved and improved by gas and electric lighting, waterworks, sewerage, and electric railways. It has manufactures of cotton-seed oil, flour, cotton and woolen goods, clothing, mattresses, canned fruits and vegetables, carriages, farming implements, machinery, and ironware. It is the center of a growing trade in merchandise and farm produce. The place was settled in 1849 and incorporated in 1850. Population, 1900, 20,686; in 1910, 26,425.

WADAI (wä-dī'), a powerful native state of North Central Africa, situated in the Sudan. It is bounded on the north by the Sahara, east by Darfur, south by French Congo, and west by Bagirmi and Lake Tchad. The area is given as 170,000 square miles. Much of the surface is a broken and thickly forested region with a general elevation of 2,000 feet, but the Guere

Mountains in the southwest have a height of 3,000 feet. Rainfall is sparse and the water courses dry up during the summer. The soil is fertile, but the northern section is too dry for general farming, though fine grasses are abundant. Cattle, camels, and horses are grown in large numbers. Rice and wheat are the leading cereals. Other products include ostrich feathers, ivory, timber, maize, and fruits.

The inhabitants consist chiefly of Negroes and Arabs. Mohammedan is the religion of the greater number. The slave trade is still permitted, though it has become greatly restricted under European influence. Wadai was founded as a kingdom in 1625, but paid tribute to Bornu and Darfur for many years. Sultan Ali conquered it about 1860, when European explorers began to visit the section. In 1899 the region was placed in the French sphere of influence. Abeshir is the capital and is on several extensive caravan routes. Population, 2,001,500.

WAGER (wā'jēr), a contract based upon the determination or ascertainment of an uncertain event, under which one of the parties is to make a payment or transfer a valuable consideration to the other. Usually the consideration is placed as a trust in the hands of a third party, who is to deliver it to the one entitled to receive it after the points of uncertainty have been determined. Formerly a wager was valid under the common law, unless it was of a condition that rendered it immoral or opposed to public policy. Now wagers are looked upon in most countries as debts of honor and their payments depend upon the good faith of the parties to the agreement, since they are held to be without a valuable consideration. In most cases it is unlawful to bet or contract a wager in regard to elections.

WAGES, the payment for services rendered, especially the payment of manual laborers receiving a fixed sum for a specified interval of time, as per day, week, or month. Writers generally classify wages as *nominal* and *real*. The former indicates the amount of money received for a certain quantity of labor, while the latter has reference to the quantity of commodities which the money received for the labor will purchase. In the case of a man receiving \$1 a day in 1900 and \$1.50 for the same work in 1910, it does not necessarily follow that the wages in the latter case were fifty per cent. higher than in the former, though it might or might not be true. It certainly would not be true if the purchasing power of money were twice as great in 1900 as in 1910. Other conditions modifying wages include the demand and supply of laborers, the skill of those offering

to do work, and the agreeableness of the employment. The last mentioned condition applies where men have a desire to do particular kinds of work, since they are usually willing to work for less in an occupation that offers the associations and activities to which their desires incline.

It is common to estimate wages high or low according to the amount of money received for the time employed, but writers more correctly base the estimate of wages on the results achieved. Thus a \$2 ax may be cheaper than a \$1 ax, especially if the work done with it is three times as great as that accomplished by the cheaper one. In the same way, the laborer receiving the highest pay may, by reason of his superior skill, be the cheaper one for the employer. It is certainly in line with good economy to obtain that class of labor which produces the most at the least expense, rather than to secure the kind that can be had at the lowest price. All efforts to fix wages by law have thus far proven inoperative and harmful. Such an effort was made in England in the reign of Edward III. on the part of capitalists, who resorted to that step by reason of a scarcity of laborers, owing to which fact wages were high. The result was that laborers sought employment elsewhere. On the other hand, if a law were enacted to require wages higher than the natural law of supply and demand would warrant, capital would seek investment elsewhere, thus maturing to the injury of those sought to be benefited. See **Interest; Labor; Rent; Political Economy; Socialism.**

WAGON (wäg'ün), a vehicle with four wheels, especially such a conveyance used for carrying freight or merchandise. A farm wagon is a representative kind of these vehicles. It has four wheels banded with heavy iron tires, has a long rectangular box to contain the load, and is fitted with a wooden tongue so as to be drawn by two horses. Wagons intended for heavy freighting have heavier wheels and a broader tire than those used commonly on a farm. A *dray* belongs to the wagon type, but differs from it in that it has heavy springs and usually does not carry a box. *Road wagons* are heavy carriages with springs and seats for four persons. Most wagons are fitted with a movable seat mounted upon springs, have an adjustable set of side boards for hauling grain, and are provided with a movable end gate, or a shovel board.

WAGRAM (vä'grām), a village in Austria, on the Russbach River, 20 miles northeast of Vienna. It is important as the scene of a noted battle fought in 1809, between the French under

Napoleon and the Austrians under Archduke Charles. Napoleon crossed the Danube on July 5 with 150,000 infantry and 30,000 cavalry and surprised the Austrians, but was repulsed. The next day a second attack followed and the Austrians were defeated, the latter losing 25,000 men. An armistice followed on July 11, and the Peace of Vienna, Oct. 14, 1809, terminated the war.

WAGTAIL (wäg'täl), the name of a small bird found in Europe, so called from the habit of jerking its tail incessantly. The several species of wagtails run swiftly, have rounded tails, and feed chiefly upon insects and worms. They nest in stony places or among dense herbage. While on the wing, they emit chirping notes and fly by short, undulating courses. The name is given to several species of warblers found in Canada and the United States.

WAHABIS (wä-hä'bêz), a sect of Mohammedans founded about 1750 by Abd-el Wahâb, an Arabian reformer. The main tenets of this sect are orthodox and agree with the doctrine of Mohammed, but the purpose is to restore Islam to the simplicity and austerity of its founder. In practice and modes of life these people have been spoken of as the Puritans of Islam. They number about 3,850,000.

WAHPETON (wä'pê-tün), a city of North Dakota, county seat of Richland County, 45 miles south of Fargo. It is situated on the Red River of the North, opposite Breckenridge, Minn., and on the Great Northern, the Northern Pacific, and the Chicago, Milwaukee and Saint Paul railways. The surrounding country is a rich farming district. It has a large trade in grain and merchandise and has manufactures of flour, machinery, and farming utensils. The chief buildings include those of the county, a college, and a number of parochial schools and churches. It has sewerage, waterworks, and electric lighting. Population, 1905, 2,741.

WAKE, a term frequently used in place of vigil. It is the name of a festival or anniversary celebration that was formerly universal in England. As a festival it was held on the birthday of the saint of a parish church, which was preceded by a night vigil, but the custom finally degenerated into fairs and exhibits. Edward I. forbade holding wakes in country churchyards and Henry VI. prohibited the sale of all articles at the festivals, except those used as food and refreshments. It is still customary in nearly all countries to hold a wake or vigil by the friends and neighbors of a deceased person prior to burial. The custom is thought to have originated from a superstitious notion in respect to the danger of a dead body being car-

ried off by some of the agents of the invisible world.

WAKEFIELD (wāk'fēld), a town of Massachusetts, in Middlesex County, ten miles north of Boston, on the Boston and Maine Railroad. Among the notable features are the Beebe Town Library, the townhall, and the Wakefield Home for Aged Women. It has manufactures of furniture, boots and shoes, stoves, musical instruments, and ironware. Extensive electric street railway facilities, a good water supply, and electric lights are among the improvements. It was settled about 1640, was incorporated as South Reading in 1812, and was chartered under its present name in 1868. Population, 1905, 10,266; in 1910, 11,404.

WAKE-ROBIN, the name of several species of trillium, which is a genus of low, smooth herbs of the lily family. The rootstock is short, the stem is stout, and at the summit of the latter is a whorl of three large net-veined leaves. The solitary flower has three green sepals and three colored petals and is succeeded by a red or purple berry. Several species are widely distributed from Canada to the Gulf of Mexico. *Jack-in-the-pulpit* is a common name applied to several species of this plant, while others are known as *Indian shamrock* and *three-leaved nightshade*. This genus of plants includes the *calla lily*.

WALCHEREN (väl'kêr-ən), an island of the Netherlands, in the province of Zeeland, near the mouth of the Scheldt. It is 12 miles long and has an area of 81 square miles. The surface is low and is protected from overflow by immense dykes and natural downs, but the surface is highly fertile and productive. Agriculture and stock raising are the chief industries. In 1809 it was occupied by a British fleet as a base from which to attack Antwerp, but the expedition proved a failure and a loss of 7,000 men was sustained. Middelburg is the chief town. The island has a population of 42,875.

WALDENSES (wöl-dên'sēz), a Christian sect founded in Italy by Peter Waldo, an influential merchant of Lyons. He became the leader of a considerable number who looked upon the church and the clergy as corrupt and went forth to preach with the view of bringing about a reformation, though not intending to secede from the established organization. About 1170 he sold his possessions and devoted the proceeds to the Christian cause. The Archbishop of Lyons published a command charging that his followers refrain from further activity, but they appealed to Pope Alexander III., who prohibited their meetings. The reform move-

ment continued and gained strength steadily until in the 16th century, when widespread persecutions followed. Large numbers emigrated to Switzerland and Germany in 1681, where they were given entire freedom of conscience. In 1848 religious liberty was granted to them, and soon after they were given equal political rights with the Roman Catholics in Italy. Their chief seat at present is southwest of Turin, but there are about 20,000 in Germany and Switzerland. The Waldenses hold the Bible as the only rule of faith, but adhere to their confession of belief published in 1855, which they regard the most accurate of biblical interpretations. The latest official returns indicate that the Waldensian Church in Italy has fifty houses of worship, forty mission stations, and sixty pastors. They publish a considerable number of periodicals, tracts, and other literature.

WALES (wālz), a principality in Great Britain, lying west of England, which has given the title of Prince of Wales to the heir apparent to the British crown since Edward I. The length is 135 miles; breadth, 25 to 90 miles; and area, 7,446 square miles. The coast line is 362 miles long, being formed on the north by the Irish Sea, south by the Bristol Channel and the estuary of the Severn River, and west by Saint George's Channel. Anglesea Island lies immediately north and is separated from Wales by Menai Strait, and on the western shore are Cardigan and Saint Bride's bays. The surface is largely mountainous and rugged. The Snowden Mountains, in the northern part, are the highest peaks in the southern part of Great Britain, ranging from 2,350 to 3,570 feet above sea level. Most of the drainage is by the Severn and its chief tributary, the Wye, into Bristol Channel. Other rivers of more or less importance include the Tawe, Conway, Taff, and Dee. Lake Bala is the only inland water.

Wales has valuable deposits of minerals, the most extensive being coal, copper, iron, zinc, lead, silver, gold, limestone, and granite. Coal and iron are worked most profitably, and the coal trade is particularly large. The climate, though somewhat cold and damp, is favorable to agriculture and dairy farming. The chief productions include wheat, rye, barley, potatoes, hay, vegetables, and fruits. Manufacturing is an important industry, the products including cotton and woolen goods, ironware, hosiery, cheese and butter, cured fish, machinery, leather, and farming implements. All the domestic animals common to Europe are reared successfully. Railroad lines extend to all parts of the country. It is divided into twelve counties and has a

number of thriving cities. Cardiff, the chief seaport and largest city, is the seat of extensive manufacturing and commercial enterprises. The public schools are well established, and the per cent. of illiteracy is small. Several excellent institutions of higher learning are maintained, including Saint David's College, Saint Beuno's College, and University College.

Wales was invaded by the Romans at the time they occupied Britain, but the inhabitants, being favored by protection in the mountains, long resisted the intruders. These inhabitants were of Celtic origin and were known as Cymri, meaning countrymen or not foreigners. Though the Romans never fully conquered the country, they divided it into districts and called it Cambria. The Anglo-Saxons afterward invaded England, pressing the Britons toward the west, and wars between them and the Celtic tribes were carried on for many years. At that time the Celts came to be called Welsh, an Anglo-Saxon term meaning foreigners, and the country was known as Wales. At first the Welsh were divided into a number of small tribes, but King Roderick the Great united them in the 9th century. Successive advantages were gained by the English, who finally compelled the Welsh to pay tribute to Athelstan and later to Harold. Llewellyn, the last of the Welsh princes, revolted against Edward I., but was slain in a battle against the Earl of Mortimer in 1282. He was succeeded by his brother, David, who assumed the title of Prince of Wales, but was captured in a battle and executed. The country has been incorporated with England since 1284. A final effort for independence was made by the Welsh under Owen Glendower, lasting fifteen years, from 1400 to 1415.

The Welsh are noted for their bravery and generosity. Their language is quite similar to that of the ancient Britons, but it has been greatly improved since the invention of printing. In the alphabet are seven vowels and thirteen simple and seven double consonants, but numerous diphthongs and triphthongs are employed. The Welsh language is spoken exclusively by a large number of the inhabitants, but the larger portion understand and use the English. Many associations have been organized within recent years with the view of cultivating an interest in Welsh literature and promoting the use of the language. This movement, like that recently instituted to maintain the Irish, is meeting with enthusiastic support. The early romances and tales of Welsh literature date from the 8th century, including a collection called the "Mabinogion," and the earliest printed works come from the year 1546. Its literature includes works of

importance in history, theology, science, and biography. Population, 1908, 1,722,465.

WALES, Prince of, the title borne by the eldest son of the British sovereign, first conferred on Prince Edward in 1301, who afterward became Edward II. However, the title was not conferred on Edward III., though it has been borne by all the male heirs apparent from the time he conferred it upon his son, Edward the Black Prince. This title is conferred by proclamation or by special creation and investiture. The Prince of Wales, as heir to the crown of Scotland, bears the titles of Prince and High Steward of Scotland, Duke of Rochsay, Earl of Carrick, Baron of Renfrew, and Lord of the Isles. In addition the Prince of Wales, as heir to the crown of Ireland, bears the title of Earl of Dublin.

WALFISCH BAY, or **Walfish Bay** (wöl'-fish), a British possession in Africa, situated on the coast of German Southwest Africa, near the Tropic of Capricorn. It has an area of 430 square miles. Besides a small peninsula, it includes a sandy tract on the mainland. The chief productions include fruits and cereals. Horses, cattle, and poultry are raised. It is important for having a good harbor. For the purpose of government it has belonged to Cape Colony since 1878, when it was acquired. Population, 785.

WALHALLA (väl-häl'lä), or **Valhalla**, in Scandinavian legends, the palace in which the souls of those fallen in battle had their habitation, in which they spent their time in joyous feasting. The palace was supposed to be situated in Gladsheim, meaning house of joy, which was surrounded by a grove of golden-leafed trees, and its interior was decorated with the most valuable jewels. It was supposed that the inmates, when aroused by the crowing of the cock in the morning, prepared for a brisk military maneuver, which was carried on relentlessly until noon. At that time all wounds were supposed to be healed and the heroic inmates were permitted to banquet with Odin. They were attended at the feasts by the Walkyries, or battle maidens. Ludwig I. of Bavaria erected a magnificent temple on the Danube, near Ratisbon, in 1832-1842, as a pantheon to the German people. This temple is known as Walhalla, and the idea of its erection was derived from the Walhalla of the ancient Scandinavian deities. It is dedicated to people of all ranks and occupations.

WALKING STICK, the popular name of several insects found in the warm climates and the warmer part of the Temperate zones. They belong to the leaf insect and very closely re-

semble the stalks of grass and other plants among which they live. The common walking stick is about three inches long. It has a jointed body and four jointed legs. Those found in the tropics are much larger, frequently nine or ten inches in length. Some of these insects have the form of twigs and leaves, but the majority are cylindrical like a small stick.

WALLACE (wöl'läs), a city of Idaho, county seat of Shoshone County, on Placer Creek, 110 miles east of Spokane, Wash. It has transportation facilities by the Northern Pacific Railway and the line of the Oregon Railroad and Navigation Company. The surrounding country produces large quantities of gold, silver, and lead. Lumbering is an important industry in the vicinity of Wallace. The chief buildings include the county courthouse, the public high school, and numerous churches. It has manufactures of lumber products, machinery, spirituous liquors, and utensils. The trade is chiefly in merchandise, minerals, lumber, and live stock. Population, 1900, 2,265; in 1910, 3,000.

WALLACHIA (wöl-lä'ki-ä). See **Rumania**.

WALLA WALLA (wöl'lä wöl'lä), a city in Washington, county seat of Walla Walla County, 242 miles northeast of Portland, Ore. It is situated on the Walla Walla River, has communication by the Northern Pacific and the line of the Oregon Railroad and Navigation Company, and is the shipping point of large quantities of live stock, grain, vegetables, and fruits. The site has an altitude of 1,050 feet and is surrounded by a fertile section of farming land. It is the seat of Whitman College, the State penitentiary, the De La Salle Institute, the Saint Vincent's Academy, the Saint Paul's Episcopal School, and the Walla Walla College. Other features include the county courthouse, the public library, the high school, the Odd Fellows' Home, the Saint Mary's Hospital, and the Stubblefield Home for Widows and Orphans.

Walla Walla has extensive commercial and industrial interests. Among the manufactures are hardware, cigars, clothing, furniture, machinery, earthenware, flour, and cheese. It has gas and electric lighting, sanitary sewerage, public waterworks, and electric street railways. A military post was established here in 1856, when it was called Steptoe City, but it was incorporated under the present name in 1868. Population, 1900, 10,049; in 1910, 19,364.

WALLINGFORD (wöl'ling-fërd), a borough of Connecticut, in New Haven County, twelve miles northeast of New Haven, on the Quinnipiac River and the New York, New Haven and Hartford Railroad. It is the center of

a growing trade in merchandise and general manufactures. The streets are well platted and improved, being generally graded and paved, and it has electric railway connection with the leading cities of the State. Among the manufactures are brassware, furniture, machinery, hardware, tools, rubber goods, clothing, and silver-plated ware. It has electric lighting, sanitary sewerage, waterworks, and several fine schools. The borough was incorporated in 1670 and near it was established, in 1851, the Wallingford Community, a society similar to the Oneida Community. At present the State Masonic Home occupies the community property. Population, 1900, 6,737; 1910, 8,690.

WALLOONS (wöl-lōnz'), a class of people occupying the southeastern part of Belgium, especially the provinces of Liège, Arlon, and Namur. They are descendents of the Gallic Belgae and were sheltered from the German conquerors by taking refuge in the Ardennes Mountains. Ultimately their language became mixed with the French, but it still retains the greater part of the Gallic. They may be said to resemble the French more closely than the German, though they surpass the former in business activity and earnestness. Their number is steadily increasing, a fact giving rise to political contests between them and the Flemish. Many of the eminent statesmen of Belgium are to be traced to Walloon ancestry. The Walloon inhabitants of Belgium and France are placed at 2,783,280.

WALL PAPER. See **Paper Hangings.**

WALNUT (wöl-nüt), an extensive genus of valuable and beautiful trees, which are prized for their wood and for the edible nut borne by most of the species. Thirty species have been catalogued, the larger number of which are native to America. The *black walnut* is the most valuable species found in Canada and the United States, although the nuts are inferior for the market to those of the Persian, or English, walnut, but they are richer and juicier. The wood is hard and durable, has a reddish-black color, and is of much value in the manufacture of furniture and musical instruments. Black walnut trees attain a diameter of three to six feet and a height of 40 to 75 feet. The nut matures about the first of October. It is surrounded by a thick, greenish husk, which turns black when dried. The oily kernel is inclosed in a hard shell and is used in making walnut oil, in culinary arts, and for eating. Another widely distributed species is the *white walnut*, or *butternut*, which yields a nut somewhat less flavored, and its wood is not as valuable and durable as that of the black

walnut. The common walnut of Europe and Asia is a fine, spreading tree and produces excellent wood and edible nuts. These nuts are gathered in the fall and transported in large quantities. They yield the products called walnut oil and nut oil, which are used as articles of diet and by painters. In some countries the walnut oil is burned in lamps and used for the finer printing inks. The wood is of value in making gunstocks and furniture and for construction purposes.

WALPURGIS (väl-pōor'gēs), or **Walpurga**, the name applied in Germany to the eve of May 1, when, according to legends, the witches were supposed to assemble at some appointed rendezvous, such as the highest point of the Hartz Mountains. The legends of Walpurgis Night had their origin in the 8th century, when Saint Walpurgis established convents and several societies in that country. The reason that May 1 was named as the day to commemorate her is that a heathen festival was formerly held at that time and her feast was appointed to take its place, though it properly should be held on Feb. 25.

WALRUS (wöl'rūs), **Morse**, or **Sea Horse**, an animal resembling the large seals, but it has dental affinities with the ungulates. The skull is large and the facial portion is quite long. The hind limbs are flexible, serving to propel the animal in moving in the water, and tusk-like canines extend from the upper jaw. It has no external ears, but the sense of hearing is quite well developed. The eyes are small, the body is large and sacklike, and the fur is principally of a tawny-brown color. Its hide is so tough that bullets penetrate it with difficulty. The fore paws are webbed, having a horny protective covering, and are two or three feet long. Walruses are carnivorous mammals, feeding on bivalve mollusks, which they obtain by digging with their tusks. They are usually found near the coast on floating ice. The males reach 12 to 20 feet in length and weigh from one to two tons, but the females are somewhat smaller. The blubber yields excellent oil and the skin is of value in making a durable leather, used largely in manufacturing machine belts. A hard, white ivory is obtained from the tusks, which weigh three to six pounds. The walrus is gregarious and inoffensive, but becomes desperately aggressive when attacked. These animals are native to the arctic regions of both hemispheres, where they are hunted for their skins and blubber. The Eskimos value their flesh for food. Siberia, the Aleutian Islands, Baffin Bay, and Spitzbergen have valuable walrus fisheries. See illustration on following page.

WALSALL (wōl'sal), a city of England, in Staffordshire, seven miles northwest of Birmingham. It has canal and railway connections with other trade centers. The surrounding country contains valuable deposits of coal, iron, and limestone. It has public baths, electric street railways, sanitary sewerage, a municipal library, and many fine schools and churches. Among the manufactures are ironware, clothing, flour, bolts, locks, carriages, and machinery. The principal streets are regularly platted, but those in the older part are crooked and illy improved. Ethelfleda, daughter of Alfred the



WALRUS.

Great, fortified Walsall, and it subsequently passed to William the Conqueror and to the Duke of Northumberland. Though long a manufacturing city, its prosperity dates from the time railroads were built to connect it with other trade centers. Population, 1905, 96,171.

WALTHAM (wōl'thām), a city of Massachusetts, in Middlesex County, on the Charles River, ten miles west of Boston. It is on the Boston and Maine Railroad, has electric railway facilities, and is the seat of a Swedenborgian theological seminary. Among the noteworthy buildings are the public library, the Waltham Hospital, the Notre Dame Normal School, the Leland Home for Aged Women, and the Massachusetts School for the Feeble-Minded. Prospect Hill Park is a fine public resort. The manufactures include cotton and woolen goods, hosiery, watches, furniture, boots and shoes, clothing, and machinery. Waltham has many excellent residences and is the seat of a large trade. It is particularly noted for the manufacture of the Waltham watches. The place was chartered as a city in 1884. Population, 1905, 26,239; in 1910, 27,834.

WALTZ (wāłts), a dance of German origin, so named from the word *walsen*, meaning to roll. It is danced by two persons placed directly opposite and almost embracing each other, who turn round on an axis of their own, while moving in a circle, the radius of which varies with the dimensions of the room. The music is written to three-fourths time. Any number of couples may join the circle in moving round the room, or it may be danced by only one or two couples. Johann Strauss is the most famous writer of waltz music, but some of the classical masters produced compositions that are suitable

but not intended for this dance. Waltzing became very popular at the beginning of the 19th century and was long the only form of round dance in vogue, but it has been supplemented by the polka, schottisch, cotillion, and two-step.

WAMPANOAG (wōm-pā-nō'ag), a tribe of Algonquin Indians, who occupied the region included in Massachusetts and Rhode Island. They are sometimes called Pokanoket from their principal village. A large number were killed during King Philip's War and many of the survivors fled to Canada. Those who survived were either sold into slavery

or remained near Compton, R. I., but they became extinct before the beginning of the 19th century.

WAMPUM (wōm'pūm), the name of beads formed from the interior parts of shells. Formerly they were strung on threads and used among the American Indians as money, or were worn in necklaces, belts, bracelets, and other articles of ornament. According to tradition, wampum was first employed as money by the Narragansett Indians and afterward was generally adopted by the natives along the eastern coast as a medium of exchange. The colonists of New England and the Middle States adopted wampum as money, where it ranked as a legal tender from 1827 to 1861. Periwinkle shells, found largely along the Atlantic coast, were employed in making wampum. The inner part of the shell was made round and smooth by rubbing on a stone, and afterward holes were drilled for stringing the rounded pieces. Wampum made from black beads was called *suckan-hock*, while those made from white beads were called *wampumpeag*. The former had twice the value of the latter in exchange. In many in-

stances the beads were strung together and sewn upon belts. When making payments in wampum, individual beads were stripped off, or portions of the embroidered belts were used. These belts entered as an essential element into peace treaties and agreements.

WANDERING JEW (wǒn'děr-īng jū), a name used as the subject of several legends, the character being represented as a Jew who is condemned to wander from place to place until the day of judgment. Three noteworthy legends are included in the list. The one is that of Matthew Paris, who represents him as the door-keeper of the judgment hall, in the service of Pontius Pilate. It is related that he scorned our Lord as He was led forth, saying "Get on faster, Jesus," but the latter replied, "I am going, but thou shalt tarry till I come again." In another legend he is represented as a carpenter making the cross for Christ, and, when the latter was pressed down with the weight of His cross, the Jew is said to have urged Him to proceed, but Jesus replied, "Truly I go away, and that quickly, but tarry thou till I come." Another legend is that the Jew was a shoemaker at his bench and refused the Savior permission to rest on his accustomed seat. In each case the subject of the legend is represented as wandering from place to place, laden with cares and tribulations, but in vain seeking death. Some of the finest illustrations by Doré are based upon the Wandering Jew. This legend was made the subject of an interesting novel by Eugene Sue. It also forms the basis of other novels and of many poems.

WAPITI (wǎp'ī-tī), a species of large deer found in North America. It is closely allied to the red deer of Europe, but is considerably larger, weighing from 800 to 1,000 pounds and measuring five feet in height at the shoulders. Formerly it ranged from the central part of the United States to the northern part of Canada and to Alaska, but it is now confined mainly to the Rocky Mountain region. The color is yellowish brown, but the sides are grayish and each buttock has a patch of yellowish or white hair. Beneath the crisp hair is a soft down. These animals have large antlers. The wapiti is commonly called *elk* in America, but it differs materially from the moose. See **Elk**.

WAR, an armed contest between nations or states, or between different parties in the same state. In the former case the contest is termed *international war* and is under warrant and by authority of the sovereign power of each belligerent; in the latter case it is termed *civil war*. *Aggressive*, or *offensive*, war is a contest which is prosecuted in the territory of the antagonist,

while *defensive* war is an armed resistance to an attack. Wars take place principally as means of common defense, for avenging insults and redressing wrongs, to obtain and establish the superiority and dominion of one contestant over the other, and for the extension of commerce and the acquisition of territory. Savage nations wage war largely for purposes of plunder. The usual plan of conducting warfare is by the slaughter or capture of the troops and the seizure or destruction of ships, property, and towns.

Wars by savage nations and despots begin by an invasion of territory belonging to others, the incursion being without formal notice, but civilized nations take steps to secure a settlement of difficulties without employing armed force, and, when peaceable means fail, a formal *notice*, or *declaration of war* is sent. Nations have come to recognize certain usages, laws, and rights of war during the progress of the contest, these applying both to the belligerent and neutral powers. Wars are as old as human history and those of ancient times and savage nations are particularly repulsive for the great cruelties committed. Most civilized nations have come to look upon opposing parties as enemies only so long as they actively bear arms, and when peace is attained relations of friendship and commerce are reestablished. The possibility of war is no doubt lessened by a constant readiness of the nations to conduct extensive contests, a fact accounting largely for the vast standing armies and the thorough equipments in the form of forts, battleships, and implements of war maintained by the great powers of Europe. The ambition of statesmen of the present century is and ought to be to secure equitable and stable government without encumbering the people with heavy taxes for the maintenance of extensive equipments. See **Battle**; **Neutrality**; **Treaty**.

WAR, Department of. See **United States, Departments of the**.

WARBLERS (wǎr'blērz), the name applied to a family of perching birds, most of which are shy, small, and active. They have a clear and beautiful song. The common birds of this family include the *redbreast*, *hedge sparrow*, *redstart*, *nightingale*, *bluebird*, *sedge warbler*, and *reed warbler*. Most warblers are migratory and are widely distributed in all climes. They are valuable because of their activity in catching large numbers of insects, which form their chief food. The *wagtail* is a notable species of the warbler family and is so called from the habit of wagging the tail, when it is on the ground. It is seen mostly in pastures and meadow lands and includes several species, such as the gray

wagtail, yellow wagtail, and pied wagtail. Reed warblers and sedge warblers are found mostly in marshy places, where they build nests in the reeds, usually hanging them among four or five of the larger plants by means of threads of wool or soft grasses. The family of birds called *Sylviidae*, confined to the Old World, includes several typical warblers. On the other hand, the tanager family of birds embraces many American species.

WARE, a town of Massachusetts, in Hampshire County, on the Ware River, 68 miles west of Boston. It is on the Boston and Albany and the Boston and Maine railroads. The notable buildings include the public library, the town-hall, the high school, and several fine churches. It has sanitary sewerage, rapid transit, and public waterworks. Among the manufactures are cotton and woolen goods, hardware, cigars, machinery, and clothing. Ware was settled in 1673 and was chartered as a town in 1775. Population, 1905, 8,594; in 1910, 8,774.

WAR GAME, or *Kriegs Spiel*, a game invented by Herr von Reisswitz, an officer in the German army. It is played with movable pieces upon a map, which is drawn upon a large scale, and the purpose is to represent a battle or campaign between two contending parties. The importance of the game was emphasized by the war with Austria, in 1866, and became popular in many countries after the Franco-German War. Now it is played extensively among the naval and military men of Europe and America, and the most popular form is to have two players on each side. The movable pieces consist of blocks that represent the troops and sustain the same relation to the field that contending forces would in real war. There are subdivisions, such as cavalry, infantry, engineers, etc. Rules govern the time and distance of the movements. Defeat or victory depends upon the number of men who come together upon the field, the stronger side attaining victory. If both sides are equal as to number and position held, a die is cast to determine the winner.

WARMING AND VENTILATION, two subjects which are closely related and equally important in the economy of health. In the construction of buildings, it should be the aim of the architect to provide such facilities as will best serve to warm the apartments with the greatest possible economy and at the same time provide an ample supply of pure air for the occupants. These terms are in a sense opposed to each other, since pure air must be drawn from outside the building and the air which is on the inside must be constantly replaced by a stream of pure, fresh air. From this fact it will be seen

that ventilation in a measure reduces the warmth of a room or apartment. However, both subjects must be kept in mind, as a neglect of either tends to bring on disease and eventually death. In summer warmth is supplied largely by the force of nature, thus requiring only the need of a movement and replacement of the air, but for service in winter warming and ventilation must be installed as distinct systems in most houses.

Though all persons require pure air, the temperature agreeable to them varies somewhat. This depends partly on the physical constitution and state of health and whether the body is exercised while indoors. A temperature of 68° Fahr. is found the most suitable for dwellings and schoolrooms. That ventilation is a matter of importance is due to the circumstance that the foul air passing from the lungs and outward through the pores of the skin does not fall to the floor, but becomes diffused through the surrounding atmosphere. With every breath a small quantity of carbonic acid is given off and every inspiration consumes a certain amount of oxygen; hence, without ventilation, the supply of oxygen is consumed in breathing. An oil light vitiates as much air as a dozen persons and makes impure about 75 cubic feet in an hour. Thus, many breaths and lights rapidly unfit the air for use. It should be made an object to bring the air of a room into a condition as pure as that outside. This can be accomplished only by the best known methods of ventilation when the space within the room is equal to 600 cubic feet for each person..

HEATING. Many methods have been devised in which rooms may be adequately warmed. The methods differ according to climatic conditions and the nature and cost of obtainable fuel. Open coal fires were long in favor and are still considered the most healthful. The heat is pure and quite unlike the dry, parched heat of the closed stove, steam pipe, or furnace. However, there is a marked irregularity and a considerable waste of heat where the fireplace is employed. Closed stoves were introduced to overcome the loss of heat attending open fires, but, unlike them, they do not furnish an efficient ventilator. Rooms warmed by iron stoves, burning either wood or coal, may be ventilated in several ways, as by inlet tubes and registers. Some ventilation is provided by defects in carpentry, as the cracks and crevices at doors and windows. Heating by steam and hot-water systems are now employed in many dwellings and in practically all the large public buildings, offices, and warehouses.

In *steam-heating* the steam passes from a boiler through pipes, which become highly heated

and thus warm the rooms. *Water-heating* depends upon the principle of the expansion of water by heat. The pipes, which pass from a heater, are kept filled with water by a supply tank. As the water in the pipes within the heater becomes heated it begins to move upward, owing to its greater lightness when subjected to a high temperature, and colder water rushes in to take its place. Thus, a continual circulation is kept up and the apartments are warmed uniformly. Heating plants of this kind are not only popular in large edifices, but many towns and cities maintain them as a method of supplying heat to a large number of buildings. Heating by electricity is becoming popular for various purposes, especially in railway and street cars.

VENTILATING. All ordinary ventilation depends upon the fact that hot air is lighter than cold air. It is due to this fact that cold air, by the force of gravity, sinks to the lower region and forces the warm air to rise. Hence the air near the ceiling of a warmed room is warmer than that near the floor, flames ascend upward from a burning material, and the warmed smoke of a stove escapes by passing upward in the flue. Two openings are necessary to procure a change of air in a room, one for admission and the other for exit of the air. The outlet should be near the floor, opening into an air shaft, a pipe leading through the roof, with proper orifices at the top. In cases where an outlet shaft is not provided, the outlet should be near the ceiling and always larger than the inlet. Dwellings having an open fireplace are usually ventilated sufficiently, for the reason that a constant current of air sweeps up the flue. In large cities mechanical means are employed to ventilate the great structures in which hundreds of people find lodging or employment. This is done by means of flues, pipes, or shafts, and the supply of air is regulated by means of fans or pumps driven by gas, steam, or electric power. Mines are ventilated by similar methods.

WAR OF 1812, the name of an armed conflict between Great Britain and the United States, sometimes called, in the latter country, the second war of independence. The causes which led up to this war may be traced back to the attitude assumed by Great Britain immediately after the Revolutionary War in treating the new republic, especially in relation to the American foreign trade. Great Britain held to the view that "once an Englishman always an Englishman" and maintained the right to interfere with the American vessels on the high seas and search for seamen claimed to be British subjects, who were taken from them and impressed to serve in the British navy. Several

men-of-war were fired upon and compelled to give up seamen in their crew, and those who refused to serve were imprisoned. In addition to claiming the right of impressment, England issued orders to interfere with the American commerce by prohibiting trade by any neutral vessels with the dependencies of any nation with whom she was at war. This greatly interfered with American trade, since France and England were engaged in a war at that time. In 1807 Napoleon had issued the Milan Decree, forbidding commerce of any nation with England or her colonies, and it appeared that the United States would become involved with both countries. However, the proximity of Canada and the desire of France to retain the friendship of America caused Napoleon to revoke his decree, in 1810, and commercial intercourse between the two countries was resumed.

James Madison had in the meantime been elected President as the candidate of the Democratic party, but he was not disposed to favor warlike measures, while his party advocated an aggressive policy against Great Britain. It was said of the President that he "could not be kicked into a war," but the Congress that assembled in December, 1811, passed acts to increase the army and navy and made large appropriations for offensive action. The President finally declared war against Great Britain, on June 18, 1812. This was followed five days later by the withdrawal of the "Orders in Council" by the British, which has established a blockade of European ports and thus excluded American commerce to a large extent. However, the United States was not prepared for war, having made little headway in building up means of offense and defense, while Great Britain had just emerged from a war with France and, therefore, was ready to take decisive action.

An invasion of Canada was the first act of open hostility, but the enterprise proved signally unsuccessful. General Hull, Governor of Michigan Territory, at the head of 2,000 men, was operating against the hostile Indians in the Northwest when war was proclaimed. He had been invested with power to invade Canada and on July 12 crossed the Detroit River with the view of capturing the British post at Walden. General Brock captured a detachment sent out to guard the provisions coming to the American camp and Hull decided to retreat to Detroit without striking a blow. The British were reinforced by a force of Indians under Tecumseh and proceeded to attack Detroit. General Hull, without offering to make resistance, surrendered the fort, with its garrison and stores, to the British on Aug. 16. He was afterward con-

victed for cowardice and sentenced to be shot, but the President pardoned him in view of his previous services. The second attempt to invade Canada was undertaken by General Van Rensselaer with a force of militia, principally from New York. On Oct. 13 he crossed the Niagara River with a part of his troops and made an attack on Queenston Heights. After gaining possession of the British battery, when General Brock was mortally wounded, the Americans were compelled to retreat, having lost many of their men.

The Americans were more successful in their naval engagements during the first year of the war. Capt. Isaac Hull on Aug. 19, with the frigate *Constitution*, overtook and permanently disabled the British vessel *Guerriere* off the coast of Massachusetts, and the latter vessel was blown up the following day. On Oct. 18 the American vessel *Wasp* captured the *Frolic*, but the British gun ship *Poictiers* soon after captured the *Wasp*. In the same month Commodore Decatur, commander of the frigate *United States*, captured the British *Macedonian*. Captain Porter, the following month, with the *Essex*, pursued the British packet *Nocton* and captured it and its cargo, which included \$55,000 in specie. In the same month Commodore Bainbridge, with the *Constitution*, destroyed the British vessel *Java* and took its crew prisoners. President Madison was reelected in the fall of 1812 and Elbridge Gerry was chosen Vice President.

The Americans undertook a third invasion of Canada at the beginning of 1813. General Dearborn, at the head of 1,700 men, captured York, but was soon recalled and superseded by General Wilkinson, who was joined by a force under General Hampton and the two made a combined attack upon Montreal. The object sought was not attained, but the two armies wintered in Canada. In May the British invaded the State of New York, but they were defeated at Sackett's Harbor. General Harrison built Fort Meigs, on the Maumee, where he was besieged by a force of British and Indians under Proctor, but large numbers of the Indians deserted, and the British abandoned the siege and retreated to Malden. In the meantime Commodore Perry undertook to get control of Lake Erie, which was commanded by a British squadron of six vessels under Commodore Barclay. In September he made an attack upon the British near Put-in-Bay, where he won a complete victory. This destruction of the most important British fleet upon the Great Lakes enabled the Americans under General Harrison to undertake the fourth invasion of Canada. He pursued the

British under Proctor until they took a stand on the Thames River, where they were defeated after a pitched battle on Oct. 5. General Jackson was sent with a force of Americans into Alabama, where the Creeks had taken up arms, and they were completely defeated at Horseshoe Bend in January, 1814. After the battle of the Thames, General Harrison was transferred to Buffalo, where he resigned. The year 1813 closed without decisive results, except that Captain Lawrence, who had been made Commander of the *Chesapeake*, was defeated and slain in an engagement with the British vessel *Shannon*, commanded by Captain Broke.

Another invasion of Canada was undertaken in the spring of 1814.⁵ Three thousand Americans under Generals Scott and Ripley crossed the Niagara early in July and soon captured Fort Erie. They were met by the British under General Rial near the Chippewa River, where they won a victory, and the British retreated to Burlington Heights. The Battle of Lundy's Lane, the hardest fought engagement of the war, occurred on July 25. Each side lost about 800 men and neither gained material advantages, but the Americans withdrew to Fort Erie, where they were besieged until in September, when the British works were carried. The British under General Drummond retreated to Fort George, while the Americans went into quarters at Black Rock and Buffalo. In September, 1814, the British under General Prevost invaded New York by way of Lake Champlain. His fleet was defeated near Plattsburg under Commodore McDonough and the land forces were repulsed about the same time. However, the British ascended Chesapeake Bay, defeated the Americans at Bladensburg, and captured the city of Washington, where the government buildings were sacked. Many people of New England were opposed to the war and sent delegates to a convention at Hartford, Conn., where they published an address after a secret session of three weeks. This session was declared disloyal by the Democrat party and the political prospects of those that took part in it were ruined.

Spain sympathized with Great Britain during the War of 1812, and the British were permitted to fit out an expedition at Pensacola. General Jackson proceeded against that point and expelled the British from Florida. Having learned that the British were landing at New Orleans and preparing to conquer Louisiana, he proceeded to undertake to drive them out, being supported by 2,000 Tennessee riflemen. Four miles below the city, at Chalmette, he took a strong position. The British were under command of General Pakenham. Wellington, after-

ward famous for his part in the Battle of Waterloo, was present. Several attacks were made at different times, but the final battle occurred on Jan. 8, 1815, when the British were defeated with heavy losses, including Generals Pakenham and Gibbs. This battle was fought two weeks after peace had been concluded, but this was unknown to the contending parties at New Orleans. The war ended with the Treaty of Ghent, in Belgium, and both countries received the news with deep satisfaction. No mention was made of the issues that brought on the war. The treaty was devoted chiefly to the settlement of unimportant boundaries and the possessions of small islands in Passamaquoddy Bay.

WARRANT (wŏr'rānt), in law, a writ which gives an officer an authority over the persons or property of others. The term is more frequently applied to writs for the arrest of persons, which may be issued by a justice of the peace or under the order of a higher court or the grand jury. A *search warrant* gives authority to an officer to search private premises for specified goods or property belonging to another. The term *bench warrant* is applied to an order issued by the judge for the arrest of a person.

WARRANTY, in law, a term used in distinct connections, especially to indicate a covenant on the part of the grantor in the conveyance of title to real property. An instrument of this kind is called a *warranty deed*. The term applies in insurance to indicate an undertaking on the part of the insured that certain alleged facts are as he represents them to be. In the sale of personal property the term warranty indicates that the seller guarantees the title or the quality of the property sold. Such warranties may be either expressed or implied.

WARREN (wŏr'rĕn), a city in Ohio, county seat of Trumbull County, on the Mahoning River, 52 miles southeast of Cleveland. It is on the Erie, the Pennsylvania, and the Baltimore and Ohio railroads. Warren is surrounded by a rich farming and dairying country, which contains deposits of bituminous coal, iron ore, petroleum, and building stone. The noteworthy buildings include the county courthouse, the public library, and a number of fine churches. Gas and electric lighting, pavements, waterworks, and rapid transit are among the municipal facilities. The manufactures include furniture, flour, cigars, woolen goods, and wearing apparel. It has an extensive trade in farm produce and merchandise. The place was settled in 1799 and incorporated in 1834. Population, 1910, 11,081.

WARREN, a city in Pennsylvania, county seat of Warren County, on the Allegheny River, ninety miles south of Buffalo, N. Y. It is on the

Pennsylvania and other railroads and is in close proximity to the oil and coal regions of the State. The principal buildings include the public library, the county courthouse, the high school, and the Pennsylvania Hospital for the Insane. Among the manufactures are boilers, farming implements, flour, furniture, hardware, carpets, cotton and woolen goods, and machinery. Electric lighting, pavements, and public waterworks are among the utilities. The surrounding country produces large quantities of fruit and dairy products. It has a growing trade in cereals and other produce. The place was settled in 1795 and incorporated in 1832. Population, 1900, 8,043; in 1910, 11,080.

WARREN, a town of Rhode Island, in Bristol county, ten miles southeast of Providence. It is situated on Narragansett Bay and on the New York, New Haven and Hartford Railroad. The chief buildings include the public high school, several fine churches, and the Hall Library. It has manufactures of cotton goods, clothing, braid, earthenware, and machinery. Warren occupies the site of Sowams, an Indian village in which Massasoit resided. The first settlement by whites was made in 1635 and it was incorporated in 1746. Population, 1905, 5,613; in 1910, 6,585.

WARRENSBURG (wŏr'rĕnz-bŭrg), a city of Missouri, county seat of Johnson County, on the Black River, 65 miles southeast of Kansas City. It is on the Missouri Pacific Railroad and is surrounded by a fertile farming region. In the vicinity are mineral springs and deposits of blue sandstone. The manufactures include flour, woolen goods, farming implements, hardware, and machinery. Among the features are the county courthouse, the Masonic Temple, the opera house, the high school, the State normal school, and the Pertle Springs Park. It has public waterworks, sanitary sewerage, and well-graded streets. The place was settled in 1835 and incorporated in 1856. Population, 1900, 4,724; in 1910, 4,689.

WARSAW (wār'sā), a city of Russia, capital of the government of Warsaw, on the Vistula River, 650 miles southwest of Saint Petersburg. It is the converging center of a number of important railroads and has good transportation facilities by several canals and the Vistula River. Many bridges cross the river and connect the city with the suburb of Praga. The older parts of the city have narrow and irregular streets, but as a whole it is one of the most pleasant cities of Western Europe, and ranks next to Moscow and Saint Petersburg as the most beautiful city of Russia. The streets are paved substantially. They are supplied with

all the modern improvements, such as sidewalks, gas and electric lights, sewerage, waterworks, rapid transit, and extensive telephone systems.

Warsaw has many beautiful buildings, including about thirty palaces and the Cathedral of Saint John, a substantial structure dating from 1250. The Lutheran Church is the loftiest building of Warsaw and contains fine paintings and a number of connected chapels. It has a large group of other churches and synagogues, excellent public and private schools, numerous hospitals and charitable institutions, and several important scientific and educational associations. The University of Warsaw, founded in 1816, has fine botanic gardens, an observatory, a museum, and a library of 475,000 volumes. It is attended by 1,350 students. Many beautiful monuments, statues, parks, and gardens adorn the city. The principal streets are beautified by large, substantial, and artistic architecture. Among the manufactures are cotton and woolen goods, boots and shoes, carpets and clothing, leather and saddlery, wagons and carriages, musical instruments, silver-plated ware, spirituous liquors, cigars, chemicals, engines, and machinery. The general export trade is very extensive.

It is not certain when Warsaw was founded, but its history since the 16th century is closely connected with that of Poland. The Swedes and Russians contended for its possession throughout the 17th century. It was greatly improved by the Swedes under Augustus II. and Augustus III. Russia came into possession of it in 1764, but it was annexed to Prussia in 1795, and was occupied by the French under Napoleon in 1806. The Treaty of Tilsit made it the capital of the independent duchy of Warsaw, but it was taken by Austria in 1809 and was annexed permanently to Russia in 1813. An unsuccessful insurrection occurred in 1830-1831, which was followed by the confiscation of numerous estates and the deportation of many insurrectionary leaders to Siberia. A severe military rule was maintained until 1856, but another general insurrection occurred in 1863. This movement was put down with much energy by the Russians, who closed the scientific and educational institutions, deported many of the leaders to Siberia, and confiscated the landed interests of the nobles. It has been the continued policy of Russia to supplant the Polish language with the Russian and thereby crush the spirit of independence that has for centuries animated the Poles. The city has grown in population and commercial interests with a remarkable regularity for the past quarter of a century and its

educational interests have kept pace with its growth. The inhabitants include about 80,000 Germans and a large number of Jews. Population, 1908, 752,408.

WAR SHIP, the general name applied to any vessel that is armed and equipped for purposes of war. The first element considered by the naval architect in designing a war ship is its displacement, by which is meant the actual weight of the ship. This is of course exactly equal to the weight of water which the vessel displaces and in the judgment of the architect is distributed among the several parts. A portion is allotted to the hull, part to the motive power, and various proportions to the guns, stores, fuel, armor protection, and general equipment. Whatever excess is given to one element must be deducted from another, since the ship would otherwise exceed the desired displacement. Some elements in a ship of a given size cannot be varied greatly, such as the weight of the hull, stores, and furnishing, but considerable latitude may be exercised in planning the engines, armour, and fuel supply, depending upon the type of vessel that is under consideration.

In a fast-sailing ship, which has a speed of 23 knots, a large proportion of the weight is allotted to the motive power, hence the vessel can have a comparatively light battery of guns and slight armor protection. On the other hand, a more heavily armed and armored ship must necessarily have comparatively less speed, possibly from 20 to 21 knots, since the weight saved on the motive power enters into a more complete protection for the guns and heavier armament. A ship that has a speed of from 15 to 17 knots an hour, while losing in rapidity of movement, gains in the manner of greater protection and carries heavier guns and greater stores. Ships that are swift, but are lightly armed and armored, belong to the class known as *protected cruisers*, while the less speedy, but more heavily armed and armored ships, are classed as *armored cruisers*. A battleship is slowest in speed, but it has the capacity for taking and giving the heaviest blows that can be inflicted by modern guns. At present the tendency is to sacrifice speed for the power of offense and defense, but most governments supplement the more powerful ships with vessels of higher speed so as to build a fleet that contains representatives of both classes.

The British battleship *Dreadnaught*, completed in 1906, is one of the most powerful war ships afloat at present. It has a speed of 21 knots an hour, with a displacement of 18,500 tons, and was constructed at a cost of about \$8,000,000. On the upper deck are ten 12-inch

guns, so located that six can be fired either ahead or astern, and eight may be fired broadside. In addition to these it carries eighteen 3-inch guns as a means of defense against torpedo boats and other smaller vessels. With this powerful war ship may be compared the *Connecticut* of the United States navy, launched in 1904. It has a displacement of 18,000 tons, with a speed of 18 knots, and cost about \$4,500,000. The length of this vessel is 456 feet and its breadth is 77 feet. It is protected by Krupp armor eleven inches thick amidships, whence it tapers to nine inches below the water line. It is equipped with four 12-inch breech-loading guns, two of which are located within a turret at each end of the ship, and twelve 7-inch guns are dispersed in casemates along the turrets. It is further supplied with numerous other guns for offensive and defensive action, such as rapid-firing guns and torpedoes. The *Connecticut*, at the time of being launched, was the most powerful vessel of the United States navy. While it is inferior in speed to the *Dreadnaught*, it is considered by many at least equal to the latter as a forceful implement of warfare. More recently many vessels of the *Dreadnaught* type have been launched by Germany, Japan, and the United States, such as the *Michigan*, the *South Carolina*, and the *Oklahoma* of the last named country. See **Navy**.

WARTBURG, a famous castle of Germany, in Saxe-Weimar, near the city of Eisenach. It first became famous on account of the *War of the Wartburg*, a name given to a poetic contest held here about 1206, in which the Minnesingers, including Walther von der Vogelweide, were the contestants. The castle was occupied at that time by Hermann, landgraf of Thuringia, who made his court a refuge for musicians, scholars, and artists. A second circumstance that made the castle famous is that it was the scene of the legend of Saint Elizabeth of Hungary, who was the wife of a Thuringian landgraf. The next and greatest of all important events is that connected with the life of Luther, who occupied rooms in the castle after the famous diet of Worms, when he translated the Bible into German. In 1867 the 8th century of its foundation was made the occasion of a general celebration. The 300th anniversary of the Reformation was celebrated at Wartburg by German students in 1817.

WARTHE (vär'tē), a river of Germany and Poland, the largest tributary of the Oder. It rises in the western part of Poland, 35 miles northwest of Cracow, and, after a course of 540 miles toward the northwest, joins the Oder about 20 miles north of Frankfort. The Warthe is

navigable for 250 miles and its importance is greatly enhanced by several canals. Its valley is a highly fertile region, producing grasses, sugar beets, cereals, and fruits.

WART HOG, an animal of the swine family, which is native to Southern Africa. It is peculiar because of having several warty growths



WART HOG.

on each side of the face and tusks in both jaws, which curve upward and outward. The tusks are an enlargement of the molar teeth, and their composition is similar to that of the tusks of an elephant. Wart hogs have a large head and feed on roots and bulbs of plants. The river, or water, hogs of Central Africa are allied animals, but are peculiar for spending much of the time in water. They are savage and ill-looking. The flesh of both species is esteemed as food.

WARWICK (wār'wīk), a town of Rhode Island, in Kent County, five miles south of Providence. It is situated on Narragansett and Cowesett bays, the Providence and Pawtuxet rivers, and on the New York, New Haven and Hartford Railroad. The chief industries include machine shops, foundries, cotton mills, and canning and curing establishments. Among the public utilities are electric and gas lighting, waterworks, sewerage, and electric street railways. The streets are improved with pavements and avenues of shade trees. It has an extensive trade in merchandise and manufactured products. The first settlement in the vicinity was made in 1642, when it was known as Shawomet, and was later named in honor of the Earl of Warwick. It is the birthplace of Nathaniel Greene. Population, 1910, 26,629.

WASHBURN (wōsh'būrn), a city of Wisconsin, county seat of Bayfield County, sixty miles east of Superior. It is situated on Chagamegon Bay, an inlet of Lake Superior, and

on the Northern Pacific and the Chicago, Saint Paul, Minneapolis and Omaha railroads. The city has a fine harbor and is the center of a large trade in grain, lumber, and building stone. The chief buildings include the public library, the high school, and the county courthouse. It has manufactures of lumber products, clothing, cigars, spirituous liquors, and machinery. Near the city is a large dynamite plant. Electric lighting, waterworks, and sewerage systems are among the public utilities. The first settlement in the vicinity was made in 1665, when a Jesuit mission was established here, which was one of the first settlements in the State. Population, 1905, 7,284.

WASHINGTON (wōsh'ing-tūn), a city in Indiana, county seat of Daviess County, twenty miles east of Vincennes, on the Evansville and Terre Haute and the Baltimore and Ohio Southwestern railroads. It is surrounded by a fertile farming and dairying country. The chief buildings include the public library, the county courthouse, and many fine schools and churches. Among the manufactures are earthenware, cigars, machinery, clothing, and hardware. Large quantities of bituminous and cannel coal are mined in the vicinity. The city has a large trade in grain, coal, flour, lumber, and live stock. It is improved by electric lights, waterworks, pavements, and street railways. Population, 1900, 8,551; in 1910, 7,854.

WASHINGTON, a city of Iowa, county seat of Washington County, 65 miles southwest of Davenport. Transportation facilities are provided by the Chicago, Burlington and Quincy, the Chicago, Milwaukee and Saint Paul, and the Chicago, Rock Island and Pacific railroads. It is surrounded by a fertile farming and stock raising country. The features include the county courthouse, the high school, the public library, and municipal waterworks. It has manufactures of flour, earthenware, and machinery. Population, 1905, 4,489.

WASHINGTON, a city in Pennsylvania, county seat of Washington County, thirty miles southwest of Pittsburg, on the Baltimore and Ohio, the Pittsburg, Cincinnati, Chicago and Saint Louis, and other railroads. Deposits of natural gas and bituminous coal abound in the surrounding country, which also produces cereals and dairy products. It is the seat of Washington and Jefferson College, which was founded as Washington Academy in 1787. Other features include the public library, the county courthouse, the Y. M. C. A. building, the Washington Female Seminary, Trinity Hall, and many fine churches. It has manufactures of flour, woolen goods, ironware, machinery, and farm-

ing implements. Electric lights, pavements, sewerage, and rapid transit are among the municipal facilities. The place was first settled in 1768, when it was known as Bassetown, but was incorporated under its present name in 1784. Population, 1900, 7,670; in 1910, 18,778.

WASHINGTON, the capital of the United States, situated in the District of Columbia (q. v.), on the Potomac River, 40 miles southwest of Baltimore. It occupies a beautiful site on the east bank of the Potomac River, about 100 miles from its entrance into Chesapeake Bay, at the junction with the Anacostia, or East Branch, and is the head of navigation and tide water. Originally the tract occupied by the city was 10 miles square, ceded by Maryland and Virginia to the Federal government, but the Virginia portion was given back in 1846, and the territory now belonging to the city comprises 70 square miles, of which about 10 square miles are water surface. Near the Potomac the land is low, but it rises gradually from the margin of the water, and the general elevation is about 100 feet, though the higher parts reach an altitude of 250 to 400 feet. Georgetown, situated in the western part of the District, is separated from the main part of the city by Rock Creek and is now frequently spoken of as West Washington. The Anacostia, or Eastern Branch, flows into the Potomac in the southeastern part of the city. Anacostia Island is a tract of land in the Potomac, opposite the mouth of Rock Creek.

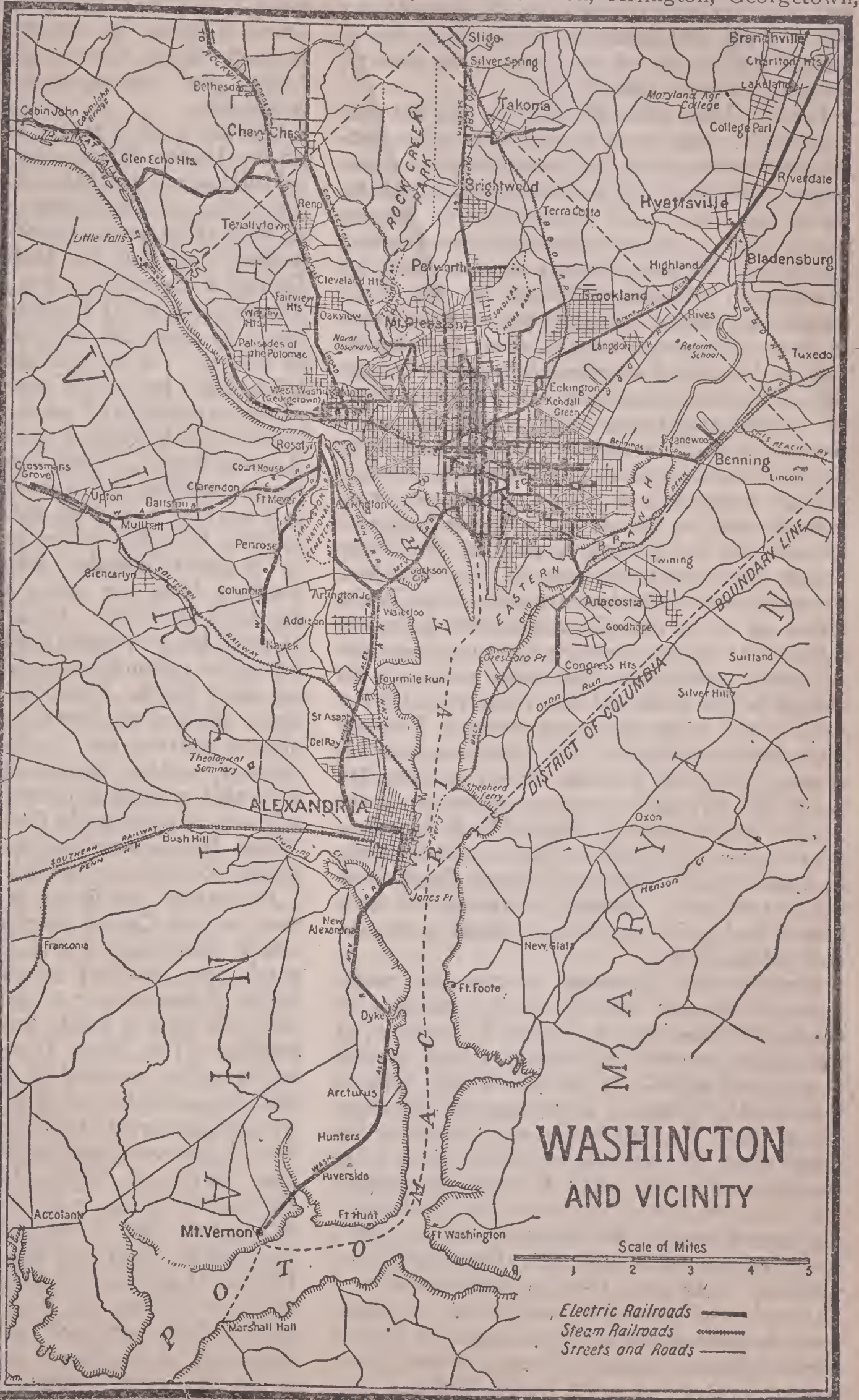
DESCRIPTION. The principal streets are wide and range from 80 to 160 feet. They are paved largely with asphalt in the main parts of the city and farther out the pavements are of macadam. The sidewalks and curbs are almost exclusively of cement. Beautiful shade trees line the streets, though they are confined principally to the residential sections. The broad transverse avenues that cross the streets diagonally are named after the states of the Union. At the time this arrangement was agreed upon, it was decided to name the great central avenue after Pennsylvania, the *Keystone State*. South of this the avenues received the names of the Southern States, the avenues which cross Pennsylvania were named after the Middle States, and those north of it were designated for the New England States. The rectilinear streets have a direction north and south and east and west with the points of the compass. Those running east and west are known by the letters of the alphabet, hence are designated North A and South A, North B and South B, etc. At right angles to the alphabetical streets are the thoroughfares that bear numbers and their house enumeration begins at a line running due north

and south through the Capitol. In this way the city is divided into four quarters, known as Northwest, Northeast, Southwest, Southeast.

In each section the houses are numbered upon the decimal system, that is, 100 numbers for each block. In addressing mail intended for different parts of the city, it is advisable to add after the addresses the designation of the quarter by its initials, but it is customary to omit the letters N. W. from mail intended for the Northwest section, since the greater part of the business houses are within that quarter.

TRANSPORTATION. The city has steamboat connection by the Potomac with ports on Chesapeake Bay and the Atlantic and the landing for vessels is at the foot of Seventh Street. Inland transportation is by the Baltimore and Ohio, the Pennsylvania, the Southern, the Chesapeake and Ohio, the Atlantic Coast Line, and other railways. The Cumberland Canal extends along the Potomac River above Washington, but is not used extensively, except to some extent for freighting. Intercommunication is by a system of electric railways, which have

branches to all parts of the city, and with it are connected interurban railways that extend to Alexandria, Mount Vernon, Arlington, Georgetown,



Anacostia, Bladensburg, Brightwood, and many other points. Tourists have the advantage of being able to obtain excellent service by cabs and automobile conveyance to all parts of the city. North of Capitol Hill is the new Union railway station, one of the finest in the country, erected at a cost of \$4,000,000.

PARKS. More than 300 squares and reservations are formed at the intersections of the rectangular streets with the broad transverse avenues, and they are uniformly beautified by shrubs and trees, with interspersing of flowers and statuary. The most important reservations are located between Capitol grounds and the Washington Monument, known as the Mall, stretching a distance of about one mile from east to west. The entire tract is about four blocks wide and within it are the government's botanical gardens and conservatory, fine beds of flowers, native and foreign plants, and numerous substantial and imposing buildings. Extending north of the west end of the Mall are the Executive grounds, a finely improved and ornamented tract. At the north end of the Executive grounds are the private gardens of the White House, the official residence of the President. Across Pennsylvania Avenue, north of the White House, is the beautifully ornamented Lafayette Square. Originally there was no provision for additional parks, since the tracts which are included in the Mall and the small park have a total of 617 acres, but more recently Potomac Park has been added. This tract has been reclaimed from the Potomac River, contains 740 acres, and serves as a western extension of the Mall. The National Zoölogical Park lies some distance north of Potomac Park, on Rock Creek, and immediately north of it is Rock Creek Park. These two parks include 1,700 acres and their broken and picturesque aspects make them popular public resorts.

MONUMENTS. Foremost among the monuments is the one erected to the memory of George Washington, a beautiful structure of pure white marble. It is 555 feet high, erected at a cost of \$1,187,710, and is the most lofty in the world. Within is a staircase of 900 steps, which winds its way to the top around an interior shaft of iron pillars, within which is an elevator sufficiently large to carry 30 persons. The elevator carries sight-seers 517 feet above the ground, where the country may be viewed for a distance of 15 to 20 miles from eight small windows. Lafayette Park contains a statue of Lafayette and one of Rochambeau. A bronze group to commemorate Lincoln stands in Lincoln Park. Other memorials of beauty include those erected to Martin Luther, Daniel Webster, Ben-

jamin Franklin, James A. Garfield, Andrew Jackson, John Marshall, Samuel Hahnemann, Nathanael Greene, Winfield S. Hancock, and Admiral Farragut. Oak Hill Cemetery, on Georgetown Heights, is the most beautiful burial ground. Rock Creek, Congressional, Mount Olivet, and Glenwood are other noteworthy cemeteries.

CAPITOL. Capitol Hill is the site of the Capitol of the United States, one of the most beautiful buildings of the kind in the world. This structure stands near the center of a park, which has an area of sixteen city blocks, and is located immediately east of the Mall. The base of the Capitol is elevated 90 feet above the Potomac. The building is 751 feet long, 348 feet wide, and above its dome, 287 feet high, is a bronze statue of Liberty. All the apartments are substantially finished and beautifully decorated. The exterior of the structure is of white marble. The largest room in the building is the hall of the House of Representatives, which contains seats for the representatives and delegates from the states and territories, and its galleries have a seating capacity for 1,650 spectators. Next to it in size is the Senate chamber, which has seats for the senators from the states and accommodations for 1,150 spectators. Other interior apartments of much beauty include the hall for the Supreme Court, the national memorial hall, and the rooms set apart for the President and the Vice President. Both of the latter are adorned with magnificent mirrors and finished in the purest of Carrara marble. Beautifully platted and finely decorated grounds surround the Capitol. Pennsylvania Avenue leads from the Capitol to the White House and may be regarded equal in beauty to any street in the world.

BUILDINGS. About one mile and a half northwest of the Capitol is the White House, the official residence of the President. Unfortunately the beautiful grounds surrounding the White House cannot be seen from the Capitol, since the view is partly cut off by the Treasury building. The White House was built in 1792 and was first occupied by President Adams. It was destroyed by the British in 1714, but was restored four years later, and since then a number of improvements have been made. On a line between the White House and the Capitol are the Treasury and the Post Office departments, and west of the White House are those of the War, Navy, and State departments. The Interior Department, the Federal Printing Office, the Patent Office, and the Pension Office are located in the northwest quarter. A short distance east of the Capitol is the Library of Congress, the finest building of the kind in the

world. This library contains a vast collection of books, photographs, pamphlets, pieces of music, and manuscript. The ordnance factory is a great workshop of the government, on the site of the old navy yard, and south of the Mall is the Bureau of Engraving and Printing. A short distance from the latter is the Agricultural Department, near which are the Smithsonian Institution, the National Museum, the Army Medical Museum, and the United States Fish Commission. The Washington Barracks are located on the point of land that separates the Anacostia from the Potomac River, and the government hospital for the insane is situated on the north side of the Anacostia. On the west side of the Potomac, in Virginia, is the famous Arlington National Cemetery, formerly the home of Robert E. Lee.

The city has many fine structures that are not classed with those of the government. These include many business buildings and ecclesiastical structures of great value. Among the leading churches are the Church of the Covenant (Presbyterian), on Connecticut Avenue; the Saint John's (Episcopal), on Lafayette Square; the Metropolitan Memorial (Methodist), on Four-and-a-half Street; the Calvary (Baptist), at H and Eighth streets; the Lutheran Memorial, on Thomas Circle; the Christian Memorial, on Vermont Avenue; the Saint Matthew's (Roman Catholic), on Rhode Island Avenue; the First Congregational Church, at G and Tenth streets; and the Church of All Souls (Unitarian), at L and Fourteenth streets. The public library, on Mount Vernon Square, was given by Andrew Carnegie. Corcoran Art Gallery, the gift of W. W. Corcoran, on Seventeenth Street, is a beautiful structure and contains valuable works of art. Among the leading clubs are the Cosmos, the Columbia Athletic, the Chevy Chase, the Gridiron, the Army and Navy, and the Y. M. C. A. of Washington. The leading places of amusement include the Belasco, Chase's Grand Opera, the National Theater, the Academy of Music, the Kernan's Lyceum, and the Butler's Bijou. Among the principal hotels are the Montrose, the Regent, the Shoreham, the Saint Louis, the Ebbitt, the Riggs, the Willard, the Dewey, the Crafton, the Arlington, and the Cairo.

EDUCATIONAL. The public schools are well organized and generally attended, in fact the patronage of these schools is larger proportionally than in most of the larger cities. This system of schools was organized in 1800 and was presided over by a board of trustees of which Thomas Jefferson was the first president. Among the institutions of higher learning are the Carnegie Institution, the American Univer-

sity (Methodist), the Columbia University, the Georgetown University, the Catholic University of America, and Howard University. Many institutions afford splendid facilities for educational work in special departments, such as the Smithsonian Institution, the Library of Congress, the Bureau of Labor, the Bureau of Education, the Bureau of Fisheries, the Army Medical Museum, etc. The city has many educational and scientific associations. Numerous hospitals, homes, asylums, and relief societies are maintained.

INDUSTRIES. Though the city includes among its inhabitants many employees of the government, it is the permanent home of a large majority of its people. This gives rise to many industrial enterprises of vast extent, especially in the line of manufacturing. Within the city are 2,775 establishments that engage in manufacturing, and the value of the output is \$50,500,000 per year. About one-fifth of the total product is obtained from the establishments managed by the government. Cotton and woolen goods, jewelry, scientific instruments, wearing apparel, ironware, machinery, and musical instruments are among the leading products. Many extensive publishing houses have their seat in the city. Washington is important as a market for fruits, food products, and merchandise. It is the center of a large wholesaling and jobbing trade.

GOVERNMENT. The inhabitants of Washington have no direct vote in appointments to office within the city or in national affairs, but the government is directed by the Federal authorities. It is vested in a board of three commissioners, who serve for three years, two of whom are appointed by the President with the consent of the Senate and one is detailed by the Secretary of War. They have authority as empowered by Congress, and in them is vested the appointment of all clerks and subordinate officials. One-half of the expenditures are provided for by an appropriation of Congress and the remainder is raised by assessment upon the District. This plan of raising revenue is thought equitable for the reason that much of the property belongs to the United States, which is estimated, including the streets, to constitute about one-half of all the property. Extensive systems of waterworks, sanitary sewerage, and gas and electric lighting are maintained.

INHABITANTS. In 1900 the city had a population of 278,718, which included 86,702 colored inhabitants. The census of 1910 places the population of the city at 331,069.

HISTORY. The site occupied by the city was selected by George Washington when the region was sparsely settled. The town was first called

by its present name in 1791, when it had only 3,000 inhabitants. Pierre Charles L'Enfant, a French civil engineer, was employed to prepare the plan for the city proposed to be built. Washington selected the site and marked the boundaries, and the plans drawn up by the engineer were accepted by the commissioners in 1792. The British captured it in 1814, after a weak resistance at Bladensburg, and many of the public buildings were destroyed by fire. All the public buildings, including the residence of the President, were restored within the next few years. At the time of the Civil War it contained a population of 61,000 and was repeatedly threatened by Confederate armies, especially in 1864, when General Early advanced to within a few miles of the city. Georgetown was settled as early as 1695, occupying an elevated site on the Potomac. It remained an independent corporation from 1789 until 1878, when it was annexed to the city of Washington. Since that time the city has made rapid strides of advancement in population and industrial growth.

WASHINGTON, a western State of the United States, in the northwestern part of the country, popularly called the *Corner State*. It is bounded on the north by British Columbia, east by Idaho, south by Oregon, and west by the Pacific Ocean. The length from east to west is 350 miles and the extreme breadth is 225 miles. It has an area of 69,180 square miles, which includes 2,300 square miles of water surface.

DESCRIPTION. The Cascade Mountains divide the State into two sections, which differ widely in climatic and surface condition. The eastern section comprises about two-thirds of the State and is formed largely of grazing lands. This region is a treeless plain, with an elevation of 1,000 to 2,000 feet above the sea, and is characterized by more or less dry cañons and hilly tracts along the larger streams. In the western part the surface is mountainous, but the rainfall is greater than in the eastern part, and the climatic conditions are more favorable to the growth of vegetation. Gray's Harbor is the chief inlet from the Pacific, while Puget Sound, a beautiful sheet of water, extends inland from the straits of Georgia and Juan de Fuca. Numerous fertile islands lie off the shore, both in the Pacific and in the straits toward the northwest, most of the latter being included in San Juan County. Within Washington the Cascade Mountains have a general elevation of 8,000 feet. In two places they are broken by passes, known as Stampede Pass and Steven's Pass, through the former of which passes the line of the Northern Pacific Railway and through the latter, that of the Great Northern

Railway. Among the highest elevations are Mount Baker, 10,827 feet, Mount Adams, 12,470 feet; and Mount Rainier (Tacoma), 14,526 feet. A range of the Cascades, known as the Olympic Mountains, stretches from the Strait of Juan de Fuca toward the south, whose highest peak, Mount Olympus, has an elevation of 8,150 feet. This range stretches southward into Oregon and is cut from the southern end of the Puget Sound valley by the valley of the Chehalis River, which has its outlet in Gray's Harbor.

Washington lies almost entirely within the basin of the Columbia, which crosses the northern border from the Dominion, flows through the eastern part of the State, and forms most of the southern boundary. The Clark Fork crosses the border from Idaho, but joins the Columbia after passing through the northeastern corner into Columbia. A part of the western border is formed by the Snake, which flows through the southeastern corner and joins the Columbia at Ainsworth. The Spokane River enters the State from Idaho, passes the city of Spokane, and joins the Columbia at Fort Spokane. Other tributaries within the State include the Charles, the Okanogan, the Wenatchee, the Yakima, the Cowlitz, and the Lewis rivers. The northwestern part of the State is drained chiefly by Puget Sound, which receives the inflow from the Skagit, the Nesqually, the White, and the Puyallup rivers. Numerous lakes of considerable size are located within the State, most of them in the mountainous region. They include Lake Chelan, Washington (connected by canal with Puget Sound), Moses, Big Swamp, and Queniult. Throughout the mountains are forests of valuable timber, such as spruce, red and white cedar, red and yellow fir, oak, ash, alder, larch, and hemlock.

The climate in the eastern part is quite dry, owing to the fact that the greater part of the moisture is condensed by the Cascade Range before it reaches the plains. Here the mean temperature for January is 30° and for July 74°, but the extremes range from 30° below zero to 110° above. Western Washington has an equable climate, with a mean temperature of 40° in January and 62° in July. The extremes in this section range from 10° in winter to 95° in summer. The rainfall in the western part is excessive, being 132 inches on the Pacific coast, and about 50 inches at Olympia. In some places on the coast the rainfall reaches 140 inches and the precipitation is confined chiefly to the winter months. Eastern Washington has a rainfall of from 14 to 16 inches. In the Great Plains of the Columbia River the rainfall sometimes is as low as 10 inches. The climate is singularly healthful.

MINING. Washington is rich in mineral deposits. Extensive coal fields are found in the east central part and the basin of Puget Sound, and it is the leading coal-producing State of the Pacific coast. The annual output of this mineral is reported at 3,575,000 short tons, and the larger part of the product is obtained from King, Pierce, and Kittitas counties. Gold and silver are mined in the mountains. Granite, limestone, sandstone, and clays are obtained in abundance for manufacturing and constructive purposes. Other minerals include copper, lead, iron, tellurium, arsenic, platinum, slate, and antimony. Mineral waters with curative properties are found in many sections of the mountains.

AGRICULTURE. About 25 per cent. of the total area is included in farms, which average 256 acres. A large variety of crops are grown, since the soil has elements of fertility suitable for general farming. Irrigation is carried on extensively in the eastern part, but wheat can be grown successfully in many sections without artificial watering. The rainfall during winter is usually sufficient to supply moisture for the growing crop. Wheat exceeds in acreage all other cereals combined and the quality is of a high class. A large section of country between the Cascade and the Olympic mountains is well adapted to all classes of farming. Among the leading crops beside wheat are oats, barley, hay, potatoes, sugar beets, hops, rye, and fruits. Irrigation is carried on most extensively in the valleys of the Yakima and the Columbia.

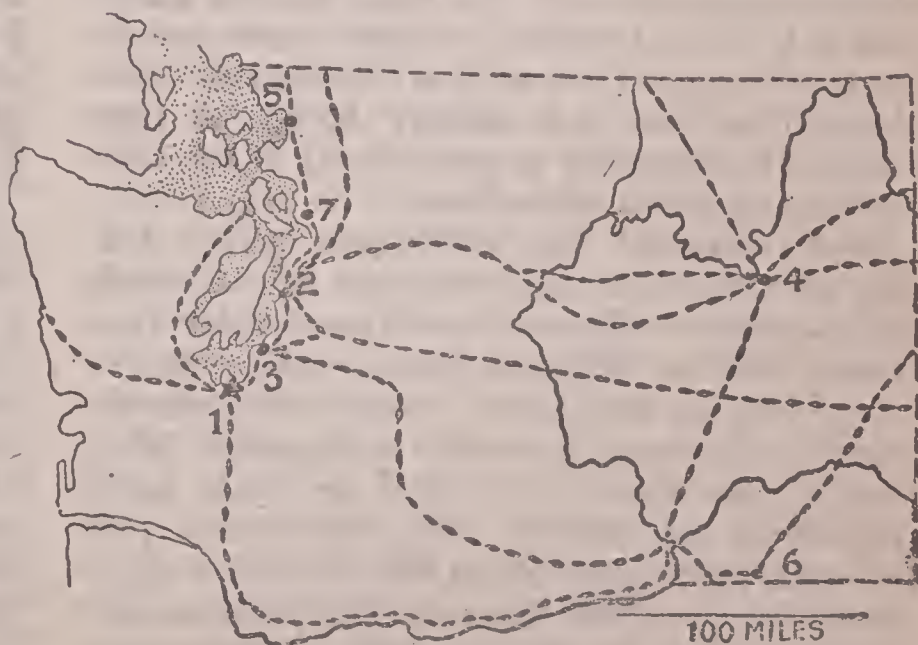
The eastern part of the State, though located in the arid region, has large stretches of country that are well grassed, and rich grazing lands are likewise found on eastern slopes of the Cascades. This has given rise to large livestock interests. Cattle are grown extensively for meat and dairying and choice breeds of horses are reared. There has been a constant increase in the number of sheep and the clip of wool. Other domestic animals include swine, mules, goats, and poultry.

MANUFACTURES. The State has an abundance of raw material to promote manufacturing enterprises, especially timber, coal, stone, and agricultural products. The fisheries yield products annually which are valued at about \$6,800,000. Vast quantities of fish are canned and cured for the market, especially the salmon, blue back, halibut, cod, smelt, and oysters. Large interests are vested in flour and grist milling, slaughtering and meat packing, the manufacture of lumber and timber products, and the output of cheese and other products obtained

from the dairy. The general manufactures include machinery, earthenware, clothing, canned and dried fruits, malt and spirituous liquors, cigars, beet sugar, and paper and wood pulp. Seattle, Tacoma, Spokane, and Bellingham are the chief manufacturing centers.

TRANSPORTATION. The Snake and Columbia rivers and Puget Sound furnish facilities for inland communication. Puget Sound is suitable for the largest seagoing vessels as far as Seattle and ships of medium size sail as far south as Tacoma. The entire coast line, including the inlets, has an extent of 2,000 miles. Three trunk lines traverse the State from west to east, the Great Northern, the Northern Pacific, and the Chicago, Milwaukee and Saint Paul railways. Other lines include the Canadian Pacific and several others. Electric railways are operated through some parts of the State, especially in the western section. A large trade with foreign countries is carried through ports on Puget Sound, Gray's Harbor, and Willapa Harbor, from which regular liners sail to European and Asiatic countries. The chief exports include coal, lumber, canned fish, cereals, and live stock.

GOVERNMENT. The constitution was adopted when the State was admitted, in 1889. It vests the executive authority in the governor, lieutenant governor, secretary of State, treasurer, auditor, attorney-general, commissioner of public lands, and superintendent of public instruction, each elected for four years. Legislative authority is vested in the General Assembly, which consists of a senate and a house of representatives. Membership in the latter is limited between 63 and 99 members, while the senators



WASHINGTON.

1, Olympia; 2, Seattle; 3, Tacoma; 4, Spokane; 5, Bellingham; 6, Walla Walla; 7, Everett. Dotted lines indicate principal railroads.

cannot number less than one-third nor more than one-half of the number of representatives.

Sessions of the General Assembly are held biennially. A supreme court of five judges, elected for six years, has the highest judicial authority. Superior courts are maintained in the counties. Local government is administered by towns, municipalities, and counties.

EDUCATION. The schools are supervised by a State superintendent of public instruction, who is elected for four years and is assisted by a board of education, which is appointed by the Governor with the consent of the senate. All the public schools are required to have not less than three months of school during the year, but the average time the schools are in session is 140 days, which is exceeded only by a few of the states. Based on the school population, the rate of illiteracy is 3.1 per cent. The rural schools are organized on the district plan, being supervised by a county superintendent, and the towns and cities maintain graded schools. A permanent school fund yields a part of the revenue for the support of public instruction, but the principal income is derived from State and local taxes. Normal schools for the instruction of teachers are situated at Cheney, Bellingham, and Ellensburg, but normal training is likewise given in several colleges and a number of public high schools.

The State University of Washington, situated at Seattle, is at the head of public instruction. Other institutions of higher learning include the Washington Agricultural College and School of Science, at Pullman; the Whitman College, at Walla Walla; and the Gonzaga College, at Spokane. Chehalis is the seat of an industrial school, Walla Walla has the penitentiary, and Vancouver is the seat of a home for the feeble-minded. The hospitals for the insane are located at Medical Lake and Fort Steilacoom. Orting is the seat of a soldiers' home. A State board of control has general charge of the charitable and penal institutions.

INHABITANTS. The inhabitants include 111,364 persons of foreign birth, who consist chiefly of Canadians, Germans, and immigrants from Great Britain. Olympia, in the western part of the State, is the capital. Other cities include Seattle, Spokane, Tacoma, Bellingham, Walla Walla, and Everett. In 1900 the State had a population of 518,103. This included a total colored population of 21,799, of which 2,514 were Negroes, 3,629 Chinese, 5,617 Japanese, and 8,039 Indians. Population, 1910, 1,141,990.

HISTORY. The region now included in Washington was discovered by Juan de Fuca, a Greek sailor in the service of Spain, in 1592, and his name has been given to the strait south of Vancouver Island. Boston merchants sent an ex-

pedition to explore the Columbia and establish trade with the Indians, in 1789, and another expedition for the same purpose was organized by John Jacob Astor in 1810. Lewis and Clark visited the region in 1805 by crossing the Rocky Mountains and spent the winter on the Pacific coast. England claimed a part of the region, but in 1846 recognized the claims of the United States to all of the Oregon country. The first permanent settlement was made at Tumwater in 1845 and the Territory was organized in 1853. Rapid settlement of the region, stimulated by the extensive natural resources and the building of railroads, led to the admission of Washington as a State in 1889. Thousands of tourists from all parts of the continent visited the State in 1909, being attracted by the Alaska-Yukon Exposition, which was held on the ground of the University of Washington, in Seattle.

WASHINGTON, Treaty of, a treaty concluded at Washington, D. C., in 1871, between Great Britain and the United States. It had for its object the settlement of various differences between the two governments, the chief of which was the dispute in regard to the Alabama Claims. The commission consisted of five representatives of the United States, headed by Hamilton Fish and E. R. Hoar, and five representatives of Great Britain, headed by Earl de Gray and Sir John MacDonald. The first session convened on May 8 and 34 meetings were held, after which the treaty was proclaimed in force on July 4. Geneva, Switzerland, was selected as the place of meeting. Besides adjusting the Alabama Claims, the commissioners declared certain rules regarding neutrality in war, settled claims of British subjects against the United States, adjusted some differences in regard to fisheries, and submitted for arbitration to the Emperor of Germany the northwestern boundary dispute. See **Geneva Award**.

WASHINGTON, University of, a State institution of higher learning founded at Seattle, Wash., in 1861. In the early history of the institution it ranked only as an academy and the first class did not graduate until in 1876. The departments include the College of Liberal Arts, the Graduate School, the College of Engineering, and the schools of Mines, Pharmacy, and Law. It has grounds which cover 355 acres and the value of the property is about \$2,150,000. The faculty includes 110 teachers and professors and the library contains 25,000 volumes. About 1,750 students attend annually.

WASHINGTON AND LEE UNIVERSITY, an educational institution at Lexington, Va. It had its beginning in 1749, when Robert Alexander established the Augusta Academy,

which was removed to Lexington in 1792. The name was changed to Washington University in 1798, when General Washington made a donation of some funds, and its present name was adopted in honor of Gen. Robert E. Lee, who became its president after the Civil War. The institution has courses in classics, sciences, law, literature, and engineering. It has about 25 instructors, 375 students, and a library of 45,000 volumes. The endowments amount to \$875,000 and the property is valued at \$500,000. It is the burial place of Robert E. Lee and his resting place is marked by a statue.

WASHINGTON ARCH, a memorial erected in New York City to commemorate the first inauguration of George Washington as President of the United States. It was designed by Stanford White, an architect of New York, and is located at the foot of Fifth Avenue. The structure is 62 feet wide and 77 feet high, and the archway is 30 feet wide and 47 feet high. It is constructed of marble. A popular subscription was raised to defray the expense, which was \$128,000.

WASHINGTON COURT HOUSE, a city of Ohio, county seat of Fayette County, 75 miles northeast of Cincinnati. It is situated on Paint Creek and on the Baltimore and Ohio, the Ohio Southern, and other railways. Among the noteworthy buildings are the high school, the public library, several fine churches, and the county buildings. It has manufactures of flour, boots and shoes, woolen goods, and machinery. Electric lighting, sewerage, and waterworks are among the municipal facilities. The surrounding country is agricultural and stock raising. Population, 1900, 5,751; in 1910, 7,277.

WASHINGTON ELM, the name given to an elm in Cambridge, Mass., situated near the northwestern corner of the Common. It is celebrated because Washington stood under this tree at the time he assumed command of the American army, on July 3, 1775. Although it is protected against injury, the tree is decaying quite rapidly.

WASHINGTON MONUMENT, a celebrated obelisk in Washington, D. C., erected to the memory of George Washington. A popular movement for a national memorial began before the death of Washington and he expressed his own preference for the site, which is on a mound at the west end of the Mall and due south of the Executive Grounds. The monument is 555 feet high, with an elevator and an iron stairway of 900 steps within, which affords access to the base of the apex. The shaft is 55 feet square at the base, where the lower walls are 15 feet thick, but at an elevation of

500 feet, where the pyramidal top begins, the walls are 18 inches thick and about 35 feet square. The construction of the outer walls is of white marble blocks, which were cut in the most careful manner, and the inside walls are of blue granite, but the two parts of masonry are closely connected. A plumb line suspended from the top of the monument inside shows that the deflection from the perpendicular is less than three-eighths of an inch. Many of the large stones of the inside walls are marked, indicating that they were contributed by particular states or societies. Construction work began in 1848, when the corner stone was laid, and the monument was dedicated on Feb. 22, 1895, the anniversary of Washington's birthday. The entire cost was \$1,187,710. No ornamentation or inscription marks the obelisk, which is looked upon as a monument to the American people in the name of their foremost representative.

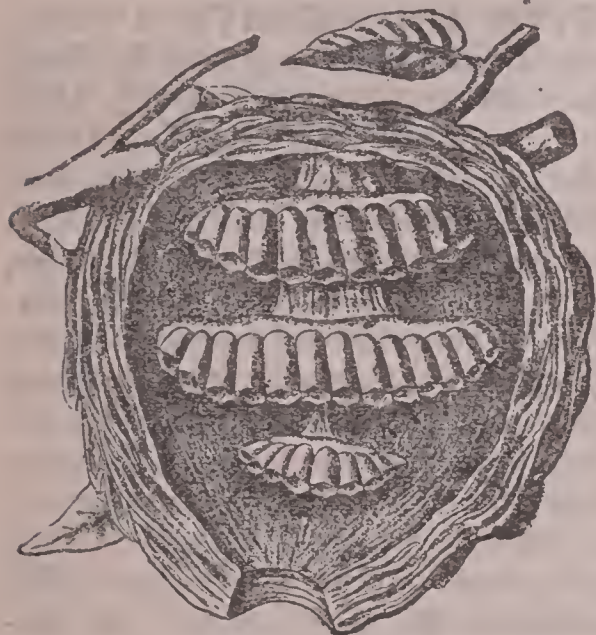
WASHINGTON UNIVERSITY, a coeducational institution of higher learning at Saint Louis, Mo., chartered as Eliot Seminary in 1853. It was so named in honor of Rev. Eliot of that city, but in deference to his wishes the name was changed in 1854 to Washington Institute. Three years later, by an amendment to the charter, the institution became Washington University. The charter was to be perpetual and was of the most liberal character, the only limitations being those forbidding any sectarian or partisan instruction. An evening school for boys was opened in 1854 and soon a day school was begun, the forerunner of the present Smith Academy, a preparatory school of the university. The college was organized in 1858 and the first degrees were granted in 1862. A building for the college was erected in 1858, to which a wing was added and which now forms the home for the School of Engineering and Architecture. The Saint Louis Medical College was made a department of the university in 1891, to which was united, in 1899, the Missouri Medical School, thus forming by the union the present medical department. Mary Institute, a school for girls, was organized in 1858 and the Manual Training School was established in 1879.

In 1894 a tract of land was purchased northwest of Forest Park. This tract now includes 115 acres. Upon this commanding site twelve fireproof, handsome buildings have been erected. The endowment funds have been so largely increased as to afford excellent opportunities for the pursuit of all branches of study. Degrees issued by the institution are held in high esteem, and their holders are admitted without examination to graduate schools of the highest standings. The general and professional librar-

ies are ample and the technical laboratories are supplied with the best modern apparatus. It has ample dormitory facilities and affords splendid opportunities for physical training under competent direction. The institution recently entered upon the beginning of a second half-century of work with full confidence in its future. It has 190 instructors and an average enrollment of about 1,200 students.

WASHITA (wōsh'ī-tā), or **Ouachita**, a river of the United States, which rises near the western boundary of Arkansas and has a general course toward the southeast. It has a length of 550 miles, two-thirds of which are navigable, and it joins the Red River at the southeast corner of Catahoula County, La. The chief tributaries are the Little Missouri, Saline, and Texas rivers.

WASP (wōsp), a genus of insects which somewhat resemble bees. They differ from bees mainly in that they have a more powerful



NESTS OF WASPS.

sting, the body is less bulky, and in that they are not useful for the production of wax and honey. They are divided into two general classes, the social wasps and the solitary wasps. The *solitary wasps* build small nests in the ground, or construct them of pasty material on trees or walls, and divide them into two or three cells. These cells are partly filled with food, usually with caterpillars and other insects paralyzed by being stung, and afterward the food is consumed by the larvae. *Social wasps* live in communities and include males, females, and neuters or workers. The neuters and females have a venomous sting, quite similar to the sting of a hornet. Most species construct a papery nest of masticated vegetable materials, which they suspend from the branches of trees. These nests are walled peculiarly to prevent the entrance of moisture and within is a large chamber, which is reached by a tortuous gallery or passage.

In cold climates most of the adult wasps die in the winter, only a few females surviving, but a new brood is soon produced from eggs laid in

the spring. Each of the surviving females finds a separate location in which to lay the eggs, thus giving rise to several distinct communities, all of them constructing new nests, instead of utilizing the old ones. Some families have 150 to 300 wasps, but in tropical countries the nests are frequently from five to six feet long and contain 15,000 to 25,000 wasps. They feed on the sweets of flowers and fruits and on insects, killing the latter with their jaws. Many species have been described, ranging from the smaller forms common to colder regions to the large tropical species. Several species of wasps native to Brazil resemble the bees in that they store honey. Insects of this genus are quite like bees in that they are infested by a class of hymenopterous parasites, which deposit their eggs in the bodies, the young living in the region of the back.

WATAUGA ASSOCIATION (wä-tā'gā), an organization associated with the history of the United States, organized in 1769 to settle the territory now comprised in the State of Tennessee. It organized a scheme of government for the settlement, which consisted of a legislative council of thirteen members, who were elected by the signers of the articles upon which the government was based. Five of the councilors had general executive authority and they chose one of their own members as supreme chairman. Many outlaws and adventurers took up their residence in the settlement, but they were not subject to the government of the association, hence the scheme did not prove satisfactory. The region became known as Washington District and in 1876 the representatives were given seats in the assembly of North Carolina.

WATCH, an instrument for keeping and indicating time, usually inclosed in a rounded case so it may be carried in the pocket. The first watch was made at Nuremberg, Germany, in 1477, but the early watches had but one hand and required winding twice a day. There is a considerable similarity between a watch and a clock, each having a train of wheels, which is moved and controlled by some form of mechanism. In the watch the mainspring, whose elastic force produces the motion of the whole machinery, takes the place of the weight in the clock. The mainspring, a spiral made of steel, is wound in a cylindrical barrel, and in unwinding moves the barrel in such a manner that motion is carried from one wheel to another by means of cogs and pinions. When wound up by turning the watch key, the mainspring acts upon the wheels exactly as does the weight of a clock, and, to prevent the watch from running

down and to make the wheels move with uniform motion, the balance wheel and hairspring have been introduced, which take the place of the pendulum of a clock. The balance wheel and the hairspring act upon the escapement (q. v.), a variously designed mechanism that serves to gauge the movement, just as the scapewheel of the clock is acted on by the pendulum. The time-keeping qualities of a watch depend largely upon the perfection of the escapement.

Many widely different sizes and kinds of watches are in use. They are variously constructed with either the lever, the horizontal, or the chronometer escapement. Watches having the chronometer escapement are of the highest attainable precision, being rendered independent of variation in temperature by a compensation balance wheel and an especially delicate and effective escapement. Those used to determine the longitude of a ship at sea are set in gimbals, whereby they remain level. They usually beat half-seconds. Watches of the cheaper class are now made principally by machinery, the different parts being made so as to be interchangeable, thus enabling the watch repairer to replace with an exact duplicate any part that becomes unfit for service. Many improvements were made in the last century, such as the addition of hands to indicate minutes and seconds and the mechanism for winding the watch and setting it by turning the stem instead of a key. Watches were made mostly in France, Germany, and Switzerland up to within the last fifty years, but now extensive establishments are maintained in many cities of Canada and the United States. The largest watch manufacturing establishments in the United States are at Boston and Waltham, Mass., and Elgin, Ill.

WATER (wa'tēr), a substance formed by the combination of oxygen and hydrogen, in the proportion, by volume, of one part oxygen to two parts hydrogen; or, by weight, of eight parts oxygen to one part hydrogen. It was classed as an element until 1773, when Lavoisier, a French chemist, discovered that it is a compound substance. Like the gases of which it is formed, pure water has neither taste nor smell. Although colorless in small quantities, it has a deep-blue color when in large masses. It is slightly compressible and a powerful refractor of light, but is not a good conductor of heat and electricity. At a temperature of 32° Fahr., it freezes and forms ice, or snow, and boils at 212° under a pressure of 29.9 inches of mercury. Water is widely diffused in nature, covering three-fourths of the surface of the earth and constituting a large per cent. of all animal and vege-

table life. It is widely distributed in the air as vapor and comprises a large part of many mineral substances. Water constitutes about seven-eighths of the human body. Though widely diffused in nature, we meet with it only in the impure form and are able to obtain it in a pure state only by distillation, that is, by boiling it in a retort and condensing the steam.

Rain water is the purest kind obtainable, since it results from vapor taken up from the surface of the earth, but even that is rendered slightly impure by smoke, dust, and various gases contained in the air. The atmospheric waters, whether in the form of rain, hail, or snow, are quite free from foreign substances, but when they sink through the porous strata of the earth and reappear as spring or river waters they are always charged, more or less, with various salts taken up from the earth. These substances embrace gypsum, iron, salt, lime, sulphur, and many others. When the proportion of minerals is small, the water is said to be *soft* and, when the proportion is large, it is called *hard water*. Mineral waters are those containing sufficient mineral substances to make them of value for medical or commercial purposes, such as are derived from siliceous, calcareous, sulphurous, or salt springs.

The weight of a given quantity of water depends upon its temperature. This is due to the circumstance that water contracts and becomes denser in cooling, though it is not the heaviest when reduced to the coldest point. It is at its maximum density when the temperature is 7.2° warmer than the freezing point, or at 39.2° Fahr. When warmed to a higher degree of temperature it becomes lighter, until at 212° it passes off in steam; and, when reduced to a lower temperature, it becomes lighter until it freezes at 32°, thus accounting for the circumstance that ice will float on the surface of water.

It may be said that the ocean is the great reservoir for the supply of water. Evaporation conveys a constant supply from the surface of the sea into the atmosphere, where it is carried by the winds to different parts until it finally falls to the surface in the form of dew, frost, snow, or rain. Thus all plant and animal life is quickened, springs are formed, rills meander into the valleys and form streams, lakes and rivers are replenished, and finally the water again finds its way back to the ocean. Though the water of the ocean is salty, the saline matters are not taken up as the vapor rises. For this reason the growing plants are watered by nature pouring upon them the practically pure form. Besides watering the plants rains tend to purify the air and the surface of the earth.

by washing foreign substances along with them.

Water exercises a continuous influence upon the surface of the land in that it softens the ground and carries many substances with it as it flows down the hills and valleys in the form of streams or glaciers. We see evidences of this in the channels of streams being cut deeper in some regions, while in others vast deposits of earth are made in the forms of river deltas and banks. Since water is absolutely necessary to life, it is quite important that it should be sought in its purest form. A cubic foot of fresh water weighs 62.32 pounds and is equal to 7.48 gallons. One gallon weighs 8.33 pounds. See **Hygiene; Ice; Steam; Waterworks.**

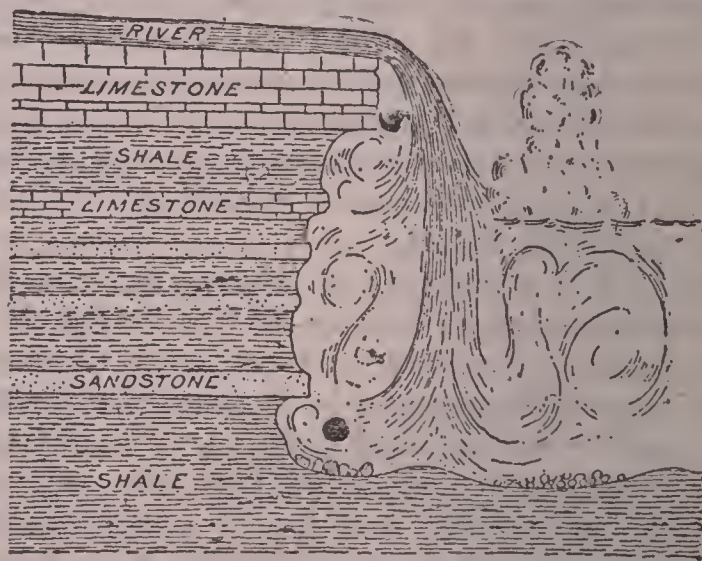
WATER BUG, the general name of any insect which lives almost entirely in water and feeds on other aquatic insects. Nearly all of these insects are active and effect movement in the water by means of oarlike hind legs. The color is brownish, the first pair of wings is horny, and the antennae are small. The head is small and the fore limbs are prehensile. They include the *water-boatman*, the *back-swimmers*, the *marsh-treaders*, the *water-striders*, and the *creeping water bugs*. These names indicate somewhat their habits of moving from place to place. Several allied species of insects are known as *water scorpions*. They are quite large, some species being two to three inches long, and are frequently seen flying about at night in search of food. In habits they are voracious and carnivorous. Two long filaments extend from the caudal extremity, through which respiration is effected.

WATERBURY (wă't'ēr-bēr-ī), a city of Connecticut, in New Haven County, on the Naugatuck River, 32 miles southwest of Hartford. It is on the New York, New Haven and Hartford Railroad and is surrounded by a fertile farming and dairying country, which produces cereals, fruits, and grasses. The noteworthy buildings include the Bronson Public Library, the Masonic Temple, the Waterbury Hospital, the Gerard School, the Convent of Notre Dame, and the Saint Margaret's Diocesan School. It has a fine soldiers' monument and a commodious city hall. The streets are lighted with gas and electricity. They are improved substantially by pavements, public parks, and an extensive street railway system. Among the chief manufactures are the Waterbury watches, a class of timekeepers used very extensively. Other products include buttons, edged instruments, silver-plated ware, carriages, boots and shoes, brass and metal goods, ironware, wearing apparel, and machinery. The region was settled in 1667, and the

city was incorporated in 1853. Population, 1900, 45,859; in 1910, 73,141.

WATER COLORS, the general name of pigments used in painting, which are mixed with water and some adhesive, as size or gum, instead of oil. Colors of this class are prepared in various ways to suit the method of application. Those employed in coloring walls and similar surfaces are mixed with size or glue, while those used in painting pictures are made in the form of small cakes. In painting with water colors the artist has a number of small brushes and several cakes of different colors, and secures advantage from the fact that the product is not only clearer, but dries more rapidly than painting in oil. Among the colors used chiefly are indigo, gamboge, cobalt blue, lake, carmine, vermilion, burnt ocher, pink reds, and ultramarine. They are usually mixed with water alone, but gum and other substances are sometimes added to the water, in order to give depth to the shadows and brilliancy to the lights.

WATERFALL, or **Cataract**, a descent of the water of a river or stream over a precipice or down a steep incline. Waterfalls occur most frequently in mountainous countries, where the streams from the mountain sides enter the valleys. They are due to the occurrence of breaks in the channels of streams, the water falling from the upper to the lower level. Rocky channels and sides are necessary to form an endur-



EROSION OF WATERFALLS.

ing waterfall, otherwise the break in the channel is soon worn down to a common slope. In most cases the volume of water is comparatively insignificant, but in some instances the fall is very great and the phenomenon is correspondingly grand. Yosemite Falls of California are the highest in the world, falling 2,660 feet by three plunges.

The Oroco Falls, in Monte Rosa, have a descent of 2,400 feet. Next to these are the Ro-

raina Falls, Guiana, which bound 2,000 feet in two plunges. Niagara Falls, height 167 feet, the largest in the Western Hemisphere, are in the Niagara River, the outlet of the Great Lakes. These falls are of much importance for the power obtained for manufacturing and other industrial purposes. Other noted falls include the Grand Falls, Labrador, 2,000 feet; Sutherland Falls, New Zealand, 1,900 feet; Staubbach Falls, Switzerland, 925 feet; Victoria Falls, Zambezi, 400 feet; and Hay River Falls, Alaska, 22 feet.

Waterfalls constantly recede, the rate depending upon the hardness of the rock. The causes of this action may be seen in the illustration, which gives a view of the different strata of earth which usually compose the ledges over which the water descends. It will be observed that the direct action of the water is greatly aided in the erosion by reaction after the main current strikes the bottom. It is estimated that Niagara Falls recedes up the stream one foot per year. Some of the waterfalls present splendid scenery and are regarded among the most pleasing natural phenomena. This is true of the Yosemite Falls, which rivals the most beautiful scenic region in the world. The most noted cascade of the Mississippi valley is formed by the Falls of Minnehaha, near Minneapolis, Minn. It was made famous by the writings of Longfellow.

WATER GLASS, or **Soluble Glass**, the name given to any one of several alkaline silicates which contain a sufficient proportion of alkalis to render them soluble in water. Some substances of this class, such as Fuchs's soluble glass, are ordinarily insoluble in water, but they may be dissolved by placing it in boiling water. They are sirupy, transparent, and colorless and have a specific gravity of not less than 1.25. They are used for coating to preserve frescoes, the process being known as *stereochromy*, and their value consists in rendering the surface fireproof and waterproof. Other uses consist in the manufacture of certain soaps, earthenware, and artificial stone. In a modified form they are employed in the dyeing and printing of fabrics.

WATER LILY, the common name of various plants resembling the true lily. They differ from the latter in that they are endogenous, that is, growing from within. On the other hand, true lilies are exogenous, that is, growing by external additions. About twenty species of water lilies are widely distributed in the lakes

and rivers of the Temperate and Torrid zones. The fleshy rootstocks send rootlets down into the mud and long, cylindrical leafstalks grow upward, with circular or cordate leaves usually floating on the surface of the water. Beautiful solitary flowers, principally white, blue, or red, are borne on long cylindrical stalks and rise just above or float on the water. The *Victoria Regia*, native to the Amazon valley, is the largest water lily, its leaves ranging from five to twelve feet in width. The *sweet-scented water lily* is the best known plant of this class in North America. The *blue lotus* and the *white lotus* are water lilies native to the Nile. They bear pleasantly scented flowers and are cultivated extensively in hothouses. In most species the flower is of two days' duration. Some have leaves ranging in diameter from six to twelve feet, but they are somewhat smaller when cultivated in gardens.

WATERLOO (wə-tēr-lōō'), a city in Iowa,



Map to show Niagara Falls and the Niagara River, indicating their use for water power.

county seat of Black Hawk County, on the Cedar River, 104 miles northeast of Des Moines. Communication is furnished by a network of electric railways and by the Illinois Central, the Great Western, and the Chicago, Rock Island and Pacific railroads. It has a large trade in grain, live stock, and merchandise. The noteworthy buildings include the county courthouse, the Federal post office, the city hall, the public library, two high schools, the Masonic Hall, the Presbyterian Hospital, the Ellis Hotel, and the

Academy of Our Lady of Victory. Water power is obtained from the river, which is crossed by several bridges. The manufactures include flour, earthenware, clothing, cigars, brooms, and machinery. The streets are wide and regularly platted, crossing each other at right angles, and are substantially improved by pavements, electric lights, waterworks, and a fine system of electric railways, which connects the city with Cedar Falls. The region was first settled in 1846. Waterloo was incorporated as a city in 1868. Population, 1905, 18,071; in 1910, 26,693.

WATERLOO, a town of Belgium, in the province of Brabant, about ten miles south of Brussels. It is famous as the scene of the battle of June 18, 1815, in which the French army under Napoleon was defeated by the allied forces under Blücher and Wellington. The British army was commanded by Wellington and consisted of about 70,000 men, of whom 25,000 were British troops and the remainder were Germans and Belgians. This army had been defeated by Ney at Quatre-Bras on June 16 and had concentrated at Waterloo, while the German forces under Blücher had been defeated by Napoleon at Ligny. Napoleon had an army of 70,000 trained veterans, with which he intended to defeat the British before the German army could reach Waterloo, while Wellington aimed to hold his position until Blücher could arrive with his army, when it was designed to make an assault upon the French.

With the situation understood in this manner by Napoleon, the French began the battle about noon and continued the attack with great vigor until evening. They were on the point of winning the contest when Blücher came to the rescue with the German army and turned the tide of battle by hemming the French in between the allied armies. As a last resort, the Old Guard, constituted of the veterans from the Imperial Guard, charged upon the allied forces with remarkable persistence, but they were either cut to pieces or compelled to retreat, and Blücher was soon in vigorous pursuit of the retreating French. Estimates place the French losses at 42,000 and those of the allied armies at 23,000. This celebrated engagement accomplished the final downfall of Napoleon, and from it the expression, "To meet one's Waterloo," has become proverbial.

WATERMELON. See **Melon.**

WATER METER, a mechanism for measuring and recording the quantity of water or other liquid flowing through a pipe. Many devices of this kind have been patented, differing somewhat in general construction, but the principal parts are quite similar in all of them. The

water meter in general use contains a chamber of spherical form, so constructed that water may flow freely through it by means of the entrance and delivery pipes. Within the chamber is a tightly fitting disk, mounted on a ball and socket bearing, which revolves under a slight pressure of water, and the flow of the liquid is measured with every turn of the disk. A recording device, consisting of wheelwork, is connected with the disk, hence the number of revolutions made is shown by the dials. Some meters register the pressure and thus afford data for a calculation of the flow of water, but these are not in extensive use. Water meters are employed in most systems of waterworks, each consumer having one of these mechanisms attached to the pipe that furnishes the inflow, and in this way it is possible to determine the quantity used and for which he is to pay.

WATER POLO, a game of ball played by swimmers. The game somewhat resembles hockey, but the large, round ball is filled with air and floats upon the surface. It is played quite generally during the winter season, especially at colleges and other institutions which have ample swimming tanks. An even number of players take part in the game. The purpose of each side is to advance the ball by throwing or pushing it to the goal line of the opposing side.

WATERPROOFING, the art of rendering certain articles, such as paper and cloth, proof against penetration by water. A common method is to apply a coating of caoutchouc, but this has been found disadvantageous for some purposes, since articles coated in this way do not allow the passage of air. Woolen goods may be rendered impervious to water and at the same time permit the passage of air by dipping the cloth into a solution of soap, being careful to rub it thoroughly into the texture, after which it is dipped into a solution of alum. This causes a decomposition of the soap and alum, and the minute openings between the fibers are filled to the extent that water is excluded. Another plan is to dip the cloth into a solution of gelatine and isinglass, and afterward submerge it in a preparation of galls. This results in a kind of tanning process, the gelatine which has pervaded the cloth being rendered as insoluble as leather by the union with the tannin of the galls.

Mackintoshes and other similar wearing apparel are made by treating the fabrics with a solution of rubber. The goods are first coated on one side with a thin solution of rubber, after which the cloth is doubled, the coated sides being placed to face each other, after which pressure is applied. When finished for market, this

product has the rubber coating on the inside. A good quality of this product is impervious both to air and to water. See **Oilcloth**.

WATERSPOUT (wə'tēr-spout), a phenomenon which is quite common to certain regions of the sea and is due to the action of whirlwinds or tornadoes. It usually consists of a whirling column of water, extending from the surface of a lake or the ocean to the cloud above. Waterspouts originate from the rapid condensation of vapor that takes place, owing to the different temperatures of opposite winds and to the rarefaction produced in the currents of revolving air. In many cases portions of the clouds descend and whirl in the form of a funnel-shaped mass. The whirl may draw a column of spray from the surface of the sea, which it unites with the mass above, and may move as an immense pillar over the surface. In fairly calm weather the waterspouts have a vertical position, while winds bring them into a position oblique to the horizon. Waterspouts, whirlwinds, dust clouds, and tornadoes are essentially the same, differing from each other mainly in the quantity of moisture, their dimensions, their intensity, or the degree in which visible vapor has been formed. See **Wind**.

WATERTOWN, a city of Massachusetts, in Middlesex County, on the Charles River, seven miles west of Boston. It is on the Boston and Maine Railroad and has communication by electric railways. The features include the public library, the Mount Auburn Cemetery, and the United States arsenal. It is the residence of many Boston business men. Among the manufactures are paper, starch, soap, hardware, needles, wire, and machinery. It was settled in 1630 and was the seat of important meetings at the beginning of the Revolution, including the second and third provincial congresses. Population, 1905, 11,202; in 1910, 12,875.

WATERTOWN, a city of New York, in Jefferson County, of which it is the capital. It is on the Black River, 90 miles north of Syracuse, and is on the New York Central Railroad. Among the noteworthy buildings are the county courthouse, the post office, the State armory, the Y. M. C. A. building, the Henry Keep Home for the Aged, and the Flower Memorial Library. Water power is supplied for manufacturing purposes by the Black River. The manufactures include silk and woolen textiles, flour, paper, scientific instruments, carriages, steam engines, canned fruits, and farming machinery. Among the general improvements are pavements, waterworks, electric street railways, and several parks. The place was settled in 1800 and became the county seat in 1805. It was in-

corporated as a city in 1869. Population, 1905, 25,447; in 1910, 26,730.

WATERTOWN, a city of South Dakota, county seat of Codington County, 98 miles north of Sioux Falls. It is on the Big Sioux River and on the Great Northern, the Chicago and Northwestern, the Chicago, Rock Island and Pacific, and the Minneapolis and Saint Louis railroads. The surrounding country is fertile. Three miles northwest of the city is Lake Kampeska, which is reached by a railway. Among the chief buildings are those of the county, a fine high school, and a number of churches. The industries include flouring mills, grain elevators, machine shops, stock yards, and manufactures of implements and machinery. It has a large trade in wheat, live stock, and merchandise. Population, 1900, 3,352; in 1910, 7,010.

WATERTOWN, a city in Wisconsin, at the boundary between Dodge and Jefferson counties, on the Rock River, 35 miles northeast of Madison. Transportation facilities are furnished by the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul railroads. It is surrounded by a fertile farming and dairying country. The streets are paved substantially. They are improved by pavements, waterworks, and street railways. Among the manufactures are cheese, flour, cigars, shoes, lumber products, machinery, and farming implements. Watertown has many fine public schools and churches. It is the seat of Northwestern University, a Lutheran institution founded in 1865, and of the Sacred Heart College, opened in 1872. Other features include the public library, the city hall, and many large business blocks. It has a large retail and jobbing trade in merchandise. Population, 1905, 8,622; in 1910, 8,829.

WATERVILLE, a city of Maine, in Kennebec County, on the Kennebec River, 18 miles northeast of Augusta. It is on the Maine Central Railroad and on Ticonic Falls, which supply an abundance of water power. The principal buildings include the public library, the high school, the city hall, the Colburn Classical Institute, the Ursuline Academy, and the Colby College. Among the chief manufactures are leather, edged tools, machinery, furniture, clothing, and textiles. Pavements, waterworks, street railways, and sanitary sewerage are among the municipal facilities. The place was settled in 1760, but was a part of Winslow until 1802. It was chartered as a city in 1888. Population, 1900, 9,477; in 1910, 11,458.

WATERVLIET (wə-tēr-vlēt'), a city of New York, in Albany County, on the Hudson River, 150 miles north of New York City. It is on the Delaware and Hudson Railroad and the

Erie and the Champlain canals. The features include the public library, the high school, the city hall, and the Saint Patrick's Academy. The United States arsenal is located here, occupying a tract of 109 acres along the river front. It has a large trade in merchandise and farm produce. Among the manufactures are saddlery, furniture, stoves, carriages, cotton and woolen goods, cigars, and machinery. Watervliet was incorporated with West Troy in 1836, but was made a city in 1897. Population, 1910, 15,074.

WATER WHEEL. See **Wheel.**

WATERWORKS, a system of improvements and appliances to furnish a water supply. An ample quantity of pure water is of vast importance for the preservation of health in all cities. Wells drilled or dug in the ground are the common source of water supply in country districts. People residing in villages, small towns, and suburban districts utilize wells to a large extent. In many cases springs furnish ample quantities, while in some regions cisterns for storing rain water are the only source of supply. The greatest danger from impure water is in cities, where the soil may be polluted by impurities resulting from dense populations being crowded into a small space, thus tending to contaminate the water in wells. A system of waterworks is maintained in most towns and cities to overcome such dangers. Such a system involves both the collection of water at a common source and its distribution to consumers, usually by steam pumps, air compressors, tunnels, or aqueducts.

According to recent estimates, 3,575 systems of waterworks are maintained in the towns and cities of the United States, about three-fourths of which are under municipal ownership. On the other hand, practically all the systems of Canada are managed under the ownership of the municipalities. In nearly all instances the supply is both for domestic use and fire protection. Reservoirs or tanks located higher than the distributing pipes are utilized to distribute the water to consumers in the larger number of establishments, but in many large cities the pressure is obtained by pumping the water direct into the distributing pipes or mains. Large mains conduct the water on the principal streets and from them the smaller pipes carry a supply to offices, hydrants, and private residences. Loss in the water supply is prevented principally by charging each consumer for the water he uses and wastes, the measurements being effected by means of a water meter, an apparatus for recording the quantity of water passing through the supply pipe.

Some systems of waterworks are of vast ex-

tent, but it is possible to mention only a few of them. Indianapolis, Ind., derives its supply from artesian wells, which have a daily capacity of 25,000,000 gallons. The supply of water for Chicago is drawn from Lake Michigan by tunnels. Cribs are located several miles from the shore and from them the water is pumped by huge engines to central stations. Philadelphia derives its supply from the Schuylkill; Boston, from Cochituate Lake and Nashua River; and New York, from the Croton River by the reservoir system. Albany, N. Y., derives its supply from the Hudson River and has an immense water-purification plant, by which it is settled in reservoirs and filtered through beds of sand. In Saint Louis the supply is drawn from the Mississippi River. Milwaukee, Buffalo, and Cleveland are supplied from the lakes near those cities. Quebec derives its supply of water from Lake Saint Charles, seven miles distant, and that of Ottawa is obtained from an intake in the Chaudière River, about 3,000 feet above Chaudière Falls.

WAUKEGAN (wə-kē'gān), a city in Illinois, county seat of Lake County, 36 miles north of Chicago, on the Chicago and Northwestern Railroad. It is situated on a prominent bluff at the west shore of Lake Michigan, having a general elevation of about 100 feet above the lake, and is a favorite resort and summer residence for citizens of Chicago and Milwaukee. The chief features include the county courthouse, the public library, the high school, and the Masonic Temple. Sheridan Drive is a beautiful public drive along the lake front. It has electric street railways, waterworks and sanitary sewerage. The manufactures include wire, pumps, sugar, earthenware, vehicles, starch, and farming implements. Waukegan has a good harbor and regular connections by steamers in the summer months. It is the center of a large trade in live stock, cereals, and merchandise. Waukegan was settled in 1835 and incorporated as a city in 1859. Population, 1900, 9,426; in 1910, 16,069.

WAUKESHA (wə'kē-shə), a city of Wisconsin, county seat of Waukesha County, 18 miles west of Milwaukee, on the Fox River. It is on the Wisconsin Central, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads. Numerous mineral springs make it a favorite summer resort for pleasure seekers and invalids. Water from these springs is shipped to many parts of the United States. The city is surrounded by a fertile agricultural country, which contains extensive quarries of excellent building stone. Among the noteworthy buildings are the county courthouse, the pub-

lic library, the high school, the Carroll College, and the State Industrial School for Boys. It has manufactures of flour, ironware, machinery, utensils, cigars, and clothing. The streets are improved by pavements, waterworks, and street railways. It was settled in 1836 and incorporated in 1848. Population, 1910, 8,740.

WAUSAU (wa'sa), a city of Wisconsin, county seat of Marathon County, on the Wisconsin River, 180 miles northwest of Milwaukee. It is on the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul railroads and is surrounded by a fertile farming and stock-raising region. In the vicinity are extensive stone quarries, mineral deposits, and large tracts of valuable timber. Among the features are the city hall, the county courthouse, the post office, the public library, the asylum for chronic insane, and the Marathon County Training School for Teachers. The manufactures include lumber products, furniture, clothing, cigars, ironware, and machinery. An abundance of motive power is obtained from the Wisconsin River. It has brick and asphalt pavements and street railways. The trade in farm produce and merchandise is extensive. It was settled about 1850 and incorporated in 1872. Population, 1910, 16,560.

WAVE, the name applied to an advancing ridge or swell on the surface of a liquid, due to any force which causes the particles to be set in motion. Waves are either visible or invisible, depending upon whether they are apparent to the vision. *Visible* waves are caused when the surface of water is set in motion by the friction of the wind. *Invisible* waves result when a body is agitated by some force and consist of minute vibrations. They manifest themselves by their results, as in heat, light, and sound. If a tightly stretched wire or string, such as a piano wire or a violin string, is moved out of its position of rest momentarily, it is caused to move to-and-fro like a pendulum. This is true when the sides of a bell are struck. In either case sound waves are produced. The number of complete vibrations made by a vibrating body in one second is termed the *frequency of its vibration*, and the distance through which a wave moves in a given time is called the velocity. Sound waves travel in the air with the same velocity, whether they are the short waves which produce the shrill sounds, or the long waves which produce the grave tones. On the other hand, light is caused by a wave motion in the luminiferous ether, and heat is produced by the rapid to-and-fro motion of the molecules in a body.

Waves upon the surface of water result when

the particles are raised by the wind and the surface is quieted, or assumes a condition of rest, through the force of gravity. In deep water the liquid mass does not advance, but the movement up and down is a local vibration. Apparently the wave progresses, but this is true only of the form, and is similar to the apparent motion of the thread of a screw when it is turned. The distance between the crests of two succeeding waves is called a *wave length*, and the corresponding parts of two different waves are their *like phases*. Wave motion in some parts of the sea is very complicated. A *tidal wave* may be moving steadily toward the west, distant storms may cause waves to move upon it, and ripples from the breeze then blowing may diversify the surface. This causes what is known as the *interference of waves*. *Breakers* do not occur in deep water, but are due to friction on the bottom of the sea, the effect being to retard the base of the wave while the crest rolls forward until a break occurs. Tidal waves are not noticeable on the surface of the ocean, but in some places become extremely high, sometimes twenty to forty feet, especially where the current flows into an estuary or a narrowing inlet. The waves of the ocean, due to heavy winds, frequently rise to heights of forty feet above the general level.

WAX, a solid fatty substance allied to the fixed oils and fats, derived both from animal and vegetable sources. It differs from the fats in having greater hardness and a higher melting point. True wax contains no glycerin, does not dissolve in water, and gives off a bright flame in burning. The specific gravity is .96 and the melting point is 155° Fahr. When its temperature is raised to 86°, it may be molded into any form by the hand. The term wax was formerly restricted to beeswax, but it is now extended to various bodies possessing similar characteristics, found widely diffused on various parts of plants, as on the leaves of some species, in the pollen of some flowers, and in many kinds of fruits. *Beeswax* is the principal insect wax. It is the product made by the honey bee in building its honey cells. It is constructed of the sweet juices of plants and in a natural state has a light yellow color, but when separated from the honey and bleached it becomes a beautiful white. Beeswax was formerly an important product for making candles, but its use for that purpose has been quite largely replaced by stearine. Other means of lighting, such as mineral oil and electricity, have largely superseded it as a lighting agency. However, it is still used for that purpose, for models in

casting, for statues in museums, and for wax fruit and flowers.

The chief vegetable waxes include *myrtle*, or *bayberry*, *wax*, which is made from a thin coating on the berries of the bayberry tree, and the *palm wax*, obtained in Columbia as an exudation on the surface of the growing leaves of the carnauba palm. *Chinese wax* is a secretion deposited by an insect closely related to the lac, and is found as a white coating on the branches of several species of trees. It is a highly important article of trade in China and Japan, where it is utilized for medicinal purposes and candle making. *Cuba wax*, which is imported from Cuba, resembles Chinese wax. It is somewhat softer than beeswax and may be dissolved in warm ether and oil of turpentine. *Japanese wax* is obtained from the small stone fruits of several species of rhus cultivated in Japan. *Mineral wax* is a natural product and is employed in the manufacture of candles. It is found oozing in small quantities from rocks of coal formation, chiefly in California, Rumania, Austria, and Scotland. *Sealing wax* is a commercial product of importance, but is not properly a wax. Wax is employed to a considerable extent in making figures in imitation of sculptures, especially those of human beings. Many of these figures are life-size and in appearance rival living persons.

WAX PALM, a species of trees native to Colombia, which is noted for its secretion of a resinous substance, composed of one part of wax and two parts of yellow resin. These trees grow at elevations ranging more than 3,000 feet above the sea and attain a height of 150 to 175 feet. The resinous secretion covers the trunk, but is found more or less abundantly on the leaves, and is obtained by felling the tree. A large tree yields twenty to thirty pounds, obtained by scraping. The wax is used extensively in making candles and is known in the market as *Brazilian wax*, *carnauba*, or *palm wax*. Several allied species of trees are native to Brazil, Peru, Bolivia, Venezuela, and other sections of the Andean highlands.

WAX PLANT, a class of plants of the milkweed family, so called from the waxlike appearance of the flowers and leaves. Most of the species are climbing plants, throwing out aerial rootlets. The leaves are opposite and fleshy and the flowers are sweet scented, growing in dense umbels. Several species are highly prized as house plants. The honeysorts and begonias belong to this class of plants. They take root readily and are easily cultivated in windows.

WAXWING, a class of birds native to North America and Europe, so named from the secondary wing feathers and the tail feathers being tipped with horny appendages resembling red or yellow sealing wax. The plumage is mainly brown and the head is decorated with an erectile crest. Most species are remarkable for their irregularity in migrating. Though all are birds of passage, they seldom visit the same summer quarters or winter retreats. Two species are native to North America, which some writers class with the flycatchers and others are classed with the chatterers. The *cedar bird* is a familiar North American species, but it is somewhat smaller than the waxwing proper. The *Bohemian waxwing* is the most widely diffused of the European species, visiting Northern Europe in the spring and migrating to Northern Africa and Southern Europe in autumn. It has a weak, whistling song and is easily tamed. The food consists of berries and insects.



COMMON
WAXWING.

WAYCROSS (wā'krōs), a city in Georgia, county seat of Ware County, 60 miles west of Brunswick, on the Atlantic Coast Line and the Atlanta and Birmingham railroads. The surrounding country is heavily timbered and produces live stock, cereals, and tobacco. Among the features are the county courthouse, the high school, and many fine churches. The manufactures include cigars, smoking tobacco, earthenware, and machinery. It has a system of sanitary sewerage, telephones, and waterworks. Population, 1900, 5,919; in 1910, 14,485.

WAYNESBORO (wānz'būr-ō), a borough of Pennsylvania, in Franklin County, 48 miles southwest of Harrisburg, on the Western Maryland and other railroads. It is important as a manufacturing and commercial center. Among the chief products are flour, pottery, furniture, machinery, engines, farm and dairy implements, and fertilizers. It has a number of fine schools, several academies, and numerous churches. Waynesboro, being located near South Mountain and Antietam Creek, was on the route of the Confederate army when passing to Gettysburg. Population, 1900, 5,396; in 1910, 7,199.

WEALTH, a collective term employed in common speech to designate riches, such as a large possession of money, goods, or lands. It is used in political economy to describe such objects as have utility and can be exchanged. Most writers apply a threefold test in determining

whether commodities should be classed as wealth. They are utility, difficulty of attainment, and transferability. All objects having these three essential characteristics are classed as wealth. Although many others may have value, they are not regarded wealth in an economic sense. Thus air, health, and time, though highly essential, are not wealth in an economic sense, while wheat, houses and land are classed as wealth. Some writers speak of skill, intelligence, and all mental and physical habits that facilitate the production of wealth as *immaterial wealth*, while all the objects answering to the threefold test stated above are classed collectively as *material wealth*. Since material wealth can be passed from one person to another, it is implied that one can have a right of property in it, that is, one may own it. Labor is the only source of wealth, and by it alone can be increased the individual and national wealth. See **Capital**.

WEASEL (wē'z'l), a group of quadruped mammals of the Northern Hemisphere, which includes a number of widely diffused species.



WEASEL IN SUMMER.

The body is slender, usually about eight inches long and three inches high, and the back generally is much arched. The tail is about three inches long, the legs are short, the ears are small and rounded, and the fur is fine and close. When irritated or alarmed, they emit a disagreeable odor. Most species are reddish-brown above and pure white underneath, and those in cold regions turn completely white in winter. The common weasel is native to the region extending from the Atlantic Ocean to Nebraska and northward. They feed on rats, mice, moles, and small birds. In some regions they are a pest to poultry. Not only can the weasels pur-

sue their prey through very small holes and crevices of rocks, but they are able to climb the trunks and branches of trees with rapidity and swim with perfect ease and safety. Their fur is highly valuable in making wearing apparel. They build their nests of herbage and dried leaves or in a hollow tree, where they rear four to six young, which the mother defends with much devotion. An American species known as the *fisher weasel* is about two feet long. The *bridled weasel* of Texas and Mexico is distinguished by several white spots on the head. The polecat, sable, ferret, ermine, mink, marten, skunk, otter, and stoat are allied animals.

WEATHER BUREAU, an organization maintained by the government for making meteorological observations, predicting weather and storms, and reporting atmospheric phenomena for the benefit of mankind. Bureaus of this kind are supported by the leading governments of the world. They have been the means of obtaining much useful information in regard to the occurrence of rainfall, frost, floods, storms, and other phenomena of the weather which materially affect industry. Observations of this kind have been made and reported in the United States since 1818, when meteorological reports were first issued by the surgeon-general of the army, but the weather bureau as now organized dates from 1891, when the organization was made a part of the Department of Agriculture. Canada, Great Britain, Germany, Japan, and France likewise have weather bureaus of a very high class.

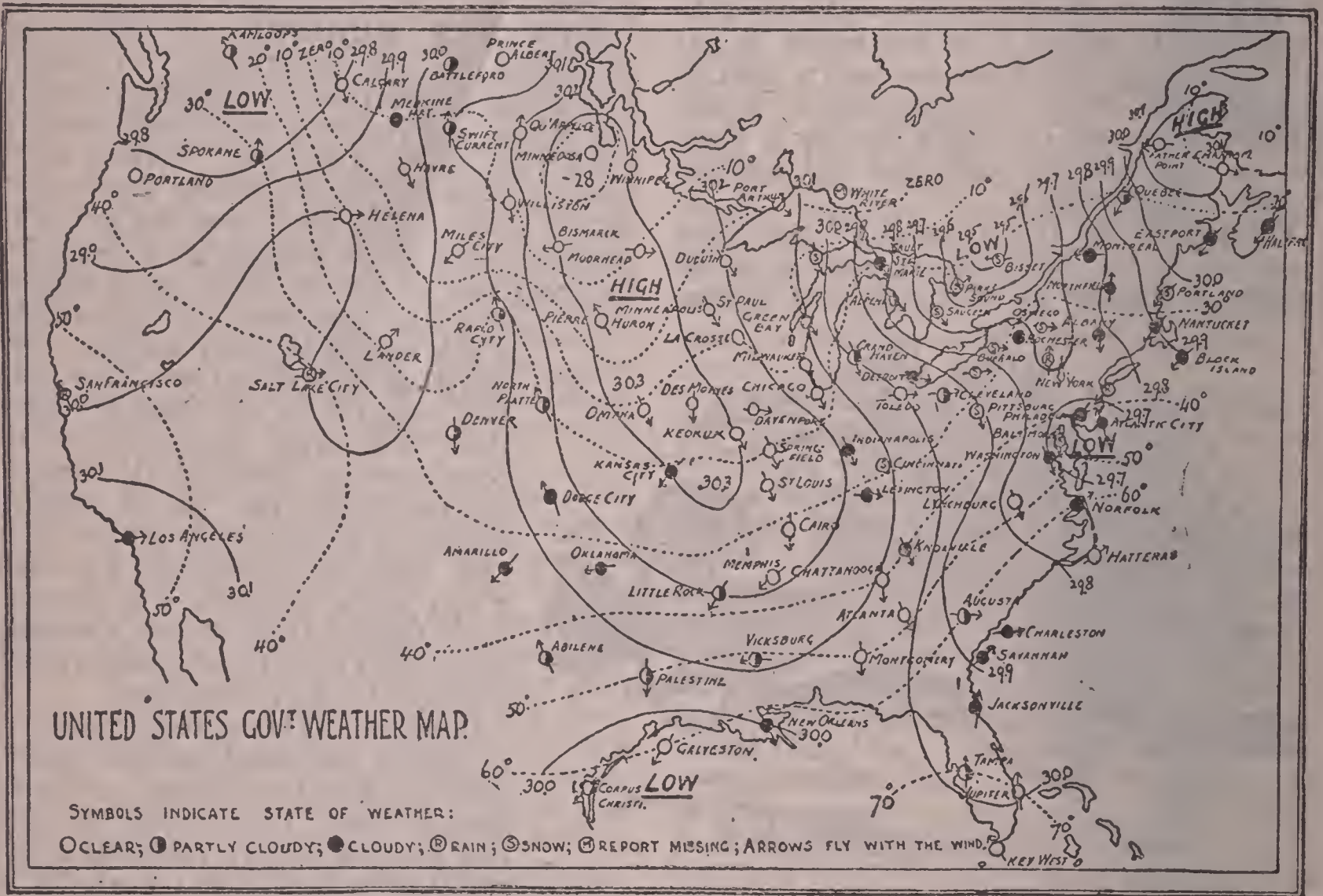
DIVISIONS. The weather bureau as at present organized includes several divisions that have charge of special lines of duty. For instance, the *forecast division* gathers information and makes predictions as to the weather at definite times* each day. These forecasts are based upon reports received daily from the stations which are distributed in all parts of the country. They cover a period of from 20 to 48 hours and are sent out in the form of *weather maps*, or *charts*. The weather bureau of the United States sends daily weather forecasts to more than 2,250,000 addresses. Most of these are reached by telephone without expense to the government, but a large number are reached by mail, by train service, and by railroad telegraph. The *division of climate and crops* reports data in regard to rainfall, temperature, and other climatic conditions which affect the agricultural and other interests. The *division of river and*

flood service obtains and distributes information relative to rain, snow, ice, and other phenomena which may stimulate or retard navigation and commerce. Other divisions include those of *publications, supplies, and records*. The *Monthly Weather Review*, which is issued regularly by the bureau, is an official publication for distributing information of value to farmers and stock raisers. It is sent free upon application to any one who may be interested in receiving reports at stated times.

FORETELLING THE WEATHER. A system of rules has been adopted for use with aneroid barometers. These rules have special reference

indicates stormy weather. In winter, when the fall is accompanied with dry air and increasing cold, it is liable to snow. A fall after very calm and warm weather indicates rain with squally weather. The rules in general use are quite elaborate, but those indicated are examples of the more important ones.

UTILITY. Actual experience has demonstrated the utility of a well organized and conducted weather bureau service. Regular reports are received daily by telegraph, at 8 A. M. and 8 P. M., and the forecasts are based upon these for the next 36 hours. These telegrams are sent from all parts of the country, being forwarded



to a steady barometer, a rising barometer, and a falling barometer. A *steady barometer*, when the weather is dry and the temperature is seasonable, indicates a continuance of very fine weather. A *rising barometer*, when rising rapidly, indicates unsettled weather, while a gradual rise indicates settled weather. A rise with dry air and cold increasing in summer indicates wind from the northward, but, if rain has fallen, better weather may be expected. Southerly winds accompanied by a rise indicate fine weather. A rise with moist air and a low temperature indicates wind and rain from the northward. A *falling barometer*, when rapid,

by thousands of voluntary and special observers. After they are tabulated with much care, they are prepared for publication in newspapers and to be sent out on postal cards and by telegraph. Signals based upon these reports are displayed upon the principal government buildings and elsewhere in many parts of the country. In this way much profit has been obtained by those who are interested in commercial enterprises, since they may modify their plans so as to be less unfavorably affected by severe atmospheric conditions, or may take advantage of favorable prospects. See **Signals**.

WEATHERFORD (wĕth'ĕr-fĕrd), a city of

Texas, county seat of Parker County, situated in a farming and stock-raising region, 65 miles west of Dallas. It is on the Texas and Pacific, the Gulf, Colorado and Santa Fé, and other railroads. The noteworthy buildings include the county courthouse, the high school, the Saint Joseph's Academy, the Weatherford College, and the Texas Female Seminary. Among the industries are grain elevators, cotton gins, flouring mills, potteries, stock yards, and machine shops. It has a growing trade in merchandise and farm produce. Population, 1910, 5,074.

WEAVER BIRD, a class of birds of the finch family, which are native to the warmer climates. They are noted for their habit of



WEAVER BIRDS AND SOCIAL WEAVER BIRD'S NESTS.

hanging a closely woven nest in the form of a pouch from the branches of trees. About 250 species have been described by naturalists. They are more or less widely distributed in Australia, Africa, and Asia. Some weaver birds build their nests singly, but most species unite in communities and occupy a large structure in common. The *social weaver birds* of Africa belong to the latter class, their nests being built under a common overhanging roof, which all of a group unite to construct, but afterward

each pair completes its own nest. Several hundred separate nests are often built after this manner, and they are usually constructed on trees which are difficult to reach by intruders. The individual nests form separate compartments and are entered by different passages. Some species build single, pouchlike nests, containing one compartment, which they enter from below, and to secure protection against monkeys, snakes, and squirrels suspend them from small branches hanging over water. The *Philippine weaver bird* is native to Southeastern Asia and the *paradise weaver bird* is found in India. The latter is one of the most beautiful and the largest of the species. Its general color is black, with markings of orange of various shades. It is a favorite cage bird, being noted for its beautiful plumage and delightful song.

WEAVING (wēv'ing), the art of interlacing threads of different kinds, such as silk, wool, or cotton, thus forming a woven fabric. The loom is the frame or machine employed in weaving, and in its simpler form has come down to us from the nations of antiquity. Though clothing was first made of the skins of animals and of the leaves of trees, it is evident that spinning and weaving were practiced in the Stone Age of man. Evidences of this have been found in the lake dwellings of Switzerland, where spindle whorls and fabrics of flax were secured from among the remains. Weaving is represented in the sculptures on Egyptian tombs at Thebes. Women and slaves were highly skilled in hand weaving in ancient Phoenicia and Greece.

Although the hand looms of the ancients were everywhere rude, they turned out excellent fabrics, many of them equal to the best made at the present time. The chief objection to the hand loom was that too much time was consumed in turning out the product, hence the improvement and invention of the power loom became an important subject for study. Weaving was not developed in England until in 1732, when a number of weavers settled there from the continent, and Charles Wyatt, of Birmingham, in 1738, patented a machine for spinning by means of rollers. In 1784 Cartwright invented the power loom, but it has been successively improved and other machines have been invented by which weaving has become a rapid process under the application of steam and electric power.

In all kinds of weaving, whether plain or figured, two sets of threads are employed, which traverse each other at right angles in the web. The one set of threads is called the *woof*, or *weft*. They are made to pass alternately under

and over the other system of threads called the *web*, *warp*, or *chain*. In weaving fabrics of any kind the warp threads are fastened in the loom, the number used depending on the fineness and width of the cloth. The woof or cross threads are wound on bobbins or spools and are placed in a shuttle. The warp threads, being stretched in the loom, are acted on by a movement that lifts and lowers alternate threads, thus allowing the shuttle to pass from side to side between the two sets of threads. When the woof thread has been carried between the warp threads, the lower threads are raised and the upper threads are lowered, after which the shuttle is returned. In this manner the shuttle consecutively carries the woof thread to and fro until the entire piece of cloth is completed. The shuttle is moved by hand in the hand looms and the threads are alternated by the action of the foot, but in power looms all the movements are by machinery.

Plain weaving consists of alternating every other warp thread. Besides this common method, many other kinds of weaving may be mentioned, such as taking up one thread and leaving two or three, interlacing to form a double cloth, and pile weaving. The last named process is employed in making velveteens, velvets, and Turkey carpets. It consists of leaving pile warps above the surface in the form of loops, which are afterward cut by an attached mechanism to form the pile. Many other forms of weaving are utilized, such as are used in producing figured goods, and in interweaving different kinds of threads and threads of various colors. Weaving is applied in a more or less modified form in making cotton and woolen textiles, ribbon, carpet, silk goods, tapestry, damask, and velvet.

WEBB CITY, a city of southwestern Missouri, in Jasper County, eight miles west of Carthage, on the Missouri Pacific and the Saint Louis and San Francisco railroads. It has a growing trade in cereals, minerals, and fruits. The features include the high school, the public library, and many fine churches. The surrounding country contains deposits of zinc and lead, which minerals are mined profitably. The improvements include sanitary sewerage, street pavements, waterworks, and several parks. Fruit gardens and orchards are profitable in the vicinity. Population, 1900, 9,201; 1910, 11,817.

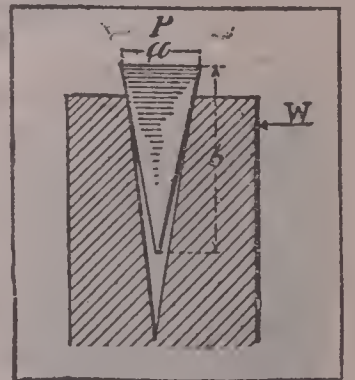
WEBSTER (wĕb'stĕr), a town of Massachusetts, in Worcester County, on the French River, fifteen miles south of Worcester. It is on the Boston and Albany and the New York, New Haven and Hartford railroads. Among the features are the high school, the public library,

the townhall, a number of large business blocks, and many fine churches. The industries produce clothing, cotton and linen goods, woolens, hardware, shoes, and machinery. It has well graded and paved streets, waterworks, and a large local trade. The place was incorporated in 1832. Population, 1900, 8,804; 1910, 11,500.

WEBSTER-ASHBURTON TREATY. See *Ashburton Treaty*.

WEBSTER CITY, a city of Iowa, county seat of Hamilton County, 72 miles north of Des Moines. It is situated on the Boone River and on the Illinois Central and the Chicago and Northwestern railways. The surrounding country produces large quantities of cereals and live stock. Among the chief buildings are the county courthouse, the Kendall Young Library, the Jacob Funk Hospital, the city high school, and a number of fine churches. It has manufactures of cigars, canned goods, clothing, and machinery. Brick pavements, waterworks, and sanitary sewerage are among the public utilities. The first settlement in the vicinity was made in 1857. Population, 1905, 4,797; in 1910, 5,208.

WEDGE, one of the simple mechanical powers, being a modified form of the inclined plane. In the wedge the plane is moved under the weight, instead of moving the weight up the plane. It is used for splitting wood or stone, in lifting vessels in the dock, and in pressing oils or juices from seeds. Two classes of the wedge are in use, the single wedge and the double wedge. The latter is the more common type and is shown in the illustration. The force of a wedge is very great, since it is driven into position with a hammer or sledge. Axes, nails, pins, and knives are made on the principle of the wedge.



DOUBLE WEDGE.

WEDNESDAY (wĕnz'dā), the fourth day of the week, named from Woden or Odin, the chief Scandinavian deity. According to an old superstition, Wednesday was considered neither particularly lucky nor dangerous.

WEEDS, the general name applied to plants that are troublesome in cultivated grounds, owing to their persistence and rapid growth. Many weeds are obnoxious because they take up the fertility of the soil which should be utilized in supporting the cultivated plants, and in some cases they suppress the useful variety. Others are injurious to stock, or produce seed that decreases the value of cereals when mixed with them. The *cocklebur*, *morning-glory*, *milkweed*,

Canada thistle, and *Russian thistle* are obnoxious weeds that are difficult to destroy even by careful cultivation. *Foxtail* is a widely distributed weed, but it is not particularly injurious, unless it is permitted to grow so densely that it will smother the cultivated plants. *Burdock* is a deeply rooted plant that is difficult to destroy. *Wild mustard* and *dandelion* are classed with the obnoxious weeds, but the last mentioned is cultivated for its flowers in some localities. In general it is best to cultivate the ground carefully at or before the time of seeding, since it is much easier to keep the ground clean than to destroy the weeds after they have become firmly rooted. Where weeds are permitted to mature from year to year, they fill the ground with seeds, thus making it more difficult and undesirable for cropping. Fields in this condition are greatly benefited by seeding with clover, timothy, or other useful grasses.

WEEK, the space of seven consecutive days, especially the cycle beginning with Sunday, the first day of the week, and ending with Saturday, the last day. The week has been in use in eastern countries for reckoning time since prehistoric times, but was not introduced into the Roman calendar until after the reign of Theodosius, in the 4th century A. D. It is probable that the week was first instituted as a division of the periodical month, corresponding to the four quarters of the moon, or about seven and three-eighths days. The days of the week were named from the astrological notion that each of the seven heavenly bodies best known to the ancients had a modifying influence on the days according to the distance from the earth, and each body was regarded as presiding over an hour of the day. Hence, the Roman week was divided into seven days. These days were named in order from the sun, the moon, Mars, Mercury, Jupiter, Venus, and Saturn. The Jews and the early Christians applied no special names to the different days, but counted from the previous Sabbath; thus, Sunday was the first after the Sabbath, Monday the second, etc.

The Latin nations still retain the names derived from the Roman deities, but in the Germanic languages they have been replaced by names taken from those of the corresponding Germanic deities, except Sunday, Monday, and Saturday, these being still named after the sun, moon, and Saturn. Tuesday is named from Tyr, as the equivalent of Mars; Wednesday from Woden, for Mercury; Thursday from Thor, for Jupiter; and Friday from Freya, for Venus. The Society of Friends designates the days by their numbers, beginning with Sunday, as First-day, Second-day, etc. Both Jews and Arabs

count the day as beginning and ending with sunset. The Jews and many Christians keep Saturday as the Sabbath, while the Mohammedans observe Friday.

WEEVER (wē'vēr), or **Stingfish**, a class of small marine fishes found off the coasts of Europe, noted for the unpleasant wound they are able to inflict by the sharp dorsal spine. The weevers belong to a family of spiny-rayed fishes. They have a long body with two dorsal fins, a covering of very small scales, and a greatly compressed head. Wounds inflicted by the dorsal and opercular spines are very painful, owing to the mucous secretion being somewhat poisonous.

WEEVIL (wē'v'l), an extensive genus of insects, which are distinguished by having the head elongated into a long snout or rostrum, bearing the mouth parts at the end and the antennae at the sides. The various species are widely diffused and in the larval form are often highly destructive to roots, leaves, and fruits. Some species lay their eggs on the leaves of trees and afterward cut the leafstalk partly through, thus causing it to fall to the ground. The young insect feeds upon the leaves until sufficiently developed to bury itself in the ground, where it remains in the chrysalis state until the return of spring. Other species, such as the *plum weevil*, or *curculio*, attack pears, plums, cherries, grapes, peaches and apples. They lay their eggs in an opening made in the fruit by a small sting when it is quite small and, when the grub or larva is hatched, it eats its way into the stone or center of the fruit, thus causing it to fall from the tree. In this way access is obtained to the ground, which is entered by the larva, and the developed insect soon makes its appearance.

The best known species of these insects include the *corn weevil*, *boll weevil*, *bean weevil*, *grain weevil*, *nut weevil*, *rice weevil*, *grape weevil*, *palm weevil*, *clover weevil*, and *pine weevil*. All these species are more or less destructive to fruits, grains, and nuts. The *pine weevil* infests the pine forests of temperate and warm climates, often stripping those trees of their leaves. The *pear weevil* in a similar manner infests the pear tree. Turnips are subject to ravages by weevils. Though the species attacking those vegetables are quite small, they feed on both the leaves and the roots. It has been found that the best security against many species of weevils is obtained by protecting the birds that feed upon their larvae, but certain species attacking fruit may be destroyed by careful application of chemicals. See **Insects**.

WEIGELIA (wī-gē'lī-à), an ornamental plant

of the honeysuckle family, which is widely cultivated for its profuse flowers. Several species are native to China and Japan, whence they were brought to North America, but a number of species are indigenous to America. They are bushy shrubs, growing to a height of five to six feet. The leaves are oval and taper to a point. In most species the flowers are funnel-shaped and usually are white or pink in color. The *Rocky Mountain Weigelia* is a bush about four feet high and the *southern bush honeysuckle* has sessile leaves, the stalk growing about four feet high. These plants are less showy than those native to China.

WEIGHING MACHINE, a mechanism used to ascertain the weight of bodies. Since weight is the result of the attraction of gravitation upon a body, an object or body does not have the same weight on all parts of the earth's surface, owing to the fact that the force of gravity decreases as the square of the distance from the center of the earth increases. Weight is least at the Equator, since the earth bulges and centrifugal force is strongest at that place, and it is greatest at the poles, because the earth is flattened and centrifugal force is not a factor at those regions. A mass of iron which weighs 1,000 pounds at the Equator would weigh 1,005 pounds at either of the poles. The same mass would weigh 500 pounds at a point 2,000 miles below the surface of the earth and at an elevation of 1,650 miles above it, and the weight on the surface of the sun would be 28,000 pounds. However, the term weight in ordinary use does not imply the absolute heaviness of a body, but rather its heaviness as compared to a piece of metal which is taken as a standard. It will be seen from this that it is quite necessary to have a standard of weight, which is ascertained by an arbitrary rule, and the weighing is done at the same place and under the same conditions.

The *platform scale* is the most common weighing machine to ascertain the weight of large quantities. It makes use of a number of levers, all of which are connected with the last lever of the series, or principal lever, and this is connected by a long arm with the short arm of the weighing beam. Several weights of different denominations are fitted to be suspended from the weighing beam, which is also furnished by a sliding weight to balance the scales. Thaddeus Fairbanks of Vermont patented such a weighing machine, in 1831, and since then numerous modifications and improvements have been made. Weighing machines based on the principle of *even balance* are used to a considerable extent. These consist essentially of a beam balanced upon a pivot, and the object to be weighed is

placed on one end while a weight is placed on the other extremity of the beam. Usually each end of the beam has a pan for receiving the weights or the objects to be weighed, and in some forms a side beam is utilized, as in many scales used by grocers. The *steelyard* and the *torsion balance* are other forms of instruments for weighing.

WEIGHTS AND MEASURES, the means employed to ascertain exact quantity. It is necessary to have systems to compare and express mass, or quantity, as a means of effecting the exchanges which are involved in commerce, and they are likewise indispensable in the arts and sciences. All governments maintain standards of such systems and the standard units are securely preserved at the capitals. The standards now in use have been chosen arbitrarily, though in particular cases some natural rule has been followed in determining the value of the units. This may be seen from the fact that the average length of the foot, twelve inches, was made the basis of the foot among the Greeks. On the other hand, the cubit of the Jews and the Egyptians was established upon the average length of the fore arm. A law in England, passed in 1266, made 32 grains of wheat taken from the middle of the ear the basis of the English penny, while 20 pence were declared to be an ounce, 12 ounces a pound, and 8 pounds a gallon of wine. A London bushel contained 8 gallons of wine.

Apothecaries' weight is used in buying and selling medicines by prescriptions, but *avoirdupois weight* is employed when the drugs are not ordered by prescription. All goods are bought and sold by avoirdupois weight, except for which *troy* and *apothecaries' weight* are used. The *short ton* of 2,000 pounds is used commonly in the United States, while the *British* or *long ton* is employed to some extent in that country and almost exclusively in Great Britain. The latter contains 2,240 pounds, corresponding to a cwt. of 112 and a quarter of 28 pounds. The common standard of weight by which the relative value of these systems are compared is the grain, which for this purpose may be regarded as the standard of weight. Both the pound troy and that of apothecaries' weight have each 5,760 grains, while the pound avoirdupois has 7,000 grains. Below are tables of the three systems of weight mentioned:

APOTHECARIES' WEIGHT.

Lb.	Oz.	Dr.	Scr.	Gr.
1	12	96	288	5,760
	1	8	24	480
		1	3	60
			1	20

AVOIRDUPOIS WEIGHT.

Gross or Long Ton.	Cwt.	Qr.	Lb.	Oz.	Dr.
1	20	80	2,240	35,840	573,440
	1	4	112	1,792	28,672
		1	28	448	7,168
			1	16	256
				1	16
Short or Net Ton.	Cwt.	Qr.	Lb.	Oz.	Dr.
1	20	80	2,000	32,000	512,000
	1	4	100	1,600	25,600
		1	25	400	6,400
			1	16	256
				1	16

TROY WEIGHT.

Lb.	Oz.	Dwt.	Gr.
1	12	240	5,760
	1	20	480
		1	24

7,000 troy grains =	1	lb. avoirdupois
175 troy pounds =	144	lb. avoirdupois
175 troy ounces =	192	oz. avoirdupois
437½ troy grains =	1	oz. avoirdupois
1 troy pound =	.8228+	lb. avoirdupois

WEIMAR (vī'mär), a city in Germany, capital of the grand duchy of Saxe-Weimar, fifty miles southwest of Leipzig. It is beautifully situated on the Ilm River and has good railroad facilities, connecting it with the leading trade centers of Germany. The streets are finely improved by pavements, electric lights, gardens, and parks. It has systems of public waterworks and electric street railways. The most prominent buildings include the public library, with 225,000 volumes, the grand ducal palace, the Gothic townhall, the court theater, the Goethe museum, the Schiller house, and many fine schools and churches. Weimar is noted as the home of Schiller, Herder, Goethe, Wieland, and Lucas von Cranach (1472-1553), an eminent painter.

Among the adornments of the city are splendid monuments to Wieland, Schiller, Herder, and Goethe, and the last three mentioned writers were buried there. Tourists find the houses occupied by a number of these writers objects of special interest, including a number of rooms of the ducal palace, which has fine decorations and frescoes illustrating scenes from the works of these authors. Weimar has a number of manufactures, including pottery, porcelain, clothing, scientific instruments, and chemicals, but its trade is of a local character. Nearly all the inhabitants are Protestants. Population, 1905, 31,117.

WELDING (wēld'ing), the process by which two pieces of the same metal, at a suitable temperature, are made to unite permanently. Welding is confined chiefly to such metals as iron and platinum, but many other substances can be welded with facility, such as glass, horn, and tortoise shell. However, iron and steel are the only metals that are welded extensively in the arts. The process consists of cleaning the ends of the bars to be welded, when they are brought

to a white heat, whereby they are softened. To prevent the formation of oxide, a quantity of borax, or some other flux, is put upon them. Having been brought to this suitable condition for welding, the heated ends are placed together and hammered, by which they are caused to unite so as to form sensibly but one mass, showing no appearance of the junction. Welding is done extensively in the larger shops by electricity. The heat is obtained by passing a strong electric current through the pieces of metal that are to be joined. By this process it is possible to weld copper quite as easily as iron. Pressure applied to two pieces of lead with fresh surfaces will cause them to adhere with considerable force. Powdered graphite in a dry condition may be consolidated into a coherent mass by great pressure, and the union is so complete that it may readily be cut into strips for use as lead pencils.

WELL, a deep hole of small diameter sunk into the earth for the purpose of obtaining various substances, such as water, natural gas, or petroleum. Wells for water are usually dug by hand with a spade where water is desired at no great depth, usually from ten to sixty feet. If water cannot be obtained at reasonable depths by digging, the wells are then made by boring or drilling. A well bored for water may be from six inches to two feet in diameter, but generally not more than 150 feet in depth, and the inside casing usually consists of ordinary well tile. On the other hand, drilled wells are frequently put down to great depths and usually range from 100 to 3,000 feet. They are cased in the inside with piping to prevent caving and pumps used in such wells are protected by screens. In most instances wells of this kind are lined with a casing that serves for the pump itself.

The machinery used in sinking wells by boring and drilling consists chiefly of a derrick, usually from thirty to seventy feet in height; a machine for boring or drilling, which consists of bits and drills to suit the size wanted; and a windlass for lowering and raising the drill. The machinery is operated either by horse or steam power, and steam or gasoline engines are usually employed where the well is to have considerable depth. In boring a well, the auger is turned by the engine or power acting upon the main rod, and, when the auger is filled with earth, it is raised by the windlass to be cleaned, after which it is again lowered for boring. Drilling is the only method by which wells can be sunk where the strata are hard and the depth is considerable. For this purpose a so-called *diamond drill* is used, with which it is possible to penetrate any

rock, no matter how hard. Drills of this kind are generally used in prospecting for coal, iron ore, petroleum, and precious metals.

WELLAND (wĕl'land), a river of Canada, in the Province of Ontario. It rises in southern Ontario and, after an easterly course of sixty miles, flows into the Niagara River a short distance above Niagara Falls. The Welland River is important for the reason that it is joined with the Welland Canal, thus forming a part of the system that passes around Niagara Falls and connects the navigation of Lake Ontario with that of Lake Erie. This canal is 15 feet deep, 160 feet wide, and 27 miles long. It has a total lift of 327 feet, which is possible by 25 locks. The town of Welland, capital of Welland County, is situated on the Welland Canal, near the Welland River, about twelve miles south of Saint Catharines. It is on the Grand Trunk, the Wabash, and the Michigan Central railroads. The place has a large trade in lumber and produce. It has manufactures of flour, machinery, and lumber products. Population, 1908, 3,248.

WELLESLEY (wĕlz'li), a town in Norfolk County, Massachusetts, fifteen miles west of Boston, on the Boston and Albany Railroad. It is an attractive place, being well situated and improved by gardens, parks, and modern municipal facilities. The leading features include the Wellesley College, the Dana Hall, the Rockridge Hall, and the public library. It has systems of public waterworks and sanitary sewerage. Population, 1905, 6,189; in 1910, 5,413.

WELLESLEY COLLEGE, an institution for the higher education of women, founded at Wellesley, Mass., by Henry Fowle Durant. It was established "for the purpose of furnishing to young women who desire to obtain a liberal education such advantages and facilities as are enjoyed in institutions of a higher class." It was incorporated by the Legislature of Massachusetts in 1870, was opened for students in 1875, and the first degrees were conferred in 1879. Situated in the beautiful town of Wellesley, 15 miles from Boston, endowed with extensive grounds which are diversified by hill, meadow, and lake, the institution combines the advantages of free and healthful country living with those which come from proximity to a great literary, artistic, and social center. It has two large halls of instruction and residence, nine smaller dormitories, a chapel, an art building, a music hall, a chemistry laboratory, an observatory, and several society houses and other buildings. The institution has no separate schools, but offers two courses, the undergraduate course leading to the degree of B. A. and the graduate course leading to the degree of M. A. It is affiliated

with several institutions in Europe, including the zoölogical station at Naples and the American School of Classical Study at Athens and Rome. The faculty embraces 100 instructors and professors and the attendance is about 1,200 students. It has a library of more than 61,500 volumes.

WELLINGTON (wĕl'ling-tŭn), the capital of New Zealand, situated near the southern extremity of North Island, on Cook Strait. It has an excellent harbor and extensive steamboat and railway connections. The streets are spacious and well graded and paved. Among the chief buildings are the city hall, the customhouse and post office, the parliament building, the public library, Masonic Temple, and two fine cathedrals. It is the seat of Victoria College, which is affiliated with the University of New Zealand, and has several parks and botanical gardens. The manufactures include flour, leather, soap, boots and shoes, sailing vessels, vehicles, earthenware, preserved meat and fish, clothing, and machinery. It has a growing trade in cereals, coffee, live stock, and merchandise. The first settlement of New Zealand was made near Wellington in 1839. Population, 1908, 70,947.

WELLSTON (wĕlz'tŭn), a city of Ohio, in Jackson County, about 100 miles east of Cincinnati, on the Detroit Southern, the Baltimore and Ohio Southwestern, the Cincinnati, Hamilton and Dayton, and other railroads. The surrounding country is farming and fruit growing. It produces coal and commercial clays. The chief buildings include the public library, the high school, and several fine churches. Among the manufactures are hardware, cigars, earthenware, flour, and machinery. Electric railways, street pavements, waterworks, and sanitary sewerage are among the improvements. It was settled in 1871 and incorporated in 1876. Population, 1900, 8,045; in 1910, 6,875.

WELLSVILLE, a city of Ohio, in Columbiana County, 38 miles north of Wheeling, W. Va. It is situated on the Ohio River, 48 miles below Pittsburg, and is on the Pennsylvania Railroad. Coal and fire clay are obtained in the vicinity. It has manufactures of brick, pottery, hardware, flour and grist, leather belting, and machinery. Electric lighting, waterworks, and sewerage are among the public utilities. It has a public library, a fine high school, and several well-built churches. Population, 1900, 6,146; 1910, 7,769.

WELWITSCHIA (wĕl-wich'ĩ-à), a plant found in the desert regions of South Africa. It was so named from Friedrich Welwitsch (1806-1872), a German botanist. The plant is represented by a single species, which somewhat resembles a giant radish. The stem is not more

than two or three feet high, but develops so as to be as much as twelve feet in circumference. Two long and leathery leaves spring from the main root, and these frequently become torn and dry, but no other leaves appear. However, short flower stocks spring from the base of these leaves from year to year. Botanists estimate that some of these plants subsist for more than a century.

WENER (vā'nēr), or **Vener**, the largest lake in Sweden, which is next in size to lakes Onega and Ladoga in Russia, hence it is the third lake of Europe. It is situated 150 miles southwest of Stockholm. The elevation above the sea is 150 feet and its greatest depth 310 feet. The lake is 90 miles long, is from 10 to 50 miles wide, and has an area of 2,010 square miles. It receives the overflow from several smaller lakes and the outlet into the Cattegat is by the Göta River. The lake has fine fisheries and in its vicinity are valuable forests. A canal connects it with Lake Wetter. It has canal connections with the Baltic Sea and the Cattegat.

WERWOLF (wēr'wulf), or **Werewolf**, a man who was supposed to be able to convert himself into a wolf. It was an old superstition of many countries, especially among Germanic and Scandinavian peoples, that such persons existed. A werwolf, while in the form of a wolf, was supposed to possess all the powers and appetites of that animal. He was thought to be particularly fond of human flesh, hence he was much dreaded by the ignorant and superstitious. The belief in beings of this kind spread to Ireland, where it was thought that men existed who were not of one skin. Later the belief in werwolves was carried to France. In the latter country it was supposed that these beings carried off children.

WESER (vā'zēr), a river of Germany, which is formed by the Fulda and Werra rivers a short distance southwest of the Hartz Mountains, and, after a course of 260 miles toward the northwest, flows into the North Sea. A canal connects it with the Elbe. Bremen and Bremerhaven are the chief cities on its banks. The tributaries include the Aller and Hunte.

WESLEYAN UNIVERSITY, an institution of higher learning at Middletown, Conn., established under the patronage of the Methodist Episcopal Church in 1829. A class of six students graduated from the institution in 1833, and it takes rank as the pioneer college of that denomination in America. The courses include classics, sciences, theology, philosophy, and literature. Though coeducational, the number of women admitted in any year is limited to twenty per cent. of the enrollment for the pre-

ceding year. The value of the property is placed at \$2,500,000. It has a library of 65,000 volumes, a faculty of 40 instructors, and an attendance of 350 students.

WEST BAY CITY, a city of Michigan, in Bay County, five miles south of Saginaw Bay, on the Detroit and Mackinac, the Grand Trunk, and the Michigan Central railroads. It is finely situated at the mouth of the Saginaw River. Across the river is Bay City, with which it is connected by several bridges. The features include the public library, the high school, and many large business blocks. Among the manufactures are ironware, furniture, machinery, clothing, salt, lumber products, and sailing vessels. The city is lighted by gas and electricity, has an extensive system of street railways, and is the center of a large interior and lake trade. It has public waterworks, street pavements, and sewerage. Population, 1904, 12,997.

WESTBORO (wĕst'būr-ō), a town of Massachusetts, in Worcester County, 12 miles east of Worcester, on the Boston and Albany Railroad. It has a number of fine public schools, the Lyman Reform School, a public library, and a hospital for the insane. The manufactures include automobiles, clothing, machinery, boots and shoes, earthenware, and rubber goods. It has electric lighting and municipally owned waterworks. The first settlement in its vicinity was made in 1659, when it became known as Chauncy, and was incorporated as a town in 1717. Population, 1905, 5,378; in 1910, 5,446.

WESTBROOK (wĕst'brōok), a city of Maine, in Cumberland County, at the junction of the Stroudwater and Presumpscot rivers, six miles northwest of Portland. It is on the Maine Central and the Boston and Maine railroads. Among the noteworthy buildings are the public high school, several parochial schools, a number of fine churches, and the Walker Memorial Library. The chief manufactures are silk and woolen textiles, paper, clothing, and machinery. It has waterworks, street pavements, and electric railroad connections with Portland. The trade is largely in cereals, manufactures, and merchandise. It was incorporated as a town in 1814 and became a city in 1891. Population, 1900, 7,283; in 1910, 8,281.

WEST CHESTER (chĕs'tēr), a city in Pennsylvania, county seat of Chester County, 27 miles west of Philadelphia, on the Pennsylvania and the Baltimore and Washington railroads. It is surrounded by a fertile farming and dairying region. The noteworthy buildings include the county courthouse, the public library, the Chester County Hospital, the Friends' School, the Turk's Head Hotel, the Darlington Semi-

nary, and the West Chester State Normal School. Marshall Square contains a botanical collection. The manufactures embrace flour, hosiery, machinery, soap, hardware and farming implements. It was founded in 1784 and chartered as a borough in 1799. Population, 1910, 11,767.

WESTERLY (wĕst'ĕr-lĭ), a town of Rhode Island, in Washington County, on the Pawcatuck River, five miles north of Long Island Sound. It is on the New York, New Haven and Hartford Railroad. In the surrounding country are extensive quarries, which produce the well-known *Westerly granite*. Among the features are the fine public library, the high school, many large churches, and the Soldiers' Memorial building. It has manufactures of flour, cotton and woolen goods, carriages, medicines, clothing, and machinery. The public utilities include electric street railways, waterworks, and sanitary sewerage. Although it was first known as Misquamicutt, it was incorporated as Westerly in 1669. Population, 1905, 8,381; in 1910, 8,696.

WESTERN AUSTRALIA, the largest State of the Commonwealth of Australia, comprising the entire western third of the continent. It is bounded on the north, west, and south by the Indian Ocean and the eastern boundary is formed by South Australia. The length from north to south is about 1,450 miles, the breadth is 950 miles; and the area is 975,920 square miles.

DESCRIPTION. The surface is of an undulating character, but the general elevation is not high above the sea. Much of the surface consists of sand or sandstone plateaus. Fertile regions lie along the coast and in the southwest, where vegetation is extensive, and the interior is occupied largely by the Victoria Desert. Several mountain ranges diversify the surface, including the Victoria, Darling, and Herschel ranges, but their heights do not exceed from 2,500 to 3,825 feet. The Kimberley District, in the northern part, consists of elevated plains through which deep ravines have been cut by the action of streams. As a whole the coast is quite regular, with small indentations, such as Shark's Bay, Exmouth Gulf, and King Sound. Many small islands lie off the coast.

The drainage is chiefly toward the west, and all of the southern part is without a river. Rainfall in the interior is so scant that it does not exceed the natural evaporation, hence the water sinks into the ground or is carried by short streams into lakes that have no outlet. Among the chief rivers flowing west are the Fitzroy, the DeGrey, the Ashburton, the Gascoyne, and the Murchison. Many salt lakes are located in the west central part, but none of them has an outlet to the sea. These include

Austin, Carey, Barlee, Moore, and Monger lakes. Sterile tracts of sandy wastes and numerous salt marshes abound in the region of the lakes, but many sections contain good grazing lands. Most of the lakes become mud flats during the dry season, when they are covered with beds of salt.

The climate in general is very dry, but it is healthful and quite pleasant. Slight frosts occur in winter. The summer heat is usually from 70° to 90°, though the thermometer may rise to 112°. Rainfall is from six to ten inches in the interior, but along the coast it ranges from fifteen to forty inches. A scarcity of precipitation renders it almost impossible to secure wells in many parts of the interior, thus necessitating the construction of cisterns to preserve water for the dry season, or the movement of stock toward the coastal districts. Fine forests abound in the southwestern section, where many trees attain an enormous size, such as the sandalwood, karri, tuart, and eucalyptus. Other trees include the baobab, red gum, pepper bark, mangrove, and grass trees.

MINING. The State is rich in mineral deposits. Gold has been mined in the Kimberley District since 1882 and in the Yilgarn District since 1887, and the output of this mineral is now greater than in any other subdivision of the continent. At present the production of gold is about half of the total output obtained in the continent. Clays suitable for brick and pottery are abundant, and granite, limestone, and sandstone are widely distributed. Other minerals include silver, lead, zinc, tin, iron, copper, salt and plumbago. The prospects for development in mining are very great.

AGRICULTURE. The arable portion of Western Australia is better adapted to agriculture and stock raising than any other part of the continent, this being due to the fact that rainfall is certain. However, progress in these enterprises has been made only along the southwestern coast, since the vast interior does not have sufficient moisture to mature the crops. Farming has developed materially since the mining interests have extended. Wheat is the leading cereal and both wheat and oats are cut to some extent for hay. Other products include tobacco, barley, sugar beets, rye, vegetables, and fruits. Large areas are suitable for grazing, but the pastoral industry is seriously limited on account of the difficulty in obtaining water. Sheep are grown more extensively than any other class of domestic animals, but the interests in cattle and horses are large. Camels are reared for use as beasts of draft and burden. The culture of silk and the mulberry tree has been introduced successfully.

TRANSPORTATION. None of the rivers is navigable and few harbors are afforded by the coast. Railroad building has been confined chiefly to the southwestern part, with Perth as the leading railway center. The lines of railways in operation include a total of 2,475 miles, the larger part of which is owned and operated by the government. Highways have been built and are maintained in the more generally settled portions. Telephones are in general use and the telegraph lines include a total of 14,500 miles. The exports include minerals, pearls, timber, wool, cured and canned fish, cereals, live stock, and hides. Among the leading imports are clothing, tea, chemicals, spirits, and machinery.

MANUFACTURES. The manufacturing enterprises are connected largely with the mines and lumber industries. Flour and grist are produced extensively and considerable interests are vested in canning fruits and fish and in tanning hides. Extensive machine shops are located at Perth, but these are devoted chiefly to the manufacture of implements and in reconstructing and repairing in connection with railway transportation. Among the general manufactures are clothing, pottery, canned fruit and fish, cigars, furniture, and clothing.

GOVERNMENT. The Governor is appointed by the British crown, and he exercises general executive power through a responsible minister. Legislative authority is vested in a Parliament of two branches, the legislative council of thirty members and the legislative assembly of fifty members. Representatives in both departments are elected by popular vote without distinction of sex, the councilors for six years and the assemblymen for three years. The right of suffrage is based upon a property qualification. Local government is administered by counties, municipalities, and towns.

EDUCATION. Public schools are maintained in all the settled portions, at which attendance is free, but compulsory between the ages of six and fourteen. Instruction in the public schools is secular, but religious training may be given by clergymen of the same denomination as the parents of the children. Numerous secondary schools are maintained in the larger towns. Perth is the seat of the university. A number of parochial schools and educational associations of various kinds are in a flourishing condition.

INHABITANTS. The State is one of the most sparsely settled regions in the world. Nearly all the settlements are confined to the coast and in the mining districts. The larger number of inhabitants are British or of British descent, and the Anglican Church has a larger membership than any other. Among the leading denom-

inations, besides the Anglicans, are the Roman Catholics, Methodists, and Presbyterians. Perth, in the southwestern part, is the capital and largest city. Other cities include Fremantle, Kalgoorile, Boulder, Coolgardie, and York. In 1906 the State had a population of 261,746.

HISTORY. The western coast of Australia was first visited by the Portuguese in the 16th century. Dutch explorers surveyed the northern coast about a century later. In 1825, the first settlement was established within the present confines of Western Australia by the English, who took official possession of the region two years later. Large grants of land were made to companies in 1829, with the view of colonizing the country, and several thousand convicts from Sydney came with the early settlers. The discovery of gold, in 1882, brought a large number of prospectors to the Kimberley District, and after 1890 the immigration became extensive. Western Australia long opposed the formation of the Commonwealth of Australia, but it finally agreed to that project in 1900. The extensive development of mining and agriculture are contributing to the rapid growth in wealth and population.

WESTERN RESERVE UNIVERSITY, an institution of higher learning at Cleveland, Ohio, founded at Hudson in 1826 as the Western Reserve College. It was removed to Cleveland in 1882 and renamed Adelbert College. The College for Women was established in 1888. Four years later, in 1892, the Department of Graduate Instruction was founded by the faculties of Adelbert College and the College for Women. Adelbert College and the College for Women are located on Euclid Avenue, adjacent to Wade Park and the boulevard system. The Medical College, founded in 1843, is the third oldest institution of its class west of the Alleghenies. Other departments include the Law School, opened in 1892, the Library School, founded in 1894, and the Dental Department, which is located down-town. At present the total enrollment averages about 950 and the faculty consists of 213 instructors and officers. The libraries of the university contain about 90,000 volumes. It has endowments valued at \$1,500,000, an income of \$300,000, and property valued at \$2,850,000.

WESTFIELD (wĕst'fĕld), a town of Massachusetts, in Hampden County, on the Westfield River, ten miles west of Springfield. Communication is furnished by the Boston and Albany and the New York, New Haven and Hartford railroads. It is surrounded by a fertile farming and dairying region. Among the notable buildings are the Noble Hospital, the West-

field Athenaeum, and the State Normal School. It has electric street railways, pavements, waterworks, and several libraries. The manufactures include cigars, baskets, paper, whips, textile fabrics, thread, and machinery. It has a growing trade in farm produce and merchandise. Westfield was settled in 1642 and incorporated in 1669. Population, 1905, 13,611; in 1910, 16,044.

WESTFIELD, a village of New Jersey, in Union County, seven miles west of Elizabeth, on the Central of New Jersey Railroad. It is surrounded by a fertile region. The site is on elevated ground and affords attractive locations for residences. It has several fine schools and churches. The manufactures include clothing, utensils, and machinery. Electric lighting, waterworks, and macadamized streets are among the improvements. Population, 1910, 6,420.

WEST HAVEN, a borough of Connecticut, in New Haven County, separated from New Haven by the West River. It is on the New York, Hartford and New Haven Railroad and is popular as a residential center. Among the chief buildings are the townhall, the Union School building, and a number of fine churches. Pianos, safes, fertilizers, and utensils are the principal manufactures. The place was a part of New Haven until 1822, when it was united with North Milford. Population, 1900, 5,247; in 1910, 8,543.

WEST HOBOKEN (hō'bō-ken), a town of New Jersey, in Hudson County, near Hoboken and two miles west of New York City. It has railroad and electric railway facilities. The features include the public library, the high school, the Monastery of the Passionist Fathers, the Masonic Temple, the Catholic theological seminary, and the Convent of the Sisters of Dominic. It has manufactures of clothing, silk textiles, furniture, gloves, and machinery. Large quantities of flowers are cultivated in the vicinity. It was a part of Bergen until 1861, when it was incorporated under the present name. Population, 1905, 29,082; in 1910, 35,403.

WEST INDIES (in'dēz), or **Antilles** (än'til'lēz), an island archipelago of America, ex-

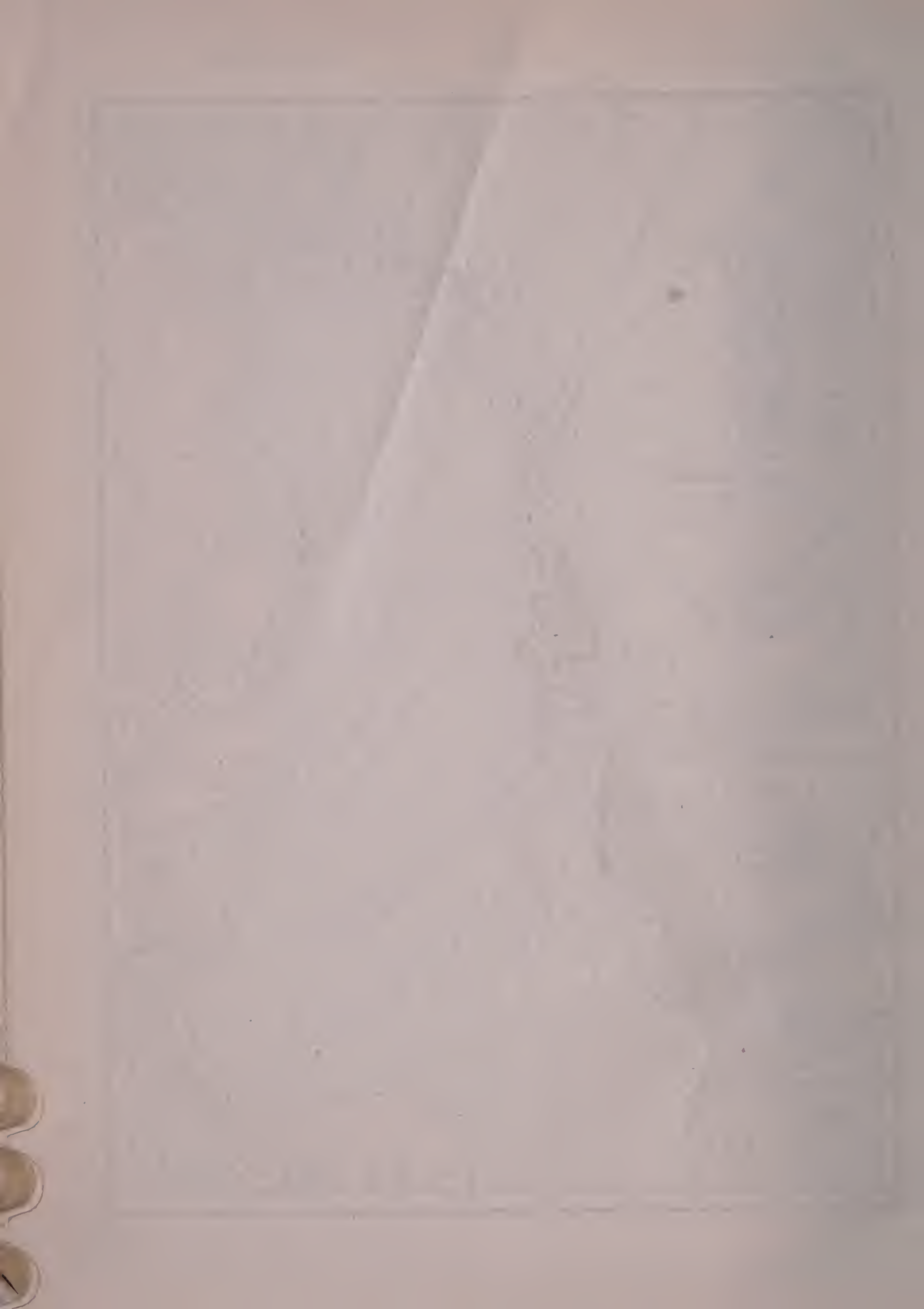
tending from the extremity of Florida to the northern coast of Venezuela. It lies between the Gulf of Mexico and the Caribbean Sea on the west and the Atlantic Ocean on the east. About 1,000 islands are included in the group, ranging from small islets to Cuba, which is the largest of the islands. The archipelago may be divided into four groups: the Greater Antilles, the Lesser Antilles, the Bahama Islands, and the Virgin Islands. Since these groups and a number of the more important islands are described in special articles, it is intended in this article to call attention to only a few general characteristics.

The Greater Antilles comprise the four largest islands of the West Indies, including Jamaica, Porto Rico, Hayti, and Cuba. The Lesser Antilles lie between the northeastern part of Venezuela and Porto Rico, forming an extensive chain of islands and islets. On the other hand, the Virgin Islands form a connecting link between the Greater and Lesser Antilles, lying northeast of Porto Rico, and the Bahama Islands



are southeast of Florida. These islands lie within the Torrid Zone, except the Bahama group, which is situated mostly north of the Tropic of Cancer. The area is estimated at 93,575 square miles, and of this land surface about 82,575 square miles are included in the Greater Antilles.

The West Indies are largely of volcanic origin, probably embracing the summits of a submerged



mountain system, but the Bahamas and a number of individual islands are of coral formation. The latter are generally low and level, but those of volcanic origin have peaks towering from 5,000 to 8,550 feet above sea level. Marked differences prevail in the climatic conditions of the islands, largely because of much diversity in elevation and in their situation in latitude. Those having an elevated surface are generally favorable to Europeans, while those lying near sea level are excessively hot in the summer season. Hurricanes and storms are quite frequent. Insects, reptiles and birds are well represented by many species. The group as a whole has considerable mineral wealth in gold, silver, lead, coal, iron, copper, tin, manganese, limestone, and granite. Among the chief productions are tobacco, cotton, sugar, rum, coffee, maize, potatoes, yams, pineapples, lemons, oranges, citron, pomegranates, manioc, indigo, pepper, aloes, saffras, and other tropical products. Horses, cattle, sheep, swine, mules, and poultry are grown in abundance. The islands yield large quantities of valuable timber.

Columbus first saw land in America by discovering San Salvador, an island of the West Indies. The archipelago was so named by a company of Dutch traders, who also had interests in the East Indies. Carib and Arawak Indians inhabited the islands at the time of the discovery, but they were enslaved by the Spaniards and were largely exterminated. Slave labor being highly profitable in the sugar and tobacco plantations, many Africans were imported by English and other slave traders. The present inhabitants descended largely from the early natives, Africans, and Spaniards, but now many Americans and Europeans are found on the different islands. Spain gradually lost influence in the archipelago, owing to wars with the French, English, and natives, and in 1898 the last possessions were surrendered as a result of the Spanish-American War. Porto Rico belongs to the United States; Cuba and Hayti are independent republics; and Jamaica, Trinidad, and several smaller islands belong to Great Britain. The Netherlands, France, Denmark, and Venezuela have possessions in these islands. See *Danish West Indies*.

WESTMINSTER ABBEY (wĕst'mĭn-stĕr ăb'bĭ), the famous church in Westminster, which was formerly a distinct city of Middlesex, England. It is now united with London, though separate local jurisdictions are maintained. Westminster Abbey is one of the chief ornaments of London and is famous as the coronation place of the English sovereigns. The first building to be erected on its site was a church

built in the 7th century under Sebert, King of the East Saxons, but subsequently an abbey took its place, which was named Westminster to distinguish it from Saint Paul's, or Eastminster. In 1065 the first stone church was erected here by Edward the Confessor and a part of it still remains, the preserved portion being known as the Pyx-House. The main structure dates from 1220, when Henry III. built the choir and transepts, but the principal building was not completed until in the reign of Edward I. Richard III. added the west front. About the same time were built the nave and aisles and the Jerusalem chamber, while Henry VII. erected the chapel which bears his name. Sir Christopher Wren designed the upper parts of the two western towers.

The Church of Westminster is 531 feet long, its roof is 212 feet high, and its towers are 225 feet above the foundation. It has been the place of coronation since the time of Edward I., who brought from Scotland the coronation stone on which the kings of Scotland had been crowned. All the English kings from Edward the Confessor to George II. were buried at Westminster Abbey. In the *Poet's Corner*, on the east aisle of the south transept, are memorials to all the most eminent English writers from Chaucer down. Among the excellent monuments are those erected to Canning, Pitt, Chatham, Fox, Watt, Stephenson, and other famous statesmen and inventors. The Westminster School is a famous institution of Westminster and is one of the seven noted public schools of England. It was founded in 1560. Among the eminent masters and pupils of this institution are Jonson, Cowper, Dryden, Halifax, Wren, Hastings, and Gibbon.

WESTMINSTER HALL, the large hall of the former palace of Westminster, now used as a vestibule to the British Houses of Parliament, in London. It was erected during the reign of Richard II., about 1398, when it succeeded a number of government buildings that had been destroyed by fire. As the structure now stands, it is 68 feet wide, 90 feet high, and 290 feet long. The roof is made of carved timber and the structure is ornamented by a fine porch. In historical associations it may be said to be the foremost hall of England. It is the place where Richard II. was deposed, Charles I. received his death sentence, and the trials of Warren Hastings, Chancellor More, and Lady Jane Grey were held. Here Cromwell was installed as Protector. The hall served for great public festivals during the coronation ceremonies and when the lord mayor of London was sworn into office.

WEST NEW YORK, a town of New Jersey, in Hudson County, situated near West Hoboken, with which it is connected by electric railways. The industries consist chiefly of silk manufactures, machine shops, and cotton and woolen mills. It has an extensive system of waterworks, systems of electric and gas lighting, and a large trade in merchandise and manufactures. Population, 1905, 7,196; 1910, 13,560.

WEST ORANGE (ŏr'ĕnj), a town of New Jersey, in Essex County, twelve miles west of New York City. It is on the Erie and the Delaware, Lackawanna and Western railways. The town occupies a fine site along the slope of Orange Mountain. A fine view of New York City is afforded by Eagle Rock, an elevation of 600 feet. The streets are well paved and lighted. Llewellyn Park, a fine public resort, contains 750 acres. The manufactures include carriages, clothing, furniture, and electrical appliances. West Orange is popular as a residential center. Population, 1905, 7,872; 1910, 10,980.

WESTPHALIA (wĕst-fā'li-à), a province of Germany, in the western part of Prussia, lying south of Hanover and east of the Netherlands. The length from east to west is 125 miles; width, 108 miles; and area, 7,810 square miles. The northwestern part has a level surface, while the southern part is largely of an undulating character, being formed of hills and valleys. Most of the province is highly fertile, especially the western part, which resembles the eastern portion of the Netherlands. It has extensive mineral deposits, especially coal and iron. Other minerals include sulphur, copper, salt, petroleum, zinc, limestone, and sandstone. Manufacturing enterprises have been developed to a high degree of perfection, especially those devoted to the production of furniture, iron and steel, linen and woolen goods, chemicals, silk fabrics, machinery, pottery, and clothing. Westphalia is noted for its agricultural wealth, particularly for its yield of wheat, rye, flax, hemp, vegetables, and fruits. Hogs, cattle, horses, goats, and poultry comprise the domestic animals, yielding dairy products, cured meats, and hides.

Westphalia has a large number of railroads, but likewise has transportation by the Lippe and Ems rivers and by several canals. The inhabitants are descendants from the Saxons, who settled here from the vicinity of the Elbe shortly after the beginning of the Christian era. Charlemagne added the region to his dominion, but shortly after his death it became subject to the dukes of Lower Saxony. In 1179 it was made a part of the German Empire and until 1802 belonged to the Cologne electorate, when it came

under the government of the Hesse-Darmstadt family. Napoleon organized the kingdom of Westphalia, which included the present Westphalia and several adjacent states, and placed his brother, Jérôme, on the throne. The kingdom was abolished after the Battle of Leipsic and the Treaty of Vienna incorporated the region with Prussia. The Thirty Years' War was ended in 1648 by the Treaty of Westphalia, which was concluded at Münster and Osnabrück. Münster is the capital. Population, 1905, 3,618,090.

WEST PITTSTON (pĭts'tŭn), a borough of Pennsylvania, in Luzerne County, on the Susquehanna River, opposite Pittston. It has electric railway facilities with Pittston and other points and contains many fine private and business buildings. The manufactures include machinery, cigars, and clothing. Many Pittston business men have their homes in the borough. Population, 1900, 5,846; in 1910, 6,848.

WEST POINT, a village of New York, in Cornwall township, Orange County, on the Hudson River, 52 miles north of New York City. It has regular communication by steamboats and by the West Shore and the New York Central railroads. The place occupies an attractive site on the west bank of the river, affording a fine view of the river and the adjacent hills, which tower from 475 to 1,500 feet above sea level. West Point is celebrated on account of being the seat of the United States Military Academy. At the time of the Revolution it was fortified under an act of Congress. This body authorized a corps of engineers and artillerymen to permanently garrison the forts and in addition provided for the instruction of 32 students. In 1798 the corps was enlarged, and the number of instructors and cadets to be maintained was likewise extended. With the growth of the military importance of the United States there has been a constant enlargement of the institution, and the course of study has been extended from time to time to meet the demands of consecutive development.

The reservation occupied by the military post comprises 2,300 acres. Although the place was an important strategic point at the time of the Revolution, the government did not acquire title to the land until in 1790. Kosciusko, the Polish soldier, was retained as the engineer and the place was fortified under his direction. It was commanded by Benedict Arnold in 1780, who conspired to betray his trust to the British, but the scheme was averted by the arrest of Major André. Congress made the place the seat of the United States Military Academy in 1802. See **United States Military Academy**.

WEST SPRINGFIELD, a town of Massachusetts, in Hampden County, on the Boston and Albany Railway. It is situated on the Connecticut River, opposite Springfield, and is popular as a residential center. The chief buildings include the public library with 8,500 volumes, several fine public and secondary schools, and a number of churches. Among the manufactures are clothing, machinery, and hardware. It has extensive railway repair shops, waterworks, and electric lighting. The first settlement was made in the vicinity about 1655 and it was incorporated as a town in 1774. Population, 1905, 8,101; in 1910, 9,224.

WEST VIRGINIA (vē-jīn'ī-ā), a Middle Atlantic State of the United States, popularly called the *Pan Handle State*. It was bounded on the north by Ohio, Pennsylvania, and Maryland; east by Pennsylvania, Maryland, and Virginia; south by Virginia and Kentucky; and west by Kentucky and Ohio. The boundaries are quite irregular, being formed on the southeast by the Allegheny Mountains, on the southwest by the Big Sandy River, on the northwest by the Ohio, and on the northeast by the Potomac. A narrow strip of land, called the *Pan Handle*, extends northward between Ohio and Pennsylvania. The greatest extent from southwest to northeast is 210 miles and the distance across the State from east to west is 125 miles. The area is 24,780 square miles.

DESCRIPTION. The general surface of the State is hilly, while the eastern part is mountainous, where it is traversed by the Greenbrier Mountains and other ranges of the Appalachian system. These highlands occupy about one-third of the surface and in the southern part merge into the Cumberland Plateau. The mountains have the form of parallel ridges which trend from the northeast toward the southwest, but in the southern part merge into a generally hilly section. Spruce Knob, the highest point in the State, has an altitude of 4,860 feet. Along the Ohio River the altitude is about 550 feet and farther east, midway in the State, the general altitude is 2,000 feet.

The drainage of the larger part of the State belongs to the Ohio basin, but a small section in the northeast is tributary to the Potomac, which separates the State from Maryland. Several streams flow into the Potomac, including the South Branch, which is the largest headstream. The Big Sandy separates the State from Kentucky and has a course toward the northwest into the Ohio. Other streams that are tributary to the Ohio include the Monongahela, the Little Kanawha, the Great Kanawha, the Greenbrier, and the Guyandotte. The Ohio

is important for navigation and many of the streams within the State furnish abundant water power.

The climate is quite equable and has no great extremes of heat and cold. All parts of the State have an abundance of rainfall for the maturity of crops. In the northeast the rainfall is 22 inches and in the south it is about 45 inches. The extremes of temperature are 10° below zero in winter and a summer heat of 98°. Considerable snow falls in all parts of the State, but it does not lie long upon the ground in the south. Fine forests of walnut, oak, poplar, chestnut, butternut, ash, cherry, locust, and hemlock abound.

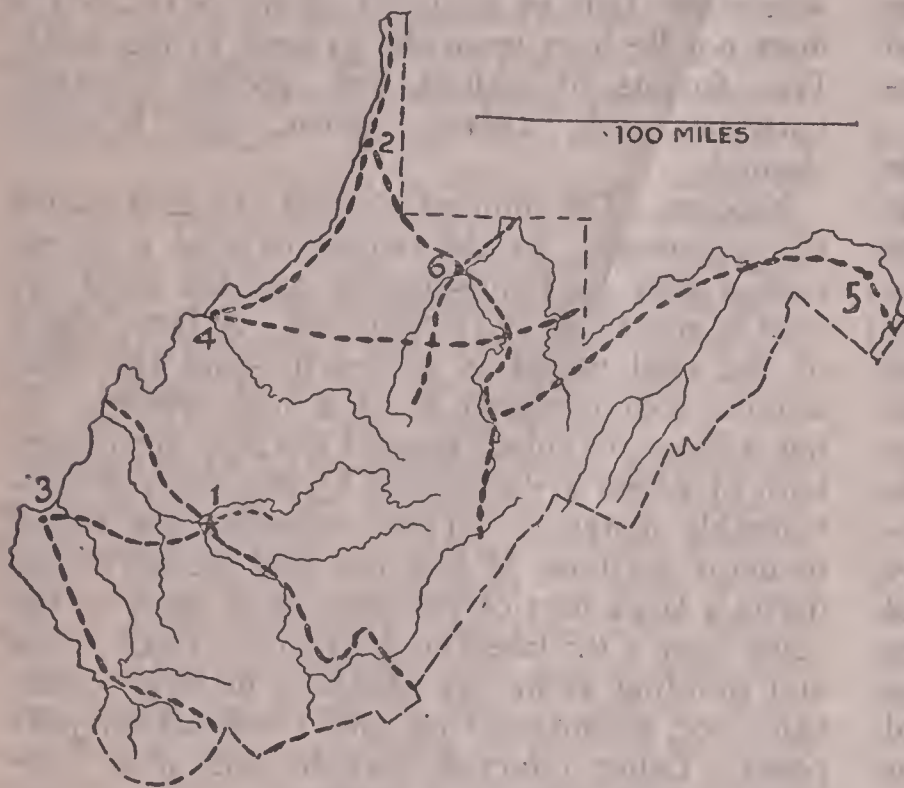
MINING. The mineral sources are both varied and extensive. In the output of coal it is exceeded only by Pennsylvania, and the yield per year is placed at 48,750,000 tons. A large share of the coal mined is anthracite, and the bituminous coal obtained is of a high quality. It has a large output of natural gas and petroleum, both of which are conveyed by pipe lines to considerable distances. These minerals are found in many sections, in fact the coal measures underlie a large part of the State, and many of the veins have a thickness of four to six feet. Clays and building stone are obtained in large quantities for manufacturing and construction purposes. Other minerals include salt, iron, bromine, copper, alum, and sulphur.

AGRICULTURE. The average size of farms is 114 acres and fully three-fourths are worked by their owners. Farming is especially profitable in the western part of the State, where the soil is highly fertile, while the eastern section is well adapted to grazing. Corn is the leading cereal, but is followed closely by the interests vested in the growing of hay and wheat. Farming as a whole is conducted on a modern basis, and considerable commercial fertilizers and the rotation of crops are employed to maintain fertility. Oats, buckwheat, potatoes, rye, tobacco, sorghum cane, and dry beans are grown profitably. Fruits are produced in large quantities, especially apples, quinces, peaches, pears, grapes, plums, and small fruits. Large interests are vested in raising cattle for meat and dairying. Other domestic animals include horses, sheep, swine, mules, goats, and poultry.

MANUFACTURES. The extensive fields of coal, petroleum, and natural gas give an immense impetus to the manufacturing enterprises, especially in the production of iron and steel, coke, and lumber products. Iron and steel rank as the most important products, and the enterprises concerned in commodities made of these metals are centered largely in the vicinity of Wheeling.

Next of importance are the lumber and timber products. Other important manufactures include leather, flour and grist, railway cars, pottery, brick and tile, glass, and machinery. The State takes high rank in the production of butter and cheese, in the output of cigars and smoking tobacco, and in the canning of fruits and vegetables.

TRANSPORTATION. The Ohio is the most important navigable highway, but steamboat facil-



WEST VIRGINIA.

1, Charleston; 2, Wheeling; 3, Huntington; 4, Parkersburg; 5, Martinsburg; 6, Fairmont. Principal railroads shown by dotted lines.

ities are provided by the Big Sandy and the Great Kanawha. Development in railroad building has brought most sections of the State in close touch with trade centers. The three trunk lines that cross the State are the Baltimore and Ohio, the Norfolk and Western, and the Chesapeake and Ohio. A total of 3,750 miles of railways are in operation. Considerable traffic is carried by electric railway lines. Much has been done to provide suitable highways and maintain them by local authorities.

GOVERNMENT. Executive authority is vested in the governor, secretary of State, auditor, treasurer, attorney general, and superintendent of free schools, all elected for terms of four years. In case of vacancy in the office of Governor, the president of the senate and the speaker of the house are in the line of succession to that office. Legislative authority is exercised by the General Assembly, which consists of the senate of 24 members and the house of delegates of 65 members. Senators are elected for four years, while the delegates are elected for two years. Four

judges elected for terms of twelve years constitute the superior court, the highest judicial tribunal. In addition there are circuit courts, courts of limited jurisdiction, courts of county commissioners, and justices of the peace. Local government is administered by the counties, towns, and municipalities.

EDUCATION. The State maintains separate schools for white and colored pupils. A part of the revenues is obtained from the income on a permanent school fund, but the larger portion is derived from a system of general taxation. Based upon the total population of ten years of age and upward, the illiteracy is 11.4 per cent., but it is much larger among the colored than among the white inhabitants. A commission was appointed in 1906 to revise the school laws. The commission reported in 1908, when many improvements were made in the system of common schools, as well as in the high school education, and many of the district schools were consolidated. The average length of the school term is about 140 days. Normal schools for the training of teachers are maintained at Athens, Fairmont, Glenville, Huntington, Shepherdstown, and West Liberty. Additional normal training is provided in the West Virginia Colored Institute, at Institute.

The University of West Virginia, at Morgantown, is at the head of public instruction. Other institutions of higher learning include the Bethany College, at Bethany; the Barboursville College, Barboursville; and the West Virginia College, Flemington. The State prison is at Moundsville, hospitals for the insane are located at Spencer and Weston, and an institution for the deaf, dumb, and blind is at Romley. Pruntytown has a reform school for boys and Salem has a reform school for girls. An asylum for incurables is maintained by the State at Huntington. The labor of the convicts is utilized in supporting the State penitentiary.

INHABITANTS. The State has a small proportion of foreign-born inhabitants, the total being only 23,451. Among the leading Christian denominations are the Methodists, Baptists, Roman Catholics, Presbyterians, Lutherans, and Disciples. Charleston, on the Great Kanawha, is the capital. Other cities include Wheeling, Huntington, Parkersburg, Martinsburg, Fairmont, Grafton, Moundsville, and Clarksburg. In 1900 the State had a population of 958,800. This number included 43,567 colored people, of whom 43,499 were Negroes. Population, 1910, 1,221,119.

HISTORY. West Virginia was a part of Virginia until the latter State passed the ordinance of secession on April 17, 1861. Shortly after the

people of the western and northwestern part of Virginia called a convention at Wheeling, at which it was decided that the officers of the State who were opposed to the national government should not be recognized, and a State Legislature was called to meet at Wheeling. The new State thus formed was called *Kanawha*, and obtained permission to separate from Virginia by the Virginia Legislature. Congress admitted the State as West Virginia on June 19, 1863. Many volunteers from West Virginia served in the Civil War. It was the scene of John Brown's raid at Harper's Ferry and the battles at Philippi, Cheat Mountain, Beverly, and Carnifex Ferry. Since the war it has made rapid strides in the development of its natural resources and is constantly gaining in population and wealth.

WEST VIRGINIA, University of, a co-educational institution of higher learning at Morgantown, W. Va., established in 1868. It was founded as a State university, being the successor of the West Virginia Agricultural College, the Woodburn Seminary, and the Monongahela Academy. The courses include arts and sciences, law, agriculture, commerce, music, engineering and mechanical arts, and military science and tactics. With it are affiliated preparatory schools located at Geysers, Morgantown, and Montgomery. The institution has a faculty of 80 instructors and professors and is attended by 1,150 students. The library contains 30,000 volumes and the value of the property is placed at \$750,000.

WETTERHORN (vē'tēr-hörn), an elevated mountain peak of Switzerland, in the Grindelwald, ten miles southeast of Lake Brienz. Limestone constitutes the chief geological formation. In many places the slopes are nearly perpendicular for hundreds of feet. The mountain rises in three peaks, their respective heights being 12,125, 12,175, and 13,280 feet.

WEYMOUTH (wā'mūth), a town of Massachusetts, in Norfolk County, twelve miles southeast of Boston, on the New York, New Haven and Hartford Railroad. It has electric street railways, public waterworks, and sanitary sewerage. Among the features are the high school, the townhall, many fine churches, and the Tufts library. The manufactures embrace nails, isinglass, boots and shoes, fireworks, hardware, and machinery. It has a large trade in coal and lumber. The place was settled in 1623, when it was called Wessagusset, but was incorporated under the present name in 1635. Population, 1905, 11,585; in 1910, 12,895.

WHALE, the common name of animals belonging to the order *Cetacea*, with which are

included the porpoise and the dolphin. They are formed somewhat like fishes and like them live in the sea, but they are really mammals; that is, they are warm-blooded, breathe air by means of lungs, and their young are born after a long pregnancy in a well developed condition. The head constitutes about one-third of the body, the mouth is large, the lips are stiff and immovable, and the tail is flattened horizontally instead of vertically as in fishes. They have no external ear and the eyes are small and far back from the wide mouth. The posterior fins are absent, but the anterior fins are well developed, and under the skin of the latter are all the joints found in the human hand and arm. The anterior fins serve to balance the animal in the water, while the projectile movement is effected by the tail. Whales have two large nostrils on top of the head for breathing, and come to the surface about every twenty minutes to blow out water and take in air. Under the skin is a fatty substance called *blubber*, which in some whales is two feet thick. As it is lighter than water, it serves in enabling the whale to swim, and aids in keeping the blood warm in the cold, Arctic seas. This blubber yields a fine oil, but the whale is also hunted for its spermaceti, a white, oily substance contained in the head of the sperm whale, for whalebone, and for ambergris.

Two distinct families of whales are recognized—the *baleen*, or *whalebone*, *whale* and the *sperm whale*, or *cachalot*. The whalebone whale family includes the *Greenland whale*, or *right whale*, and the *rorqual*. These species have no teeth, but instead have plates of whale bone in the mouth, and from them are suspended a kind of fringe, which serves to aid them in separating their food from the water. The Greenland whales commonly grow to a length of from 50 to 70 feet, while the rorqual whales attain a length of 170 to 200 feet, and are thought to be the largest species of living animals. Both of these species yield whalebone, a well-known horny substance derived from the thin, parallel plates in the upper part of the mouth. It is used for stiffening stays and for ribs in parasols and umbrellas. A young whale is usually eight to twelve feet long at birth and is suckled by the mother for nearly a year.

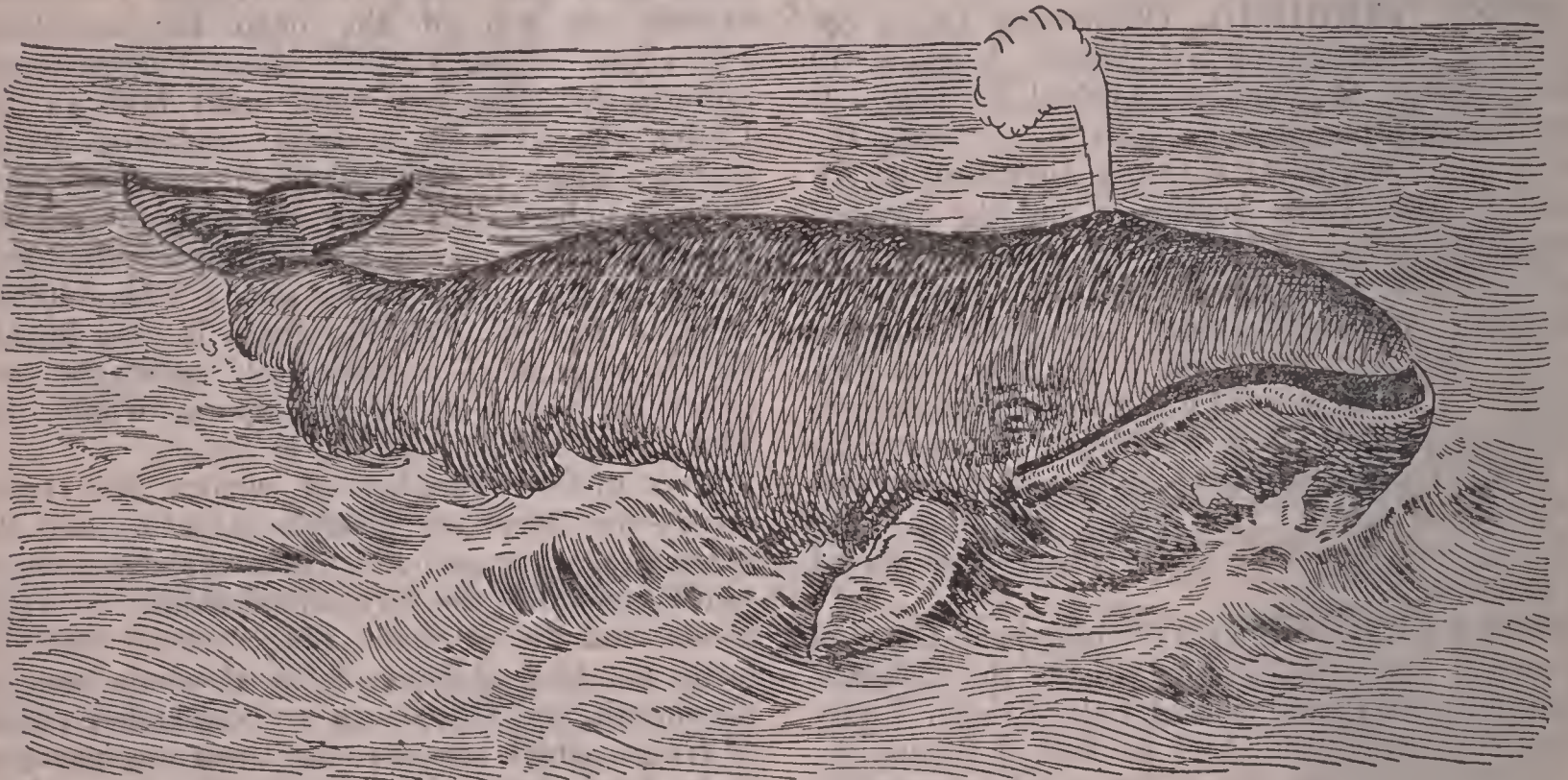
Sperm whales are about as large as the Greenland whale, but differ from them in having teeth in the lower jaw and in yielding spermaceti and ambergris. The former is used in making candles and the latter for perfumery. Whale fisheries are not as important as formerly, but valuable catches are still obtained in the Bering Sea, off Greenland, and in the vicinity of Spitz-

bergen. Whale fishing is carried on by means of boats, from which harpoons are cast into the whales, and they are afterward slain with a lance. Harpoons are iron weapons, about three feet long, and to them a line is attached. When a whale is seen, the harpoon is thrown into its body by the harpooner, or by means of a harpoon gun. The whale dives out of sight as soon as it is struck by the harpoon, but comes up again in fifteen or twenty minutes to breathe, when a second harpoon is cast. At length it is overpowered and killed with the lance, a spear of iron about six feet long. It is then cut up and the oil is extracted from the blubber and the whalebone is dried. Petroleum has largely displaced candles made of whale oil, but

hence it is replaced to some extent by steel and vulcanite. See illustration on following page.

WHANGHO. See Hoang-ho.

WHARF, a structure of wood or stone on the bank or margin of navigable waters, constructed so as to provide a suitable platform for the loading and unloading of vessels. They are built either as quays or piers, depending upon the depth of the water and the nature of the shore line. Quays are wharves that are built parallel with the shore, while piers extend into the water at right angles to the line of the shore. Wharves maintained on the margin of streams and where the tide has a material effect are usually in the form of quays, while those used in lakes and rivers are frequently con-



BALEEN WHALE.

it is still used largely for food and lighting in cold countries, especially by the Eskimos.

WHALEBONE, or **Baleen,** the horny plates or blades found in the mouth of the right whale. These plates number about 300 in the mouth of a full-grown animal, are from a few inches to twelve feet in length, and serve the purpose of retaining the food. It is not properly bone, but bears some resemblance to the horns of cattle and the hoofs of the mule and horse. In structure it is almost identical with the horns of the rhinoceros. Whalebone is used in making whip handles, stays in clothing, ribs of parasols and umbrellas, and in the manufacture of canes and upholstery. The decline of the whale fisheries has caused the price of whalebone to rise,

constructed as piers. In most cases piles are driven into the bottom of the harbor and the framework is covered with heavy planking. In most countries the wharves are controlled by the national government and owners of ships are charged a nominal rental when their vessels make use of them. However, in the United States the privileges are controlled by the several states, which lease them to individuals or corporations, and in this way they are managed as an enterprise for the profit obtained from leases.

WHEAT, an important and largely cultivated cereal. It is excelled by rice alone with reference to the number of people using it as a staple food. The plant that produces this

grain is a tall, slender annual or biennial, having a hollow, jointed stem and bearing at its summit a somewhat four-cornered spike of usually four-flowered spikelets, called the *ear*, or *head*. Though not known in a wild state, it is thought to have come from Asia. It has been cultivated so long that many species have been developed, all more or less valuable as a food product and adapted to different soils and climates.

Although wheat flourishes in regions considerably different from each other and is cultivated in many parts of the earth, it thrives best in a temperate climate and in rich clay and loam soils. The chief species include bearded wheat, unbearded wheat, and spelt or German wheat. *Bearded wheat* has a kind of awn or slender spine extending from the ears, while *unbearded wheat* is awnless. *Spelt* is less valuable than other species, but it possesses the advantage of growing in poorer soils and at greater elevations. Wheat is distinguished also as spring and winter, or fall, wheat. *Spring wheat* is sown in the spring and harvested in July or August, while *winter wheat* is sown in autumn and is harvested the following summer. While both kinds are of high value, winter wheat usually commands a slightly higher price in the market, owing to its yielding a larger per cent. of flour. Two other classes of wheat are the *red wheat* and *white wheat*, these names being applied on account of the color of the grain. The white wheat is less hardy than the red, but it yields better and is of a finer quality.

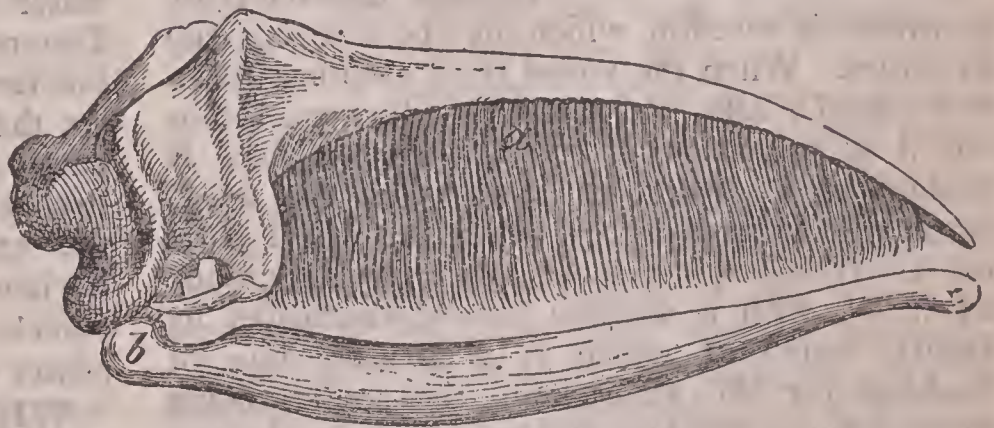
Few plants have a higher value than wheat. As a food product it possesses much utility, owing to its containing a large per cent. of starch and gluten. It likewise has mineral properties of value in supporting the body. The grains are removed from the husks by a threshing machine and are afterward ground into flour. Besides the use of wheat flour in making bread, it is employed extensively in the production of starch, crackers, and macaroni. The bran, shorts, and husks are of value as food for animals, and the straw is employed for animal food and in the manufacture of various articles, such as straw hats and mats. The total production of wheat in the world is estimated at 2,675,000,000 bushels, of which Europe produces about one-half. At present the United States is the greatest wheat-producing country in the world, the annual production being 650,500,000 bushels. Minnesota and North Dakota have long ranked as the leading wheat-producing

states, the annual yield of the former being about 95,000,000 bushels, and of the latter, 72,-



HEADS OF WHEAT.

500,000 bushels. As a whole, the most productive wheat-growing region is in the northwestern



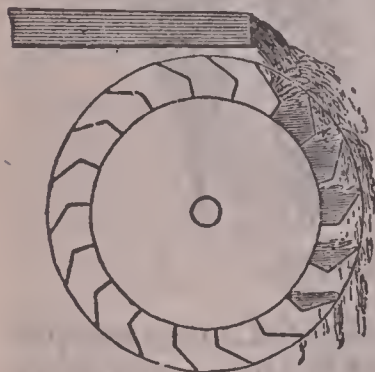
SKULL OF THE BALEEN WHALE.

a, Baleen, or bony plates; *b*, Lower Jaw-bone.

states. The states ranking next to Minnesota and North Dakota in growing wheat include Kansas, South Dakota, Nebraska, Ohio, Indiana, Michigan, California, Texas, Iowa, Oregon, Washington, and Pennsylvania. Canada produces annually about 125,000,000 bushels, the largest crops being grown in Manitoba, Ontario, Saskatchewan, and Alberta. Russia, France, India, Austria, Australia, Germany, Spain, and Italy are leading wheat-producing countries. Chicago, Minneapolis, Duluth, Buffalo, Winnipeg, and Vancouver are among the leading wheat markets of North America.

WHEAT MIDGE, an insect which is harmful to wheat, related more or less closely to the Hessian fly. It is native to Europe, but was brought to the Province of Quebec, Canada, at an early date, whence it has spread to the region extending through the central part of North America. The adult is of an orange or yellow color, but does not make its appearance until in early summer. It is about one-tenth of an inch long and lays small eggs in the heads of wheat as the grain stands in the field, and when the larvæ appear they extract the milky juice and cause the heads to blight. The larvae, after attaining full growth, descend to the ground and hibernate in small cocoons. Deep plowing causes them to be destroyed in large numbers.

WHEEL, a circular frame or solid disk employed to reduce friction and facilitate movement, as in vehicles; to produce rotary motion,



OVERSHOT WHEEL.

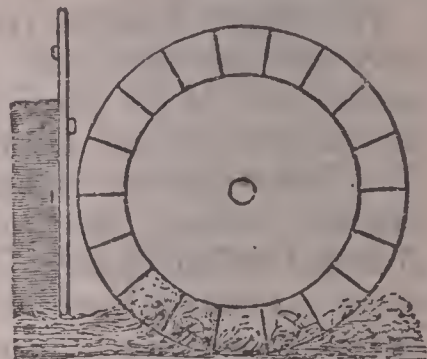
as in machines; or to modify speed, as in the form of pulleys. Many kinds of wheels are employed in the arts and industries, the form and structure depending on their uses. The only feature which is universally characteristic in wheels is rotation, which may be either partial or entire. When the wheel is of elliptical form, it is called a *cam*, and when the edges are toothed, it is termed a *gear*. The center piece is designated a *shaft*, or *arbor*, when the wheel turns with it, and an *axle* when the wheel turns on it. Wheels for vehicles are commonly made of wood, with a wooden hub strengthened by bands, inside of which is a metallic box or bushing for the axle skin, the spokes being mortised into the hub and tenoned into the rim or fully, the whole being strengthened by a metallic tire. Other vehicle wheels have a light rim connected with the hub by wire spokes, as in modern bicycles and some other vehicles, or they are of iron or steel, either cast in one piece or with a metallic hub connected by plates with a rim.

Within recent years rubber tires have been placed on many carriages and light vehicles, though these are generally attached to a main tire of metal, while pneumatic tires have come into general use on bicycles. Car wheels are usually solid and are made either of iron or steel, of iron and steel, or of paper, iron, and steel. Street car wheels are made of similar material, but in most cases they are lightened

by having cast spokes. The wheels used in machinery are known as *cog*, *belt*, *spur*, *crown*, *fly*, *ratchet*, *pinion*, or *balance* wheels. Sets of wheels in machinery are joined by belts or bands, or transmit motion by means of teeth or cogs.

The development of the power of water through *water wheels* is about five centuries old. No exact date can be given for the first device

of this kind, the earliest authentic record being a description of the water wheels at Lyons, France, dated in 1555. There are three ways in which the energy or motion of a running stream can be transferred to a water

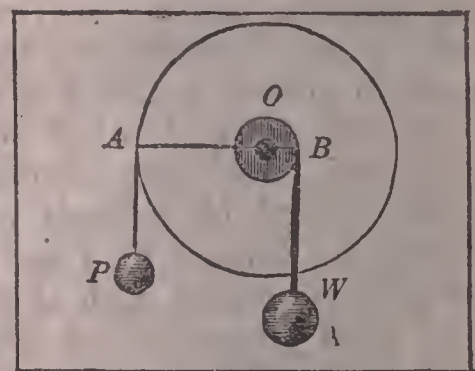


UNDERSHOT WHEEL.

wheel, namely, by impact, by weight, and by the reaction of the escaping jet. An *undershot wheel* is driven by impact, the wheel being moved mainly by the impact or blow produced by the moving water striking the flat boards of the wheel. An *overshot wheel* has buckets or boxes on the rim and the water, which flows into the buckets from above, turns the wheel by its momentum and by the weight of the water in the buckets, the side of the wheel that receives the water being heavier than the opposite side. The reaction of the escaping jet is utilized in the *turbine water wheel*, which is driven partly by the momentum of the moving water and partly by the weight of the water in the buckets. Many forms of turbines are in use, the axis of rotation being either vertical or horizontal. The size of all classes of water wheels varies with the water supply and the power which is desired. See **Turbine**.

WHEEL AND AXLE, a machine in the

form of a continuous lever, in which force is applied at the circumference of a wheel to raise a weight attached to a rope wound around the axle. A windlass is a form of wheel and axle. When the crank of a windlass is turned, the rope is wound around the



WHEEL AND AXLE.

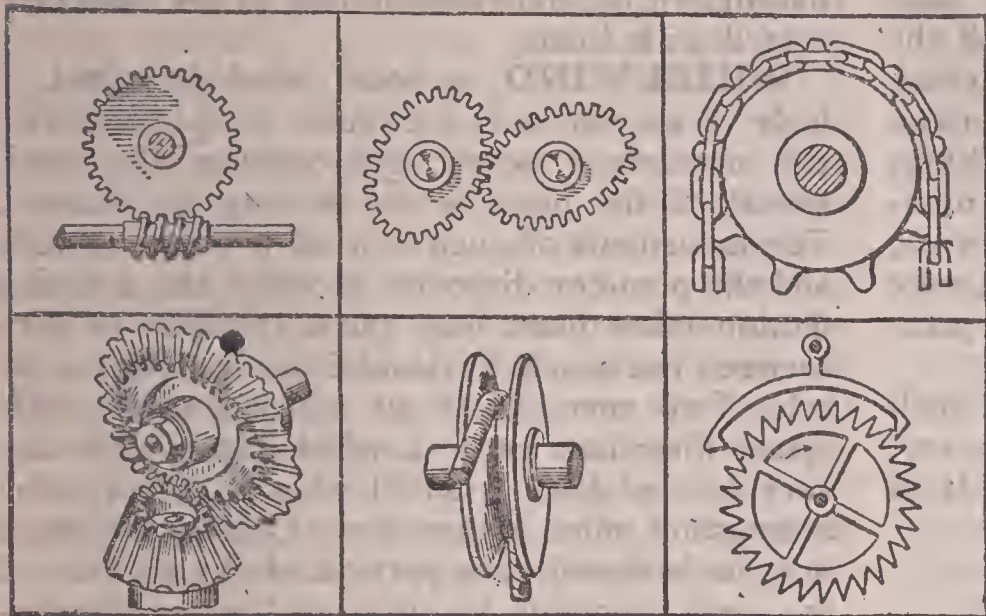
A, circumference of the wheel. *O*, circumference of the axle; *P*, power; *W*, weight; *B*, radius of the axle.

axle, which causes the weight at the lower end of the rope to be raised. The wheel and axle

is a modification of the lever, the fulcrum is at the axis, the arm of the force is the radius of the wheel, and the arm of the weight is the radius of the axle. One complete turn of the wheel causes the weight to be raised only the length of the rope wound once around the axle, hence a force of a pound weight applied at

steam engines, boilers, cotton and woolen goods, and farming implements.

Wheeling is well provided with modern utilities. It has extensive systems of waterworks and sanitary sewerage. The streets are paved substantially and are lighted by gas and electricity. A part of the city is situated on Zane's Island, a tract of 400 acres in the Ohio River, which is reached by a suspension bridge which is 1,012 feet long. Wheeling was first settled in 1770. Fort Henry, named in honor of Patrick Henry, was built here in 1774. For many years it was an outpost of defense against the Indians. It became the capital of West Virginia when that State was admitted, in 1863, and remained the seat of government until 1870, when Charleston was made the capital. It was the capital from 1875 until 1885, when Charleston became the permanent capital. Population, 1900, 38,878; in 1910, 41,641.



WHEELS.

Screw Gears.
Bevel Gears.Elliptical Gears.
Pulley.Sprocket Wheel.
Escapement.

the axle causes a weight to be raised as many more pounds, hung to the axle, as the circumference of the wheel is greater than the axle. When a winch is substituted for the wheel, the circumference described by the power in one revolution is substituted for the circumference of the wheel. The capstan is an example of this mechanical power. It is used extensively in moving houses and bodies of large bulk, while the windlass is used for raising water from a well.

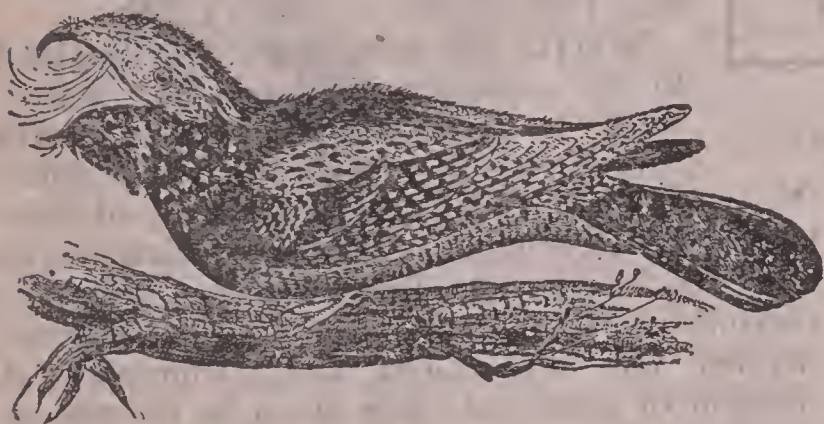
WHEELING (hwēl'ing), a city of West Virginia, in Ohio County, seventy miles southwest of Pittsburg, Pa., on the Baltimore and Ohio, the Pennsylvania, the Wheeling and Lake Erie, the Pittsburg, Cincinnati, Chicago and Saint Louis, and other railroads. It is conveniently situated on the Ohio River, in the Pan Handle district of the State, and has communication by a number of electric railways. The city is well built, containing an excellent courthouse, city hall, United States customhouse and post office, and numerous school buildings and churches. Other features include the Krugar Monument, the public library, the Haskin Hospital, the Linsley Institute, the Saint Joseph's Academy, the Wheeling Female Academy, and the Mount de Chantal Academy. Extensive deposits of coal and natural gas are in the vicinity. Among the chief manufactures are paper, nails, glass, leather, hardware, pottery,

WHIG, the name applied in England to the opponents of James II. Afterward the name was assumed in North America by the supporters of the cause of the colonies against the King of England in the Revolution. The Whigs disappeared from politics after the Revolution had been successfully accomplished and the people became divided into Federalists and Democrats. A division of sentiment came about in the administration of Andrew Jackson, when numerous small parties began to form, and in 1834 James Watson Webb led the opposition against the party of Jackson in forming the new Whig party, the name being assumed because the new party, like the Whigs of the American Revolution, declared itself against executive usurpations. It favored everything opposed by Jackson, namely, a national bank, a high protective tariff, the passage of bills over the veto by a majority vote, limitation of the power of removal from office, and extensive internal improvements.

William H. Harrison was the Whig candidate for President in 1836, but was defeated by Van Buren. He was again nominated in 1840 and defeated Van Buren, receiving 234 electoral votes, while the latter received 60. The party had a good working majority in each house of Congress, but Harrison died shortly after being installed in office, when Tyler became President. The latter showed strong democratic tendencies by vetoing two bank bills and two tariff bills and distributing the proceeds of land sales to the states. He was accordingly declared to be out of the party and Henry Clay

became the candidate for President in 1844, but was defeated by James K. Polk. In 1848 Zachary Taylor, the hero of the Mexican War, was nominated and elected President, but he died in office and was succeeded by his Vice President, Millard Fillmore. The party became weakened by accepting the Compromise of 1850, which divided it into *Conscience Whigs* and *Cotton Whigs*, and in the election of 1852 the candidate, Winfield Scott, met with defeat. Many Whigs soon after joined the American party in the North, while the Southern Whigs generally united with the Democrats. A number of other parties, such as the Free Soilers, Constitutional Unionists, and Abolitionists, were strengthened, and from these elements the present Republican party was formed.

WHIP-POOR-WILL, a bird native to North America, which was so named from its cry, resembling the words *whip poor Will*. It is



WHIP-POOR-WILL.

closely allied to the goatsucker of Europe. The length is about ten inches, with an alar extent of about twenty inches. The plumage is tawny-brown and is much mottled with white and gray spots. A number of species have been described, all of which fly about in the evening in search of food. They skim along near the ground without making a noise, thus enabling them to catch the insects on which they feed. These birds retire into the woods during the day. Their familiar cry is heard mostly in the evening. They breed about the middle of May, incubating their eggs in rude nests on or near the ground.

WHIRLPOOL (*hwēr'l'pōōl*), an eddy or vortex in a river or in the sea, which is caused by the water flowing against a peculiarly formed bank, by the meeting of two currents, or by the action of winds upon currents and tides. Small whirlpools may be seen on nearly every stream, but they assume gigantic size in many places of the ocean and oceanic channels, where their motion attracts and engulfs floating objects.

The most famous whirlpool in history is that of Charybdis, near Sicily, and another of considerable interest is the Maelstrom, in the Lofoden Islands, northwest of Norway. However, these and other famous whirlpools frequently mentioned have been greatly exaggerated, and the dangers attending them have been much overdrawn to lend enchantment to the tales connected with them.

WHIRLWIND, a local wind in which a body of air moves in a circular or spiral course, the movement nearly approaching the horizontal of the place where it may be situated. The movement of such a wind is about an axis and the plane or direction in which the whirling motion takes place may cause the axis to vary between the nearly horizontal up to a true vertical. Two currents of air which move in different directions cause a whirlwind, which may vary in size from a small eddy to a hurricane a thousand miles in diameter. Usually the cause may be assigned to a portion of the surface of the earth becoming highly heated, when the currents of air moving upward are replaced by a rush of air from all sides to take their place. An observer may see the entire whirl, if it is of



DUST WHIRLWIND IN ARABIA.

small size and passes over dusty ground, but large whirls are only seen in part and appear as straight-lined winds. Whirlwinds seldom occur on hilly ground and never take place when a strong wind is blowing. All whirls of considerable size are given a uniform direction by the rotation of the earth, from left to right in the Southern Hemisphere and from right to left in the Northern. See **Storms**.

WHISKY (hwis'ki), an alcoholic spirit obtained by the distillation of a fermented starchy compound. The name is of Celtic origin and was derived from the word *uisgebeatha*, which means water of life. Although it was employed originally as a medicine, it soon became a beverage, and its use rapidly spread to the European continent. It was first made by distilling malted brandy, but is now derived also from wheat, corn, molasses, rye, rice, potatoes, and many other vegetable products containing starch. Whisky is generally classified as *grain whisky* and *malt whisky*. The former is considered the more inferior and is derived from unmalted grain, as corn, oats, barley, wheat, etc., and from rice, sugar, molasses, and potatoes. The best grade of malt whisky is made from barley, but good grades are obtained by malting wheat and rye. The product is usually named from the kind of grain which is employed in its manufacture, as *corn whisky*, *rye whisky*, and *wheat whisky*. The grains impart to it a characteristic flavor, but it is modified somewhat by the ferment used.

Whisky is used largely in making alcohol, gin, and brandy, but more commonly as a beverage. Many doctors prescribe it as a stimulating medicine, and, like alcohol, it enters largely into the preservative arts. It is almost colorless when first distilled, but assumes a reddish hue from the barrel into which it is drawn, but some grades are colored artificially. The United States manufactures the largest quantity of whisky and the heavy tax upon it is an important source of revenue to the government, reaching \$80,750,000 annually. A bushel of grain yields about three and a half gallons of whisky and the manufacturer must pay a tax on that amount for every bushel of grain mashed. See **Alcohol**.

WHISKY INSURRECTION, a revolt in the United States, due to the enactment of a Federal excise law. It took place in the western part of Pennsylvania, in 1794, when the authorities undertook to enforce the collection of taxes upon whisky. Congress passed this law in 1791 as a means of raising revenue and considerable opposition formed against it in Virginia, North Carolina, and Pennsylvania, where a large number of the people were engaged in distillation and whisky was used as a medium of exchange. The masses held insurrectionary meetings and a number of the revenue officers were tarred and feathered. President Washington sent a force of 15,000 men to quiet the revolt in October, 1794, when the disturbances were suppressed. Several of the

leaders were arrested and found guilty of treason, but President Washington pardoned them. The affair had a good influence upon the nation, since it showed that the Federal government was determined to exercise its authority.

WHISKY RING, the name applied to a combination of distillers and revenue officers at Saint Louis in 1872, for the purpose of defrauding the government of the internal revenue tax on distilled liquors. It spread to many parts of the country, with branches at Cincinnati, Chicago, Peoria, Milwaukee, and New Orleans, and even had agents in Washington to cooperate with certain government officials. Myron Colony, of the Cotton Exchange, was appointed to make a secret investigation of the frauds. The disclosures that followed implicated the private secretary of President Grant, the chief clerk of the Treasury Department, and many other government officials. Indictments were obtained against 238 persons, many of whom were convicted and fined. The amount involved in the frauds aggregated \$1,650,000.

WHIST, a game played with the full pack of 52 cards, so named because it requires great attention and silence. The game requires four persons, of whom those sitting opposite to each other are partners. At the beginning the pack is cut for partners, the two cutting respectively the highest and lowest cards play together, and the first deal is taken by the one who cuts the lowest card. After shuffling the cards carefully, the pack is cut by the adversary sitting on the right hand, and the cards are then dealt one by one to each of the players, commencing on the left, until the pack is exhausted. The last card, called the *trump*, is turned up by the dealer and remains exposed until the first trick is turned. In 1743 Edmond Hoyle published a set of rules in his "Short Treatise on the Game of Whist," and it remains substantially in force at the present time. However, the rules differ somewhat in various countries and those wishing to study them should refer to a guide. A standard work on the subject is Cavendish's "Principles of Whist, Stated and Explained."

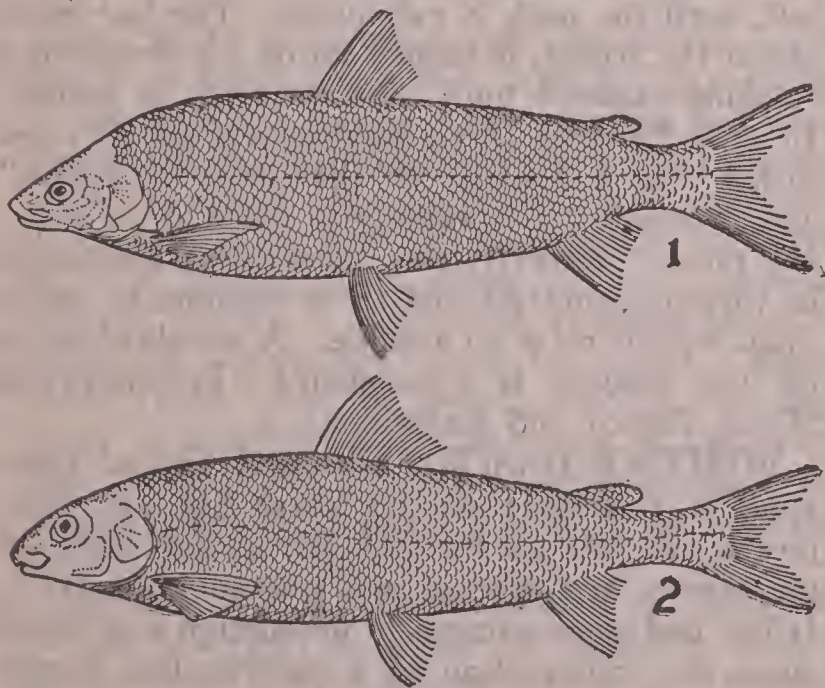
WHITBY (hwit'bi), a seaport city of England, in Yorkshire, on the North Sea. It occupies a fine site on the Esk River, but many of the streets are narrow and platted irregularly. It has had some growth in population and trade since the construction of a railway line to the port, but it is noted chiefly for its history. In the time of Queen Elizabeth it ranked as a center of manufactures of alum, and in its shipyards were built the vessels used by Captain Cook in his exploring expeditions. The most

noteworthy building now in the city is the parish church, which occupies a position on a cliff about 350 feet high and is reached by a flight of 210 steps. It has excellent herring fisheries and quarries of ironstone. The fine scenery in the vicinity and several mineral springs have stimulated interest in it as a popular summer resort. Population, 1908, 12,843.

WHITEBAIT, a class of small fishes of the herring family, which are particularly abundant at the mouth of the Thames, England, where they are caught in large quantities. They are from three to six inches long, have a pale ashy-green color above, and the sides and lower parts are white. These fishes come up the river with the tide, especially in the spring and summer. They are considered a delicacy by the aristocracy of London, where they are served on festal occasions.

WHITE CAPS, the name applied in the United States to a mass of people who assume the punishment of persons for real or imaginary offences. Bodies of this kind were formed in places where the law delayed punishment, or the penalty imposed was thought too light, hence those who joined such movements undertook to administer what they considered proper punishment. The name was applied from the large white caps worn to conceal identity. In some instances the punishment consisted only of warning people to leave a neighborhood, but in other instances violence and injustice were perpetrated upon innocent parties.

WHITEFISH (hwit'fish), the name com-



1, Common Whitefish.

2, Rocky Mountain Whitefish.

monly applied to several species of fishes of the salmon family. They are found mostly in the lakes of the northern regions of North America

and are generally favored among the food fishes. About twenty species are native to the lakes of the northern part of the United States and Canada, and in many cases find their way far up the rivers and smaller streams. They usually weigh twelve to fourteen ounces, but the larger species reach four to eight pounds. The common whitefish of the Great Lakes is the most important of the species. Other fishes frequently mentioned as whitefish include the menhaden, the silver salmon, the sewen, and the European whiting.

WHITE HOUSE, the official residence of the President of the United States, in Washington, D. C., so called because it is painted white. It is located on Pennsylvania Avenue, a mile and a half from the Capitol. The original structure was commenced in 1792, when the cornerstone was laid, and the building was completed in 1800. John Adams was the first President to occupy the mansion. The British captured Washington in 1814 and burned the White House together with the Capitol and other buildings, but its restoration was authorized by Congress the following year. In 1818 the new structure was ready to be occupied, which has since been the official presidential residence. The building is modeled after the house of the Duke of Leinster at Dublin, Ireland, is 170 feet long and 86 feet wide, and has a beautiful colonnade in front and a circular porch in the rear. An attractive park with fine walks and beautiful plants surrounds the building. Formerly the executive business was transacted largely in the White House, but separate offices were erected for that purpose a short distance from the building in 1903.

WHITE LADY, in German legends, a feminine spirit reputed to appear in the castles of German princes and nobles at the approach of an important event. She is represented in story as robed in beautiful garments of white and at her side is a bunch of keys, with which she is enabled to pass into the different apartments. Some of the beautiful legends connect her with the nursery, where she rocks and watches over the slumbering children at night. The most famous legend connected with the White Lady is that known as "Bertha of Rosenberg," in Bohemia, and next to it is the creation of Sir Walter Scott, called "The White Lady of Avenel."

WHITE LEAD, a dense, white powder. It is soluble in diluted nitric or acetic acid, but is insoluble in water. It is manufactured by the joint action of carbonic dioxide and vapor of acetic acid on metallic lead. The most common process is to place rolled sheets of lead in earthen pots and pour over them a quantity of acetic

acid, that is, vinegar. A large number of these pots are prepared and loosely covered with disks of lead, after which they are covered with refuse bark from tanneries and set away for a period of five to six weeks. In the meantime the substances undergo a slow oxidation and disengage carbonic dioxide, which in the presence of the vinegar converts the surface of the lead into carbonate. The pots are opened and the white lead is scraped from the remaining metal as soon as a considerable quantity of carbonate has been formed. A number of other processes are employed to facilitate the manufacture of white lead more cheaply, but this process is employed as the most suitable for obtaining a fine quality. White lead is used extensively in painting, not only white, but many shades of color are added to it to produce the desired effect.

WHITE MOUNTAINS, a mountain chain of New England, which is situated chiefly in New Hampshire and belongs to the Appalachian highlands. It extends from eastern Maine nearly across New Hampshire, but assumes the greatest heights and largest extent in the latter State. Mount Katahdin, north of Millinocket Lake, is the highest elevation of eastern Maine, height 5,385 feet, and Mount Washington, height 6,288 feet, is the most elevated peak of the mountain group. The latter is situated in north central New Hampshire and is noted as a favorite resort for summer visitors. A mountain railway, consisting of three rails, was built to the summit of Mount Washington in 1869. A station of the Federal weather bureau and a hotel are located at the summit. Many villas and hotels are maintained in the vicinity for the accommodation of tourists.

The western part of the White Mountains is known as the Franconia Mountains. It contains Mount Lafayette, whose summit is 5,270 feet high, and a number of others which exceed 4,000 feet, including Profile, Liberty, and Moosilauke mountains. A celebrated natural feature of Mount Profile, consisting of three projecting rocks, resembles a human profile and is known as the *Old Man of the Mountain*. Hawthorne based his beautiful allegory "The Great White Face" on this phenomenon. The summits of the White Mountains are generally rocky and bare, but fine forests originally covered the slopes.

WHITE PLAINS, a town in New York, county seat of Westchester County, 22 miles northeast of New York City, on the New York Central Railroad. It is surrounded by a fertile farming and dairying region. The features include the public library, the high school, and

many attractive residences. It is the seat of Alexander Institute and the Bloomingdale Insane Asylum. White Plains is noted as the scene of a battle in the Revolution, which occurred Oct. 28, 1776. The place was held by the Americans under Washington and was attacked by the British under Howe, who came from New York with the view of breaking the blockade by getting in the rear of the American position. Though the latter obtained possession of an unimportant outpost, Washington held the grounds commanding White Plains until in November, when Howe fell back to Dobbs Ferry and Washington removed his troops to New Jersey. The place was incorporated as a town in 1788. Population, 1905, 11,579; in 1910, 15,949.

WHITE RIVER, a stream of Indiana, formed by two branches near the eastern boundary of the State, near the border of Pike County. It has a general course toward the southwest until it joins the Wabash opposite Mount Carmel, Ill. From the junction of the two branches to its mouth is a distance of 50 miles. The entire length, including the West Fork, is 350 miles. Indianapolis is the chief city on the West Fork.

WHITE RIVER, a river of the United States, which rises in the Ozark Mountains of Arkansas and flows into the Mississippi near the mouth of the Arkansas River. It first courses toward the northeast, making a large curve through Missouri, but most of its course is toward the southeast. The White River is 800 miles long, of which 350 miles are navigable. The Black River, which rises in southern Missouri, is its chief tributary. A large portion of the White River valley is fertile, producing cereals, cotton, tobacco, grasses, and fruits.

WHITE SEA, an inlet from the Arctic Ocean, in northern Russia, sometimes called the Gulf of Archangel. It extends inland for a distance of 380 miles, varies in breadth from 30 to 150 miles, and comprises an area of 46,500 square miles. The Gulf of Kandalasksha is in the northwestern part and Onega Bay is in the southwestern part. The coast line, which embraces 975 miles, is largely precipitous. Into it flow the Mezen, Dvina, Onega, and Wyg rivers. Though the surface is frozen from October to May, it is important for commercial purposes and contains excellent cod and herring fisheries. The navigation is connected by canals with the Volga and Dnieper, thus bringing it into direct communication with the Black and Caspian seas.

WHITING (hwit'ing), a fish closely related to the cod tribe, but differing from it in not having a barbel on the lower jaw. The body is

moderately long and covered with small scales, the upper jaw protrudes, and the mouth is deeply cleft. It is usually from twelve to sixteen inches long and weighs from one to three pounds. The whiting is abundant in the seas of Northern Europe and is taken in large numbers off the shores of Great Britain. The name whiting is often applied to the hake and the kingfish of North America.

WHITMAN (hwit'man), a town of Massachusetts, in Plymouth County, twenty miles southeast of Boston, on the New York, New Haven and Hartford Railroad. The streets are regularly platted. It has a public library, waterworks, electric lighting, and a number of fine schools and churches. The manufactures include boots and shoes, hardware, wire nails, clothing, and machinery. Originally it was a part of Abington, but it was incorporated as South Abington in 1875, and the present name was adopted in 1886. Population, 1910, 7,292.

WHOOPING COUGH (hōop'ing kaf), an infectious and convulsive cough which is sometimes epidemic among children, but frequently affects adults. It is accompanied by short and sudden acts of noisy expiration, followed by a long and whooping inspiration. Though it usually occurs but once in the life of an individual and generally during infancy, some persons are attacked two or more times. It is most frequent in the spring and autumn. The symptoms are similar to those of a severe cold and the cough peculiar to the affection appears at the end of five or six days, accompanied by a watery discharge from the nose and eyes, considerable feverishness, and oppressive feeling in the chest. The period is usually from three to four weeks, but in some cases it continues much longer, sometimes even two months. Ordinarily the disease is not dangerous, but it is sometimes complicated with bronchitis and pneumonia, when careful medical treatment is necessary. Severe cases are accompanied by spasmodic symptoms.

WHORTLEBERRY (hwūr't'l-bēr-rŷ), the name of any plant of an extensive genus of shrubs, more commonly known as huckleberry, which see.

WICHITA (wich'ī-tā), a city of Kansas, county seat of Sedgwick County, on the Arkansas River, 160 miles southwest of Topeka. It is on the Missouri Pacific, the Atchison, Topeka and Santa Fé, the Saint Louis and San Francisco, the Chicago, Rock Island and Pacific, and other railroads. The city is surrounded by a fertile farming and stock-raising country. The streets are paved substantially, lighted by gas

and electricity, and traversed by an extensive system of electric railways. It has fine county buildings, many well-constructed public schools and churches, and a public library of 15,000 volumes. The county courthouse is a fine stone structure which cost \$200,000 and the city hall was erected at a cost of \$100,000. It is the seat of the Friends' University, Lewis Academy, a medical college, and a Catholic college. Other features include the Martha Washington Home, the Scottish Rite Masonic Cathedral, the Fairmont College, the Federal post office, and the Wichita and Saint Francis hospitals. Among the manufactures are flour, cigars, lumber products, clothing, machinery, ironware, and farming implements. Wichita has large packing establishments and is an important market for cereals, live stock, dairy products, and vegetables. It was settled in 1869 and incorporated in 1872. Population, 1904, 31,857; in 1910, 52,450.

WICHITA, a tribe of North American Indians, formerly resident in the portion of Oklahoma that lies between the Red and the Wichita rivers, including the region of the Wichita Mountains. According to tradition, they migrated north from Louisiana and settled in Arkansas, after which they crossed north to the region lying beyond the Red River. In 1859 they were assigned to a reservation on the north side of the Wichita, in the vicinity of Anadarko, Okla. These Indians are industrious and became self-supporting soon after the Civil War. Many have intermarried with the whites.

WIDGEON (wij'ŷn), the name of a genus of river ducks, closely allied to the teal and the gadwall. The bill is shorter than the head. It is of equal width throughout and the tip is much rounded. The wings are long and pointed and the toes are fully webbed, but the hind one is lobed. Ten species have been described, nearly all of which are found in the colder regions and usually on the margin of rivers and lakes. The *bald pate*, an American species, is about 22 inches long and is found in Canada and the northern part of the United States, especially in Minnesota. In winter it migrates southward to the interior of the United States.

WIESBADEN (vēs-bä'den), a city of Germany, in the province of Hesse-Nassau, 26 miles west of Frankfort-on-the-Main. It is situated two miles from the Rhine, at the foot of Mount Taunus, and has excellent railroad facilities. The city is the most fashionable and popular watering place in Germany, receiving many thousands of visitors annually, and is supplied with extensive hotels. The streets are beautifully paved, have gas and electric lighting, and

are traversed by a system of electric street railways. It has many beautiful buildings, including the palace, several fine Protestant and Roman Catholic churches, a library with 75,000 volumes, a synagogue of Moorish architecture, and the Kursaal, an extensive tavern. In the vicinity are numerous saline springs, some cold and others warm. The Kochbrünnen are the most remarkable, having a temperature of 156° Fahr. The Romans were acquainted with the springs of Wiesbaden and near the place are remains of baths, walls, and a military station of Roman construction. The city is supported quite largely by summer visitors, but has large manufacturing interests and a considerable trade in produce and merchandise. Population, 1905, 100,953.

WIGAN (wĭg'an), a city of England, in Lancashire, eighteen miles northeast of Liverpool. It is on the Douglas River and is surrounded by a rich farming and coal-producing region. The city has connections by a number of railways and canals. Among the chief buildings are the All Saints' Church, the Albert Edward Infirmary and Dispensary, and a number of fine public schools and churches. It has modern municipal improvements, such as pavements, waterworks, a public library, and rapid transit by electric railways. A beautiful park of 27 acres is the chief place of recreation in the summer time. The manufactures include machinery, cotton and woolen goods, hardware, chemicals, spirituous liquors, railway cars, paper, and engines. Wigan was a station during the Roman occupation. Population, 1908, 88,728.

WIGHT (wĭt), **Isle of**, an island in the English Channel, which is separated from the mainland by the Solent and the Spithead, forming a part of the county of Hants. The length from east to west is 23 miles; breadth, thirteen miles; and area, 146 square miles. Much of the surface is elevated, but it is diversified with hills and dales. The island has long been noted for its beautiful scenery and interesting geology. It is visited by many tourists. The chief streams are the Medina, Yar, and Brading. Along the southern coast is the district known as the Under Cliff, where several hospitals are maintained for invalids. It has manufactures of cement and considerable shipbuilding. Sheep raising and fruit and vegetable culture are pursued with success. Newport is the government center. Other towns include Yarmouth, Ventnor, Cowes, Freshwater, and Bembridge. Several railroads and electric car lines are in successful operation. It has a number of landmarks dating from Roman occupation, chiefly

near Brading. Carisbrooke Castle, in which Charles I. was imprisoned for some time, is an interesting ruin. Population, 1907, 84,837.

WIGWAM (wĭg'wŏm), the name applied to a house built by the Indians of North America, especially one made of bark or matting in the form of a hut or cabin. Such a structure is built with a framework of saplings or small trees, which are set in the ground and converge at the top, where an opening is left for the escape of the smoke. Some tribes covered the framework with skins, while others used bark or braided mats of grass. In winter a fire was built in the center of the tent and mats were laid near the walls to serve as places to rest and sleep.

WILD CAT, or **Catamount**, the general name given to several species of wild animals. The common wild cat of Europe formerly inhabited all parts of the continent, except the sections of the extreme north, and is still found in some of the forests and mountains. It is larger than the domestic cat and has a shorter and thicker tail. The limbs and body are longer and larger. This animal is supposed to be the source of many species of the domestic cat. The name wild cat is applied to the jungle cat of India, the chati or margay of Mexico, and the lynx of North America.

WILDERNESS, Battles of the, the name of a series of battles in the Civil War of America, sometimes spoken of collectively as the Battle of the Wilderness. It is so named from the general character of the region in which the contests occurred, where the vicinity was characterized by swamps and thickets of pine and scrub oak. General Grant had an army of 120,000 men and was supported by Meade, Hancock, and Burnside, while the Confederates under General Lee numbered about 80,000 men. The Federals crossed the Rapidan River on pontoons on the night of May 3, 1864, under the immediate command of General Burnside, and took a position at the margin of the Wilderness.

Lee anticipated the movement undertaken by Grant and began the attack early in the morning of May 5. The Confederates fully understood the locality, thus placing the Federals at some disadvantage in the almost impenetrable forests, which made it necessary to confine the fighting to musketry at close range. General Warren carried the brunt of the battle during the day, while the Confederates were led by General Ewell, and the day ended without little advantage to either side. In the meantime Grant ordered Hancock to move upon the scene from Chancellorsville, while he engaged the Confederates under General Hill in a drawn battle. Lee

summoned Longstreet to reinforce Hill and by joint action attempted to force the Federals back across the Rapidan, but the hostilities ended on the approach of night. While neither side gained material advantage, the Confederates were unable to advance farther and the Federals failed to progress toward Richmond. The contest of two days in the Wilderness caused a loss of 11,400 men by the Confederates and 15,387 men by the Federals. A few days later occurred the Battle of Spottsylvania Court House.

WILKESBARRE (wĭlks'bär-rĭ), a city of Pennsylvania, county seat of Luzerne County, 142 miles northwest of Philadelphia. It is on the Susquehanna River, which is crossed by four bridges, and on the Lehigh Valley, the Pennsylvania, the Delaware, Lackawanna and Western, and other railroads. Electric railways furnish communication within the city and to many other commercial centers and inland points, including the Laurel line to Scranton, one of the finest three-rail lines in the country. The site is a beautiful tract of land overlooking the river, and the surrounding country produces large quantities of anthracite coal.

The streets are regularly platted and well improved by pavements of stone and macadam. Among the principal buildings are the county courthouse, the Osterhout free library with 35,000 volumes, the Wyoming historical museum, the Grand Army hall, the Young Men's Christian Association, and many fine business blocks. It has a thoroughly organized system of public schools, which terminates in an extended high school course. The city has several theaters, a number of fine hotels, and many well-constructed ecclesiastical buildings. Many of the streets are ornamented with shade trees, especially in the residential section, and the city maintains its waterworks and sewerage systems.

Wilkesbarre is important as a manufacturing and commercial center. The coal produced in the vicinity has been instrumental in building up vast industrial enterprises. Among the establishments are the machine shops of the Lehigh Valley Railway, breweries, flour and grist mills, cutlery works, and manufactories of silk and cotton goods. It produces large quantities of locomotives, clothing, automobiles, underwear, and machinery. The first settlement in the vicinity was made in 1769. In 1778 it was the scene of a conflict between the Americans and the Loyalists and Indians, on account of which the Wyoming Monument has been erected. It was made the county seat in 1786, incorporated as a borough in 1806, and chartered as a city in 1871. Many towns and boroughs of

considerable size are located in the vicinity. Population, 1900, 51,721; in 1910, 67,105.

WILKINSBURG (wĭl'kĭnz-bŭrg), a borough of Pennsylvania, in Allegheny County, six miles east of Pittsburg, with which it is connected by electric railways and the Pennsylvania Railroad. The surrounding country produces large quantities of coal. Among the features are the Home for Aged Protestant Women, the public library, the high school, and the Presbyterian Home for the Aged. The manufactures include machinery, hardware, cigars, furniture, and clothing. It was formerly known as Rippeyville, but was given its present name in honor of William Wilkins, Secretary of War under President Tyler. Population, 1910, 18,924.

WILL, in law, the disposition of a person's property to take effect after death. The term will is more strictly applied to the disposal of real property, while the word *testament* has reference to the disposition of personal property. The words *last will* are usually employed in documents that dispose of real property, while the expression *last will and testament* refer to the disposal of both real and personal property. In order to have testamentary capacity, that is, to be able to dispose of property either by a will or a testament, it is necessary that the person be of full age and sound mind. In most countries this right is vested in females who have reached their majority and in married persons of both sexes, even if they have not reached full age. A will must be in writing, be signed by the testator or some one acting in his presence and by his direction, and be witnessed by two persons who are present at the time and not beneficiaries by the will. The testator may name one or more persons as executors to see that the provisions of the will are carried out, but in the absence of such an appointment the court names the executor.

A *codicil* is an addition to the will. Both the will itself and one or more codicils, to render them inoperative, may be canceled or destroyed by the testator, or a document to revoke the will may be duly executed in the presence of two witnesses, who must sign the same. If several wills are in existence, the one of latest date takes precedence, but, if it is revoked, the one prior is thereby revived. The custodian of a will files the same in the probate court after the death of the testator, where it is admitted to probate and is afterward duly recorded. In most countries personal property can be disposed of by will verbally in the presence of witnesses, though the value is usually limited to \$300.

WILL, in mental science, one of the three faculties of the mind, which include intellect, sensibility, and will. The *will* is the faculty by which we choose and execute, or, as defined by some writers, the power of choice and volition. A completed act of the will embraces the choice of an aim or object and the putting forth of energy to accomplish that aim, or attain that object. Thus, a choice is more than a mere preference between two courses of action. It may be said to constitute the choice of an object to which the activity is to be directed. To what extent the will is free in making a choice has been a subject of controversy for ages. Philosophers in all epochs of learning have discussed the relation between will and motive, but it has never been authoritatively settled whether the will determines the motive or the motive governs the will. On the one hand we have those who maintain a theological and metaphysical belief in the freedom of the will, while others assert that will action is the result of necessity. Aristotle asserted the freedom of the will in his ethics and was supported in that view by the Stoics, the Epicureans, Origen, and Saint Augustine. Many modern writers, among them Kant and Hamilton, have supported the view that the action of the will is unrestrained. The Gnostics denied the freedom of the will, as also did many early Christians, Spinoza, and Hume. That the will can be effectually trained is apparent, its right culture depending upon right use. The training of this faculty depends upon allowing the child to exercise the will within reasonable limits, but the learner is to be held responsible for the consequences attending its free exercise.

WILLAMETTE (wīl-lā'mēt), a river in Oregon, which rises in the Calapooia Mountains, a range of the Cascades, and after a general course toward the north enters the Columbia near Portland. It has a total length of 258 miles and is navigable for 150 miles. Canal and locks are maintained to avoid the falls at Oregon City and Eugene. The Willamette valley is the most densely populated part of Oregon. Among the chief tributaries of the Willamette are the Yamhill, Santiam, Calapooia, and McKinzie rivers. Portland, Salem, Albany, Oregon City, and Eugene are the principal towns on the Willamette.

WILLIAM AND MARY COLLEGE, an institution of higher learning at Williamsburg, Va., founded in 1693. It is the second oldest institution of its kind in the United States. During the Revolution it suffered heavily through the loss of its endowments and much of its

property was destroyed at the time of the Civil War, when the buildings were occupied by the Federal troops. It was again opened in 1869, but suspended instruction from 1881 until 1888, owing to a lack of financial support. In 1893 Congress granted it an indemnity of \$64,000 for its losses during the Civil War, and in the meantime it received additional aid from the State. The courses include general normal and collegiate instruction. It has a library of 10,000 volumes, the property is valued at \$160,000, and it is attended by about 200 students. Among the eminent graduates are John Marshall, Winfield Scott, and Presidents Harrison, Jefferson, Monroe; and Tyler.

WILLIAMSBURG (wīl'yamz-bûrg), a city in Virginia, county seat of James City County, on the James River, 48 miles southeast of Richmond. It is on the Chesapeake and Ohio Railroad. The features include the county courthouse, the Powder Horn building, the Bruton Parish Church, the Eastern State Hospital for the Insane, and the William and Mary College. It has manufactures of knit goods, brick, machinery, and lumber products. Fish, oysters, fruit, and farm produce are shipped from this place. It was settled in 1632 and became the capital of Virginia in 1698, supplanting Jamestown as the seat of government. Williamsburg was the scene of several battles in the Revolution and the Civil War. The Battle of Williamsburg, fought on May 6, 1862, was an engagement of the Peninsular Campaign, in which the Union army under Hooker was defeated by the Confederates under command of Longstreet and Magruder, the former losing 2,285 men and the latter 1,560. Jefferson, Randolph, Tyler, Monroe, Winfield Scott and Chief Justice Marshall are among the famous men who studied at Williamsburg. It was the Colonial and State capital until 1780. Population, 1900, 2,044; in 1910, 2,714.

WILLIAMS COLLEGE, an institution of higher learning at Williamstown, Mass., founded by charter in 1793. It is the outgrowth of a school established under the will of Ephraim Williams (1715-1755), an American soldier and pioneer. Mark Hopkins was its president from 1836 until 1872, under whose supervision it developed a high standing among the institutions of America. Students are admitted upon examinations or certificates from accredited schools, and the courses lead up to the degrees of B. A. and M. A. It has property valued at \$450,000, an endowment of \$1,250,000, and a library of 65,000 volumes and pamphlets. The faculty con-

sists of 30 instructors and it has an attendance of 450 students.

WILLIAMSPORT (wīl'yāmz-pōrt), a city in Pennsylvania, county seat of Lycoming County, on the Susquehanna River, 93 miles north by west of Harrisburg. It is on the Erie, the Pennsylvania, the Philadelphia and Reading, and other railroads. The surrounding country is a rich farming and coal-producing region. It has a large trade in coal, lumber, and merchandise. The streets are regularly platted and finely improved by pavements, gas and electric lighting, electric street railways, waterworks, and several parks. Among the chief buildings are the county courthouse, the city hall, the Federal post office, the Masonic Temple, the Dickinson Seminary, and the Scottish Rite Cathedral. The manufactures include lumber products, clothing, boilers, cigars, rubber goods, sewing machines, furniture, and machinery. It was first settled in 1795 and was chartered as a city in 1866. Population, 1900, 28,757; in 1910, 31,860.

WILLIAMSTOWN, a town of Massachusetts, in Berkshire County, on the Hoosac and Green rivers, 22 miles north of Pittsfield. It is on the Boston and Maine Railroad and has communication by electric railways. The leading features include the Mission Park, the public library, and the Williams College. It is primarily a residential center, but has manufactures of boots and shoes, woolen goods, hardware, clothing, and carriages. Williamstown was settled in 1753 and called West Hoosac, but the present name was adopted in 1765 in honor of Ephraim Williams. Population, 1905, 4,425.

WILLIMANTIC (wīl-lī-mān'tīk), a city of Connecticut, in Windham County, on the Natchaug and Willimantic rivers, 30 miles east of Hartford. It is on the Vermont Central and the New York, New Haven and Hartford railroads. The Willimantic River has a fall of 100 feet in one mile, thus supplying an abundance of water power. The noteworthy buildings include the public library, the townhall, the Dunham Hall Library, and the State normal training school. Among the manufactures are cotton and silk textiles, woolens, linen thread, carriages, machinery, and farming implements. It has a growing trade in merchandise. The place was settled in 1822, became a borough in 1833, and was incorporated as a city in 1893. Population, 1900, 8,937; in 1910, 11,230.

WILLOW, a class of shrubs or trees of the genus *Salix*, varying in size from shrubs of only a few inches in height to trees 40 to 75 feet high. They usually grow by or near water courses

and are confined almost entirely to the temperate and colder regions of the Northern Hemisphere. Many species have been described. The branches of most species are smooth and the branchlets are usually long, slender and pliant. Most species have numerous long roots which penetrate into the moist soil and by a network of fibres supply protection against the water of streams wearing away the banks. The slender and pliant branchlets of some species



WEeping WILLOW.

have been utilized from the earliest time for basket work and in the early history of Europe were twisted into ropes. This class of willows is known as *osier* and includes the two kinds generally called *velvet osier* and *purple osier*. The leaves of some species are used for fodder, some furnish excellent timber and valuable wood for gunpowder charcoal, and others yield bark which is rich in tannin.

Fully 160 different species of willows have been catalogued, of which 35 are native to North America. Most of the American species yield a wood which is too soft for construction purposes, but it possesses value for charcoal and fuel. It is employed in making furniture, baskets, and various household utensils. The *white willow* is especially valuable for making charcoal for gunpowder. It is planted in many places for its wood and for protection of other trees against winds, its rapid growth making it of particular value for that purpose. The *weeping willow* is a fine ornamental tree native to Asia and has been introduced in many parks and cemeteries of America. The branchlets of this species are remarkable for their drooping habit, thus making a large tree very attractive. It has long been considered as symbolical of mourning. The *salix regalis* is greatly admired for its white, silvery leaves.



WILLOW BASKET.

WILMINGTON (wīl'mīng-tūn), a city of

Delaware, county seat of Newcastle County, 28 miles southwest of Philadelphia, Pa. It is situated on the Delaware River and on the Baltimore and Ohio, the Philadelphia, Baltimore and Washington, and the Wilmington and Northern railroads. The harbor is sufficiently deep for the landing of large steamers and lines are maintained with many commercial centers, both for the conveyance of freight and passengers. Intercommunication is by electric railways, which extend to many inland points. The site is on elevated ground, overlooking the Delaware, which is about three miles wide at this point, and within the city is the junction of Christiana and Brandywine creeks. The streets are platted regularly, crossing each other at right angles. They are improved and beautified by parkings, pavements, and gas and electric lighting.

Among the chief buildings are the county courthouse, the post office, the public library, the customhouse, the auditorium, and the Equity Guarantee and Trust Company's building. The Holy Trinity Church, built by the Swedes in 1698, is one of the oldest ecclesiastical structures in the United States. The public schools are well organized. It has many fine hospitals and charitable institutions, such as the State Hospital for the Insane and the Home for Friendless and Destitute Children. It is the seat of the Wesleyan Female College, the Delaware Institution, the Rugby Academy for Boys, the Delaware Industrial School for Girls, and the State Normal University.

Wilmington is important as a commercial and manufacturing center. Much water power for industrial enterprises is obtained from the Falls of the Brandywine. It has large interests in shipbuilding, the construction of railway cars and machinery, the manufacture of paper, and the production of morocco leather. About four miles from the city is a large powder factory. The general manufactures include clothing, machinery, leather, saddlery, hardware, and pottery. It is the center of a large trade in merchandise, fruits, and general manufactures.

The site of Wilmington was first settled by the Swedes under Peter Minuet in 1638 and the locality was named Fort Christina. Later the village became known as Christinaham. The Dutch under Peter Stuyvesant bought the region from the Indians in 1655 and Fort Christina was taken by them the same year. Nine years later the place was captured by the English, after which it was added to the proprietary possessions of William Penn. Thomas Willing platted a town in 1737, which became known as

Willingstown, but eight years later the name was changed to Wilmington. Chad's Ford, about twelve miles distant, was the scene of the Battle of Brandywine. Population, 1910, 87,411.

WILMINGTON, the largest city in North Carolina, county seat of New Hanover County, on the Cape Fear River, eighteen miles from the sea. It is on the Atlantic Coast Line, the Seaboard Air Line, and other railroads. The harbor is well improved and has steamboat connections with the principal ports on the Atlantic. Among the noteworthy buildings are the county courthouse, the United States government building and marine hospital, the city hall, the public library, the Cape Fear Academy, the Masonic Temple, the Y. M. C. A. building, and the county and city hospitals. The manufactures include carpets, turpentine, creosote, cotton and woolen goods, cotton-seed oil, hardware, lumber products, and machinery. The exports consist chiefly of turpentine, cotton, rosin, and lumber. Gas and electric lighting, waterworks, storm drainage, and electric street railways are among the general facilities. Formerly the site was occupied by Newton, a town founded in 1730, but the name was changed to Wilmington in 1739. The place was incorporated as a city in 1866. It was the chief port of entry for the Confederates in the Civil War. Population, 1910, 25,748.

WINCHENDON (wĭn'chĕn-dŭn), a town of Massachusetts, in Worcester County, 68 miles northwest of Boston. It is on the Boston and Albany and the Boston and Maine railroads and is surrounded by a fertile region. The manufactures include cotton and woolen goods, machinery, hardware, and clothing. Among the chief buildings are the high school, the public library, an orphanage, and several fine churches. The region was first settled in 1752, and the town was incorporated under its present name in 1764. Population, 1905, 5,933.

WINCHESTER (wĭn'chĕs-tĕr), a city of Kentucky, county seat of Clark County, eighteen miles southeast of Lexington, on the Louisville and Nashville and the Chesapeake and Ohio railroads. It is situated in the famous Blue Grass region. The principal buildings include the county courthouse, the high school, and the Kentucky Wesleyan College. Among the manufactures are flour, tobacco products, carriages, and farming machinery. The streets are improved by electric lighting, grading, waterworks, and drainage. The trade in live stock, cereals, and lumber is important. It was incorporated in 1792. Population, 1900, 5,964; 1910, 7,156.

WINCHESTER, a town of Massachusetts, in Middlesex County, seven miles northwest of

Boston, on the Baltimore and Maine Railroad. It is popular as a residential center for Boston business men. Middlesex Falls, a large State park, is partly within the town. Other features include the public library, the State Aviary, and the home for the aged. It has manufactures of leather, felt goods, machinery, and earthenware. Originally the place was known as Waterfield, but it has been called Winchester since 1850. Population, 1905, 8,236; in 1910, 9,309.

WINCHESTER, a city of Virginia, county seat of Frederick County, 148 miles northwest of Richmond, on the Cumberland Valley and the Baltimore and Ohio railroads. It is surrounded by a fertile farming and stock-growing country and has a growing trade in fruits and merchandise. The manufactures include shoes, furniture, clothing, machinery, and ironware. It has the county courthouse, a public library, the Valley Female College, the Fairfax Hall, the Shenandoah Valley Academy, and Confederate and Federal cemeteries. Winchester was the scene of a number of important events in the Civil War. It was at Winchester that Sheridan heard of the battle at Cedar Creek and started from the vicinity on his famous ride to save the day. It was chartered as a city in 1874. Population, 1900, 5,161.

WIND, a current of air moving in the atmosphere, which is caused by variations of temperature in different latitudes, or in various portions of the same latitude. When all parts of a layer of atmosphere are equally dense, a calm extends over the region, but as soon as different parts of the layer become of an unequal temperature there is a more or less perceptible movement of air. This is caused by the sun heating the surface of the earth more easily in some parts than in others, thus causing the air above the more heated parts to expand and become lighter, which is then pressed upward by the colder air that rushes in from all sides to take the place of the ascending current. The ascending currents gradually become deflected and form upper currents from the heated surface, but later settle down near the surface to replace the air that has moved in lateral surface currents toward the heated area. A circulatory motion continues in the air as long as the heated area remains warmer than the surrounding regions.

Sea breezes are caused in the same way. The surface of the land becoming more highly heated than that of the water, owing to the fact that the sun's rays penetrate more deeply into the water, an ascending current rises over the land and a breeze sets in from the sea every after-

noon. At night the land becomes cooled more rapidly than the water, hence the ascending current then rises from the water and a *land breeze* sets in from the land sometime after midnight. Since the strength of these winds depends upon the difference of the temperature of the land and the water, they are best defined in the tropical and intertropical regions, though they occur in many of the higher latitudes during the hotter part of the year. Currents of electricity and the condensation of aqueous vapors rising from the surfaces of rivers and seas have a more or less noticeable effect upon the air, though the chief cause of winds is the unequal distribution of heat. The anemometer is an instrument to measure the force and velocity of winds. Winds have a relatively vast difference in the force and velocity. A wind blowing at the rate of 100 miles an hour has a pressure of 50 pounds to the square foot, a force sufficient to move loose objects along the surface of the earth. On the other hand, a breeze of 20 miles has two pounds of pressure to the square foot and a light wind moving at the rate of five miles has only two ounces.

Winds are named after the direction from which they blow, as an *east wind*, a *northeast wind*, a *north wind*, etc. They are also designated as *constant*, or those whose direction remains the same throughout the year; *periodical*, or those which blow alternately in opposite directions for regular periods; and *variable*, or those which blow in any direction. *Equatorial currents* blow as upper currents from the Equator toward the poles and move in a direction opposite to the surface wind, while *polar currents* are lateral surface currents that flow from the poles to the Equator. The earth rotating upon its axis from west to east, there is a constant tendency to deflect the direction of the winds from a straight line drawn between the Equator and the poles. Thus the polar currents, when unaffected by local disturbances, blow from the southeast in the Southern Hemisphere and from the northeast in the Northern, while at the Equator their direction is nearly due east. The equatorial currents blow from the northwest in the Southern Hemisphere and from the southwest in the Northern, but it must be observed that the lateral surface currents are felt mainly as moderate winds.

The *zone of calms* is a region extending from about 2° to 11° north latitude. It is caused by the ascending currents near the Equator neutralizing the inblowing polar currents, thus producing calms. From the zone of calms to about 30° on each side of the Equator the polar cur-

rents blow with such constancy that they have been named *trade winds*, from their value to commerce. In the Northern Hemisphere their direction is northeast and in the Southern it is southeast. Beyond the trade winds is a region of *periodical calms*, and still farther toward the poles is a great belt of variable winds, in which the equatorial and polar currents alternate as predominating winds. Besides these are numerous winds that bear local names, such as the typhoon, sirocco, harmattan, etesian, and simoom. The light winds of the Indian Ocean are called *monsoons*; the hot desert winds sweeping across Northern Africa, *simooms*; the storms in the Gulf of Guinea, *tornadoes*; and those of the Pacific, *typhoons*. *Chinook winds* are those occurring on the eastern slopes of the mountains from Colorado to the Peace River. They are warm and dry, continuing from a few hours to several days and usually coming from a westerly or northerly direction. See **Whirlwind**.

WINDERMERE (wĭn'dĕr-mĕr), a freshwater lake of England, in the northwestern part of the country. It lies in the counties of Lancashire and Westmorland. The overflow is by the Leven River into Morecambe Bay, an extension of the Irish Sea. The lake is one mile wide and fourteen miles long and contains a number of fertile islands. Rydal, the home of Wordsworth, is situated near its northern extremity.

WINDLASS (wĭnd'lās), a familiar form of the wheel and axle, used for raising weights by means of winding a chain or rope around a cylinder. The cylinder in the capstan is usually vertical, while in the windlass it is horizontal, and in the latter machine it is made to revolve either by a winch or handspike. See **Wheel and Axle**.

WINDMILL, a machine which is turned by the wind and designed to furnish motive power, as for pumping or for operating mills. Machines of this kind came into use in Europe about the 11th century, but the form was very different from that of the windmills which are now in general use. They consisted essentially of a rotating cap attached to the tower, with four to six canvas-covered frames to receive the wind and an eccentric attached to the shaft for driving the machinery below. Windmills of similar construction are still employed to a considerable extent for pumping in the dike regions of the Netherlands. The windmills used extensively at present for pumping water on farms consist of a tower, trestled or inclosed, within which is a shaft having at the top a rotary shaft

set at right angles, bearing a steering rudder at one end and a system of adjustable slats or sails radiating from the other.

In most mills the sails are made of narrow wooden slats, forming a circular disk, but sheet iron and steel turbine sails have gone largely into use within recent years. To keep the sails facing the wind, a self-adjusting fan or flyer is attached to the projecting framework at the rear. As the mill is turned by the air it revolves a crank, which transmits motion to the machinery below. Power cannot be obtained by means of a windmill unless there is a reasonable movement of air. Considerable advantage is gained by placing the windmill on a lofty tower, but it has been found that the average time a windmill can be utilized does not exceed 10 hours out of 24, though this depends very largely upon the locality where it is situated. On many farms an automatic mechanism is placed in a watering tank, which serves to stop the mill when the tank is pumped full of water. In some localities tracts of land are irrigated by water being pumped by means of windmills.

WINDOW, an opening in the wall or certain parts of the roof of a building, intended for the admission of light and partly as a means of ventilation. Openings of this kind were common among the people of ancient times, but they were comparatively small and few in number. The Egyptians had windows in dwellings and structures intended for military purposes, but rarely employed them in buildings intended for religious worship. The Greeks used glass to a considerable extent in covering the openings to prevent the admission of external air, but the forms were very irregular, usually of triangular or oblong outline. Windows were common among the Romans, who enlarged the openings, thus securing an increase in light and a better command of the surrounding prospect. In Western Europe the openings in the walls were little more than narrow slits until the 12th century, when glass came into general use. Stained glass has continued to be popular for churches and chapels, but has gone largely out of style for private dwellings, although some windows, where the view is obstructed, are either of stained or glazed glass.

The forms of windows used at present are almost endless in variety, but most of them may be grouped under two styles known as the Gothic and the Italian. These styles are alike serviceable in contributing to the general decoration or architectural effect of a building. At the same time they serve the purpose of admit-

ting light and external air, as well as shutting out cold and moisture. Windows in shops and stores are generally large in size, from ten to fifteen feet square, and are made of plate glass. The glass is usually set in a frame, or sash, which is made of wood or metal.

WINDSOR (wĩn'zēr), a city of Canada, in the Province of Ontario, on the Detroit River, opposite Detroit, Mich. It is on the Wabash, the Grand Trunk, the Michigan Central, the Canadian Pacific, and other railroads. Extensive wharves and regular communication by steamboats are maintained. The noteworthy buildings include the city hall, the high school, the public library, the International Hotel, and many churches. It has a large trade in live stock, cereals, lumber, and merchandise. The manufactures include salt, cotton and woolen textiles, ironware, shoes, lumber products and machinery. The place has sanitary sewerage, public waterworks, electric street railways, and other municipal facilities. Limestone and salt deposits are worked in the vicinity. Population, 1907, 14,310.

WINDSOR, a town of England, in Berks County, 22 miles west of London. It is finely situated on the Thames River and may be reached by railways and steamboats. Windsor Castle, the noted palace of the English sovereigns, is its chief attraction. This fine structure is situated on the east side of the town, where its elevated site furnishes a grand view of the Thames River and surrounding region. The history of Windsor dates from the reign of Henry III., who erected a tower on the present site of the palace, but Edward III. rebuilt it in 1344, largely to accommodate the Knights of the Garter. As at present arranged, the castle occupies the so-called Little Park, a tract of land four miles in circumference, while surrounding the latter is the Great Park, having a circuit of eighteen miles. Windsor Forest is a still larger park, which contains many oaks estimated to have grown fully a thousand years. Among the chief attractions are Saint George's Chapel, the installing place of the Knights of the Garter; the round tower or keep, formerly used for state prisoners; and the old and new state apartments. In Saint George's Chapel are the vaults of many sovereigns, including Henry VI., Henry VIII., George III., George IV., William IV., and the unfortunate Charles I. It has a royal library with beautiful collections of drawings, portraits, paintings, and valuable printed volumes. The town of Windsor has few manufactures aside from tapestry, but is a point of interest to tourists. It has a number of fine

schools, churches, and hotels. Population, 1908, 14,386.

WINDWARD ISLANDS (wĩnd'wērd), an island group of the Lesser Antilles, lying east of the Caribbean Sea and extending between the Leeward Islands and Trinidad. The name is applied somewhat loosely to include Martinique, an island belonging to France, but in a more restricted sense it has reference to the British colony comprising all the islands between Trinidad and Martinique, lying west of Barbados. This colony has an area of 524 square miles. It includes the islands of Saint Vincent, Saint Lucia, Grenada, and the Grenadines. Negroes constitute the chief part of the inhabitants. Among the principal productions are coffee, sugar, spices, cacao, rum, and tropical fruits. The climate is quite favorable, but hurricanes are frequent and the rainfall is excessive. Saint George's, on Grenada, is the capital and seat of government.

WINE, the fermented juice of fruits, but the name is applied more particularly to the product obtained by fermenting the juice of the grape. Many widely different varieties of wine are manufactured, the peculiar qualities depending upon the season, age, climatic conditions, and the fruits used in their production. All these more or less influence the flavor, color, and effect upon the tongue and palate. Wines are said to be *dry* when they contain little or no sugar and *sweet*, when the proportion of sugar is clearly perceptible to the taste, but between these two extremes are many marketable varieties. The essential ingredients of wine are alcohol, water, and coloring matters, but besides these wines contain glycerin, volatile oil, grape sugar, vegetable albumen, calcium tartrate, gum, and various acids, such as phosphoric, acetic, and carbonic acid. The proportion of alcohol varies from seven per cent. in certain elderberry wines to 25 per cent. in certain sheries. Wines bottled while still fermenting contain carbonic acid gas and when uncorked foam slightly and have a brisk effect upon the tongue. These are called *sparkling wines*, while those that do not sparkle are designated *still wines*.

The annual production of wine in the United States averages 55,000,000 gallons, the larger part of which is made in California. California wines are counted among the best, owing to the favorable climate and the vigorous growth of the grape on the Pacific slope. In ancient times the most celebrated wines were made by the Greeks in Lesbos and Chios and by the Romans in Cecuban. France, Germany, Spain, Italy, Portugal, Austria and Turkey are the

chief wine-producing countries of Europe. Many grades of wine have a wide and favorable reputation. *Bordeaux*, *Burgundy*, and *Champagne* are made in France; *Rhine wine* and *Moselle*, in Germany; *Tokay*, in Austria-Hungary; *sherry* and *port*, in Spain and Portugal; *Oporto*, in Portugal; and *Madeira*, in the island of Madeira, off the western coast of Africa.

The manufacture of wine from grapes is an easy art in the grape-producing regions. In making the better grades of wine much care is exercised in selecting only the fully developed berries, all the faulty and unripe portions being carefully separated by hand. After removing the berries from the stems, they are placed in a wine press or large tub, where they are crushed to separate the juice from the skin and seed, which is usually done by a lever-and-wedge press. In some countries the crushing is effected by men treading the grapes with their naked feet in shallow tubs. Usually the grapes are pressed several times, the expressed juice equaling about seventy per cent. of the grapes by weight. The juice has a sweet taste when first expressed from the grapes and is called *must*. It is placed in vats to ferment, the process of fermentation requiring a few hours or a few days, this depending upon the temperature. Small bubbles of carbonic acid gas are given off in the process of fermentation and the sugar of the juice is converted into alcohol. The fermented juice becomes clear after fermentation ceases and is drawn off into casks, in which a second or lighter fermentation takes place. As soon as fermentation ceases, the casks are closed and are ready for storage or for the market. In making Champagne wine the grapes are picked before they become entirely ripe, while port and Rhine wines require quite well-ripened grapes. The color is due to the skins. In making white wines the skins are removed before expressing the juice. Other fruits used in making wines include cherries, oranges, currants, gooseberries, elderberries, raspberries, blackberries, and many others.

WINFIELD (wĭn'fĕld), a city in Kansas, county seat of Cowley County, on the Walnut River, forty miles southeast of Wichita, on the Missouri Pacific, the Saint Louis and San Francisco, and the Atchison, Topeka and Santa Fé railroads. The surrounding country is fertile. The streets are improved by grading, waterworks, and electric lighting. Near the city is a Chautauqua ground. The noteworthy buildings include the county courthouse, the public library, the State Imbecile Asylum, the Saint John's Lutheran College, and the Southwest Kansas

College. It has a growing trade in farm produce and live stock. The manufacturing establishments include flouring mills and machine shops. Limestone quarries are worked in its vicinity. The place was settled in 1870 and incorporated in 1871. Population, 1904, 7,758; in 1910, 6,700.

WINGED LION, an emblem of Saint Mark, the patron saint of Venice, Italy. It is situated on one of the columns of the Piazzetta at Venice and is constructed entirely of bronze. Napoleon carried it to Paris in 1797, but it was restored to Venice in 1815.

WINNEBAGO (wĭn-nĕ-bā'gō), the largest lake of Wisconsin, in Winnebago County, forty miles west of Lake Michigan. It receives the water from the Fox and Wolf rivers and the overflow from Lake Poygan. The length is about 30 miles, the greatest width is 10 miles, and the area is 218 square miles. It discharges through the Fox River into Green Bay. The Fox River is navigable, making the lake of value for transportation. It has fine fisheries. On its shores are the cities of Menasha, Fond du Lac, and Oshkosh.

WINNEBAGOES (wĭn-nĕ-bā'gōz), an Indian tribe of the Dakota family, first met with by French traders in the Green Bay region of Wisconsin. They were a powerful tribe in the 16th century and opposed the Algonquins with considerable vigor, but in the next century an alliance was formed against them and their numbers became greatly reduced. In the French and Indian War they sided with the French, but joined the British against the colonies in the Revolution. General Wayne reduced them in 1793 and 1794. They sided against the Americans in the War of 1812. Subsequently they joined the alliance under Tecumseh. In 1829 they ceded large tracts of land and in 1866 they accepted certain lands in the vicinity of Winnebago, Neb. Several Protestant and Catholic missions and a number of schools have been conducted among them, and many have made material advancement in education and civil arts. At present they number about 2,125.

WINNIPEG (wĭn'nĭ-pĕg), a lake of Canada, lying in Manitoba, Keewatin, and Saskatchewan. The length is 275 miles, the width is from 40 to 62 miles, and the area is about 8,940 square miles. A basin of 395,000 square miles drains into it. The surface is 710 feet above the level of the sea. It receives the water from the Red River of the North, the Assiniboine, and the Saskatchewan rivers and its overflow passes by the Nelson into Hudson Bay. Lake Winnipeg

receives the discharge from the Lake of the Woods by the Winnipeg River, a stream about 290 miles long. It has excellent fisheries, but navigation is obstructed by ice about six months of the year.

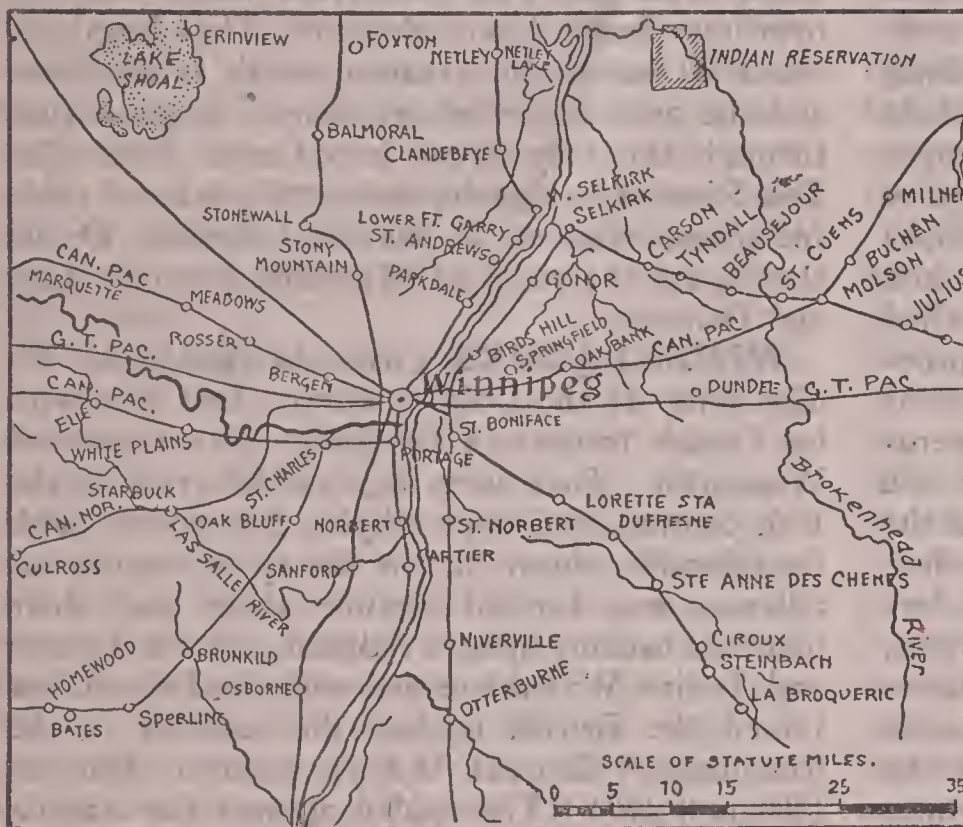
WINNIPEG, a city of Canada, capital of Manitoba, 1,124 miles west by north of Montreal and 398 miles northwest of Saint Paul, Minn. It is situated at the junction of the Assiniboine with the Red River, through which it has access to Lake Winnipeg. The transportation facilities are very extensive by the Canadian Pacific, the Canadian Northern, the Grand Trunk, the Northern Pacific, and the Great Northern railroads. Intercommunication is afforded by a system of electric railways, which operates

many hospitals and institutions of secondary and higher education. Among the leading educational and professional institutions are the University of Manitoba, the Saint John's College, the Manitoba Medical College, the Saint Boniface College, and the Manitoba College. Saint Boniface, a town with a large French population, is on the east bank of the Red River, connected with Winnipeg by a number of bridges.

Winnipeg is surrounded by a fertile farming country. It has a large trade in lumber, wheat, hides, live stock, and merchandise. It ranks as the greatest grain market in the British Empire. Within the last two decades it has developed extensive manufacturing interests, and its fine transportation facilities have caused the building of a vast wholesaling trade.

Among the chief manufactures are flour and grist, boots and shoes, clothing and hosiery, lumber products, brick and pottery, carriages, machinery, hardware, and farming implements. It has extensive railway shops of the Canadian Pacific and is important as a banking and financial center.

The history of Winnipeg may be said to have its beginning in 1870, but before that time it was known as Fort Garry, when it was important as a trading post of the Hudson's Bay Company. A band of insurgents under Louis Riel had taken possession of Fort Garry early in 1870, and Wolseley was dispatched with a military force to dispossess them. At that time about 200 people resided in the vicinity—and these served as the nucleus of the present metropolis. Soon after railway communication was established



branches to many suburban and interurban points, and a railway line extends to the shore of Lake Winnipeg. The streets are regularly platted, crossing each other at right angles, and several fine squares and public parks are maintained in good condition. A fine residential district is located south of Portage Avenue, but handsome residences are maintained in other portions of the city, especially in Fort Rouge, the portion located south of the Assiniboine.

The city is built largely of stone and vitrified brick and many of the buildings are tall and substantial. Among the larger structures are the parliament house, the city hall, the custom-house, the Royal Alexander, the Empire, and the Queen's hotels, and numerous churches. Winnipeg is noted as an educational center, having a well-established system of public schools, a number of historical and scientific societies, and

through Minnesota, and the completion of the Canadian Pacific in 1881 augmented the rapid growth. The phenomenal development of the agricultural lands in Manitoba and the country west gave the city an unusual impetus. It is now one of the best built and most progressive cities of the Dominion. Population, 1907, 118,250.

WINNIPEGOOSIS (wīn-nī-pē-gōō'sīs), or **Winnipegosis**, a lake in the provinces of Manitoba and Saskatchewan, Canada, lying west of Lake Winnipeg. The length from north to south is 128 miles and the width is from 12 to 24 miles. It has an area of 1,985 square miles. The shores are indented by numerous bays. South of it is Lake Manitoba, into which it discharges by the Waterhen River. It receives the water from Swan and Red Deer rivers. The overflow, after reaching Lake Manitoba, is discharged by the Douphin River and

Saint Martins Lake into Lake Winnipeg, whence it passes into Hudson Bay by the Nelson River. In the vicinity are fine forests.

WINNIPISEOGEE (wĭn-ĕ-pĕ-să'ke), or **Winnipesockee**, a lake in New Hampshire, lying between Belknap and Carroll counties, 22 miles northeast of Concord. It is twenty miles long and from four to ten miles wide. The area is 176 square miles. It has an altitude of 472 feet above the sea. The shores are more or less abrupt and indented by deep bays. It has excellent fisheries and the fine scenery and numerous islands make it a favorite summer resort. The overflow is discharged by the Winnipiscogee River, which unites with the Pemigewasset River to form the Merrimac.

WINONA (wĭ-nō'nà), a city in Minnesota, county seat of Winona County, on the Mississippi River, 102 miles southeast of Saint Paul. It is on the Chicago Great Western, the Chicago and Northwestern, the Chicago, Milwaukee and Saint Paul, and other railroads. The surrounding country is highly fertile, producing cereals, grasses, and dairy products. Among the chief buildings are the county courthouse, the Federal post office, the Winona Seminary, the public library, the State normal school, the Margaret Simpson Home, and many fine school and church buildings. It has large interests in wholesaling, in grain and lumber, and in manufacturing. Among the leading manufactures are lumber products, ironware, flour, carriages, boots and shoes, bicycles, and farming implements. An extensive system of street railways furnishes transportation to all parts of the city and many adjoining places of interest. Other utilities include public waterworks and a system of sanitary sewerage. Winona was settled in 1851 and chartered as a city in 1857. Population, 1905, 20,334; in 1910, 18,583.

WINSTED (wĭn'stĕd), a city of Connecticut, one of the county seats of Litchfield County, 28 miles northwest of Hartford. It is located on the Mad and Still rivers and on the Central New England and the New York, New Haven and Hartford railroads. The chief buildings include those of the county, the townhall, the Gilbert Home for Poor Children, and the Litchfield County Hospital. Excellent water power is derived from the Mad River. It has manufactures of cutlery, leather, clocks, clothing, pins, and machinery. Electric lighting, waterworks, and sewerage are among the public utilities. The first settlement was made in 1756 and it was incorporated in 1858. Population, 1900, 6,804; in 1910, 7,754.

WINSTON (wĭn'stŭn), a city of North Carolina, county seat of Forsyth County, 28 miles

west of Greensboro, on the Southern and the Norfolk and Western railroads. It joins Salem, a municipality with 3,642 inhabitants, the two places being known as Winston-Salem. Among the noteworthy buildings are the county courthouse, the Federal post office, the Salem Female Academy, and the Slater Industrial Academy and Normal School. It is an important manufacturing and trade center. The manufactures include cotton and woolen goods, ironware, clothing, cigars, machinery, and farming implements. It has good municipal improvements, including electric lighting, sewerage, waterworks, and street railways. The Moravians founded Salem in 1766. Population, 1900, 10,008; 1910, 17,167.

WINTER, the coldest season of the year, following autumn and preceding spring. It begins astronomically, in the Northern Hemisphere, on the shortest day, Dec. 21, and ends with the vernal equinox, March 21. In popular use the name winter is applied to the three coldest months, which are November, December, and January in Great Britain and December, January, and February in Canada and the United States. In the tropical zone the rainy season is termed winter. The winter months of the Southern Hemisphere are June, July, and August.

WINTERGREEN (wĭn'tĕr-grĕn), the name of several species of plants of the heath family, which are mostly native to the Northern Hemi-



FLOWERING WINTERGREEN.

sphere. They are perennial herbs and grow as half-shrubby plants in low woods. The *checkerberry*, whose aromatic leaves yield the oil of wintergreen, is a noteworthy American

species. It has slender stems, which creep near the surface of the ground, and the ascending flowers are followed by red berries. It is sometimes called *partridge berry*, *creeping wintergreen*, *mountain tea*, and *boxberry*. The *flowering wintergreen* is another familiar species of North America, having short, erect stems and conspicuous rose flowers. The *spotted wintergreen* is common in the dry woods from Georgia to New Brunswick.

WINTHROP (wĭn'thrŭp), a town of Massachusetts, in Suffolk County, five miles northeast of Boston, on Massachusetts Bay and on the Boston, Revere Beech and Lynn Railroad. It is popular as a summer resort and residential center. The chief buildings include the Frost public library, the high school, and numerous summer hotels. It contains the house of Dean Winthrop, dating from 1649. The Winthrop Shore Reservation and Ingall's Park are favorite public grounds. The town has manufactures of clothing, gloves, calfskins, and machinery. It was incorporated in 1852. Population, 1905, 7,034; in 1910, 10,132.

WIRE, an even thread or slender rod of ductile metal, formerly made by hammering, but now formed by drawing through dies or holes. Though usually cylindrical, it is made in various other forms, as square, oval, and triangular. The process of making wire is called *drawing* and depends upon the kind of metal and the nature of the product desired. Iron and steel wires are manufactured by passing a billet of metal through the rolls in a rod mill until it is reduced to the desired size of rod. This rod is cleaned and scaled, usually by submerging in diluted sulphuric acid, and then is thrashed, a process in which the wire rod or coil is raised high in the air and thrown heavily to the ground to loosen the scale and dirt. It is then pointed on one end to enable the wire-drawer to grasp it with his tongs as it is started through the die or plate. The end is next fastened to a cast-iron reel, which is put in motion and the wire is drawn through the die with great force, thus reducing it one or more sizes in diameter. If it is desired to still further reduce the size, the wire is annealed or softened by heating, when the drawing may be repeated by pulling the wire through smaller dies.

Iron and steel dies are commonly employed in manufacturing wire, but diamond or ruby dies are required where it is necessary to have much accuracy and fineness. The larger size of wire does not exceed three-tenths of an inch. When the product is thicker than three-tenths of an inch, it is called a *rod*, but the only limit to its fineness is the ability of the workmen to

reduce it. Gold and platinum wires used in the micrometers of telescopes are the finest, some being only $\frac{1}{18,000}$ of an inch in diameter. Wire drawing is utilized for a great variety of purposes, and the products serve many economic uses. Among the many uses of wire are for pins and needles, fences, baling hay, handles for pails, telegraphs and telephones, strings for musical instruments, spokes in bicycles, wire netting, and book sewing. Steel wire is now in general use in the industries. Filigree work is made of gold and silver wire.

WIRELESS TELEGRAPHY. See **Telegraph, Wireless.**

WIREWORM, the name applied to the larvae of various beetles, but especially to several species of elaters. The beetles of these larvae are generally known under the names of *click beetles* and *spring beetles*. While in the larval state they feed upon the roots of living plants, to many of which they are injurious. The worms attain maturity in a period of one to five years and within this time undergo many molts. In some places the wireworms are harmful to wheat and corn. See **Click Beetle.**

WISCONSIN (wĭs-kŏn'sĭn), a north central State of the United States, popularly called the *Badger State*. It is bounded on the north by Lake Superior and Upper Michigan, east by Upper Michigan and Lake Michigan, south by Illinois, and west by Iowa and Minnesota. The greater part of the western boundary is formed by the Mississippi and Saint Croix rivers. A small portion of the northwestern border is formed by the Saint Louis River, while the Menominee and the Montreal rivers separate it in part from Upper Michigan. The length from north to south is 315 miles and the greatest breadth is 294 miles. The area is 56,040 square miles, which includes 1,590 square miles water surface.

DESCRIPTION. The surface is an undulating plain and from the southeastern corner toward the northwest is a divide between Lake Michigan and the Mississippi basin. This divide has a general altitude of about 1,000 feet and in the northern part, a short distance south of Lake Superior, it is intersected by another ridge which extends east and west. The latter is quite hilly and includes the Gogebic Iron Range, which has elevations of from 900 to 1,780 feet above sea level. The most elevated portion is near Lake Superior, but here the surface slopes quite abruptly toward the shore, where the elevation is 600 feet. Bluffs of considerable altitude extend along the Mississippi and Green Bay. A wide valley runs across the State from the northeast toward the southwest, in which

flows the Wisconsin River. Morains and lakes, resulting from glacial action, are abundant in all parts except the southwest. The glacial area covers about four-fifths of the State.

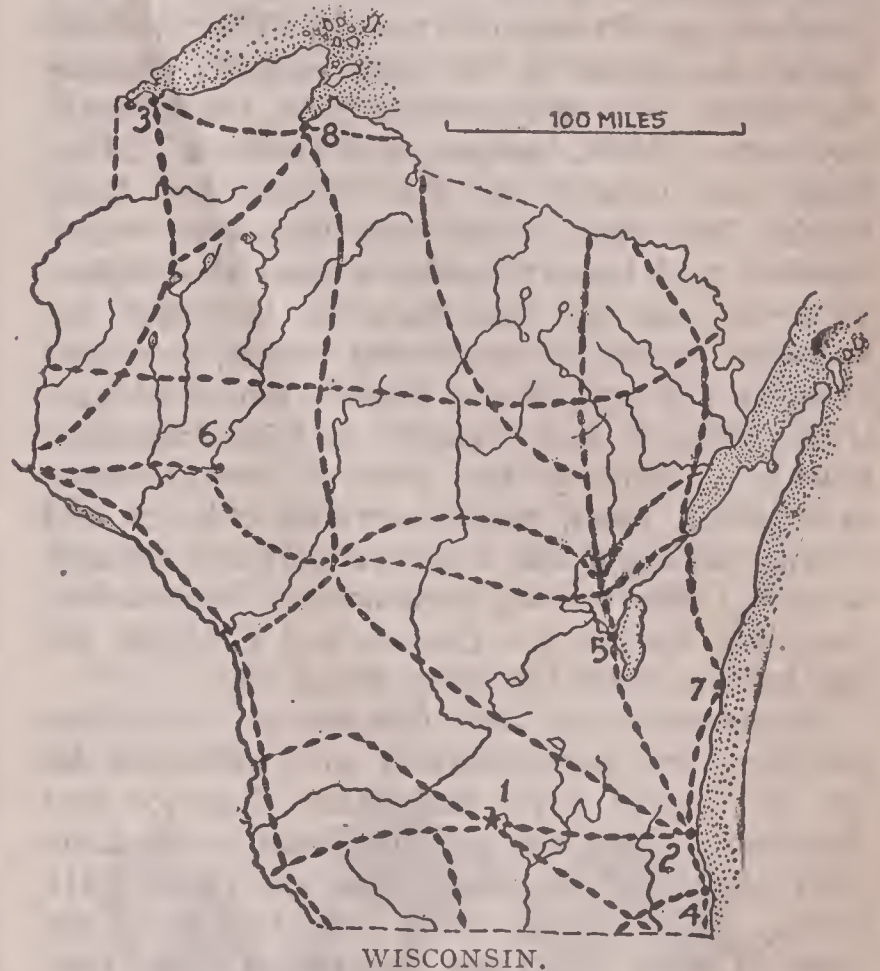
The drainage belongs to a number of systems, but may be generally classed within three drainage areas. In the northern part, north of the Gogebic Iron Range, the drainage is by small streams into Lake Superior. The eastern section is drained into Lake Michigan, while the southern and western parts belong to the Mississippi system. The rivers that drain into Lake Michigan include the Menominee, the Peshigo, the Oconto, the Wolf, and the Fox rivers, but all of these, except the Fox, are comparatively short. About three-fourths of the surface are drained into the Mississippi, which receives the Saint Croix, the Chippewa, the Black, and the Wisconsin. Sand bluffs of considerable height characterize the course of the Wisconsin, which has beautiful scenery in the vicinity of the Dalles. The Rock and the Des Plaines rivers, though belonging to the Mississippi, cross the border into Illinois. Many of the rivers pass over escarpments, hence are valuable for the water power they furnish. Within the glacial area are about 2,000 lakes, but only a comparatively few are of considerable size. The larger lakes include Winnebago, Oshkosh, Poygan, Tommyhawk, and Red Cedar.

The climate is tempered somewhat by proximity to the Great Lakes, but the winters in the northern part are long and severe. Snow covers the ground from early winter until late in the spring throughout the northern half of the State. The extremes of temperature are 25° below zero in winter to 98° or even 102° above in summer. At Bayfield the mean temperature for January is 13° and at Milwaukee it is 20°, while the mean temperature for July at Bayfield is 73° and at Milwaukee it is 70°. Rainfall is abundant in all parts of the State, usually about 30 inches, but it is slightly greater in the east than in the west. Precipitation is greatest between July and October. All parts of the State are healthful.

MINING. The State has extensive mineral interests, especially in the output of iron ore and mineral waters. The latter have a higher value than in any other State and show a constant gain, the annual production being about \$2,750,000. Iron ore is obtained along the Gogebic Iron Range in the north, which extends from Michigan through the State to Minnesota, and the product is shipped largely by steamers on the Great Lakes. Warsaw, Montello, and other points are noted for their output of a superior grade of granite, which is quarried extensively

for monument and building purposes. Coal is found in the southern part of the State. Sand suitable for glass as well as clays of commercial value are widely distributed. Productive zinc mines are worked in the vicinity of Plattville and a fine grade of red sandstone is obtained in Bayfield County. Other minerals include limestone, lead, graphite, and mineral paint.

AGRICULTURE. Farming is the leading occupation. Fully sixty per cent. of the area is in-



1, Madison; 2, Milwaukee; 3, Superior; 4, Racine; 5, Oshkosh; 6, Eau Claire; 7, Sheboygan; 8, Ashland. Chief railroads shown by dotted lines.

cluded in farms, which average 117 acres. Originally the region was covered largely by forests, but much of the stump land of the northern part has been cleared and is utilized in stock raising and for farming. All classes of hardy cereals are grown successfully, and the State occupies a foremost position in the production of oats, barley, rye, and buckwheat. The largest acreage is devoted to the cultivation of hay and forage plants, but it is approximated by the acreage of oats. Corn takes rank as the third crop in acreage. Other crops cultivated extensively are potatoes, peas, tobacco, beans, and sugar beets. Small fruits, such as currants, plums, and strawberries, thrive throughout the State. The southern part is noted for its production of apples, while the central section has large interests in the cultivation of cranberries.

Dairying is an important enterprise in connection with farming, and the State takes a high

rank in the output of butter and cheese. The number of cattle exceeds any other class of farm animals, and nearly half of the interests are vested in dairy cows. There has been a constant increase in the number of horses and swine, and the interests in sheep raising are comparatively large. Other domestic animals include mules, goats, and poultry. The annual clip of wool is about \$1,700,000.

MANUFACTURE. Wisconsin is important as a lumber-producing State, hence has much material of use in manufacturing. The available forests are chiefly in the northern part. Among the native trees are the oak, pine, maple, hickory, cedar, birch, spruce, and hemlock. Many mills are located on the Menominee, Saint Croix, Wisconsin, Wolf, and Chippewa rivers. Lumber and lumber products have the highest value among the manufactures, but they are followed closely by butter and cheese, flour and grist, tanned and curried leather, malt and spirituous liquors, and foundry and machine-shop products. Among the general manufactures are packed meat, paper, furniture, boots and shoes, carriages and wagons, clothing, textiles, tobacco, and farming implements. Milwaukee, Superior, Racine, La Crosse, and Oshkosh are the leading manufacturing cities.

TRANSPORTATION AND COMMERCE. Excellent facilities for transportation are furnished by the Mississippi River and lakes Superior and Michigan. Railroads were not built in the State until 1850, but the lines now aggregate 7,112 miles. They include trunk lines that cross the State in many directions, furnishing direct connection with points both east and west. Among the principal railroads are the Wisconsin Central, the Chicago, Milwaukee and Saint Paul, the Northern Pacific, the Chicago and Northwestern, the Chicago, Burlington and Quincy, and the Minneapolis, Saint Paul and Sault Sainte Marie. Green Bay is connected by a canal with Lake Michigan at Sturgeon Bay, and at Portage is a canal connection between the Fox and the Wisconsin rivers.

The State has large interests in commerce. It exports iron ore, lumber and timber products, malt liquors, dairy products, live stock, wool, flour and grist, potatoes, cranberries, cereals, and tobacco. The imports consist chiefly of cotton goods, machinery, and merchandise. Milwaukee is the principal port of entry.

GOVERNMENT. The present constitution was adopted in 1848, when the State was admitted. It vests the executive power in the governor, lieutenant governor, secretary of State, treasurer, and attorney-general, elected for terms of two years. The superintendent of public in-

struction is elected for four years at a spring election. Legislative authority is vested in the General Assembly, which consists of a senate of 33 members and a house of representatives of 100 members. The senators are elected for four and the representatives for two years. Sessions of the Legislature are held biennially, beginning on the first Monday in January. A supreme court of five judges elected for ten years has the highest judicial authority. The power to establish circuit courts is vested in the Legislature, and the judges of these courts are elected by popular vote. Towns, municipalities, and counties have general powers in the administration of local government.

EDUCATION. Public instruction is under the direction of a State superintendent, who is assisted by a superintendent of schools in each county. The per cent. of illiteracy is reported at 4.7, which is a slight decrease from that shown in the previous national census. A law enacted in 1907 granted special State aid for a period of three years to ungraded schools, provided certain improvements were made in heating, ventilating, and other equipments. This law has been the means of making the school facilities better and providing more efficiently for the health and comfort of the children. High schools are maintained in all the towns and cities. Many of the rural schools have been consolidated and are organized on an efficient basis under a general course of study. A large number of private and parochial schools are maintained by church and other organizations. Normal schools for the training of teachers are located at La Crosse, Milwaukee, Oshkosh, Platteville, River Falls, Stevens Point, Superior, and White Water.

The University of Wisconsin, located at Madison, is at the head of the public schools and is affiliated closely with the high schools throughout the State. Other institutions of higher learning include the Northwestern University, at Watertown; Gale College, Galesburg; Lawrence University, Appleton; Beloit College, Beloit; Ripon College, Ripon; Milton College, Milton; Marquette College, Milwaukee; Seminary of Saint Francis, Saint Francis; and Concordia College, Milwaukee. Janesville has a school for the blind, Chippewa Falls is the seat of the school for the feeble-minded, and Delavan has an institution for the deaf and dumb. Mendota and Winnebago have hospitals for the insane. The State institution for dependent children is at Sparta. Waupun has the State prison, Green Bay has a State reformatory, and Milwaukee and Waukesha have industrial schools, the former for girls and the latter for

boys. Waupaca is the seat of a State soldiers' home and Milwaukee has a national home for soldiers.

INHABITANTS. A large proportion of the people are of foreign birth, and this element is made up largely of Germans and Scandinavians. Germans settled the southeastern part of the State as early as 1840, and this element and their descendants are more numerous than any other class. The leading religious denominations are constituted of the Lutherans, Roman Catholics, Methodists, Baptists, Congregationalists, and Presbyterians. Madison, in the southern part of the State, is the capital. Other cities include Milwaukee, Superior, Racine, La Crosse, Oshkosh, Sheboygan, Green Bay, Eau Claire, Marinette, Fond du Lac, Appleton, Ashland, Janesville, Warsaw, Manitowoc, Kenosha, and Beloit. In 1900, the State had a population of 2,069,042. This included a total colored population of 11,131, of which number 2,542 were Negroes and 8,372 Indians. In 1905 the population was 2,228,949. Population, 1910, 2,333,860.

HISTORY. Wisconsin was formed from the Northwest Territory. Jean Nicollet, LaSalle, and French traders made the first exploration of the region and founded the first settlement at Green Bay in 1639. A Jesuit mission was located at Lapointe by Father Claude Allouez in 1665. In 1763 the region was transferred by the Treaty of Paris to the English and it became a part of the Northwest Territory in 1787. Wisconsin Territory was formed in 1836, but at that time it included Iowa, Minnesota, and part of the Dakotas. It was admitted into the Union on May 29, 1848. The Sacs and Foxes and the Winnebagoes were the chief Indian tribes and many hostilities between them and the early settlers took place at different times, but the Black Hawk War of 1832 finally subdued the Indians.

The State had a large element that favored the emancipation of the slaves in the Union. A convention of antislavery men, held at Ripon in 1854, stimulated the organization of the Free Soil and later the Republican parties. Subsequently the supreme court decided the Fugitive Slave Law to be unconstitutional within the State. A total of 91,379 men aided the Union in the Civil War. Destructive forest fires did much damage at different times, one of the most destructive occurring in 1908.

WISCONSIN, the largest river in Wisconsin, which rises in the northern part of the State, and, after a course of 600 miles toward the southwest, flows into the Mississippi four miles below Prairie du Chien. It is navigable to Portage, 200 miles from its mouth, and is

there connected by a canal with the Fox River, thus supplying continuous waterway across the State from Lake Michigan to the Mississippi. The valley is highly fertile and in its upper course contains fine forests. Among the cities on its banks are Grand Rapids, Portage, Merrill, Wausau, Stevens Point, and Rhineland.

WISCONSIN, University of, an institution of higher learning at Madison, Wis., established in 1838. It is coeducational and receives support from the State and the Federal government. Citizens of the State are admitted free in all departments, except the college of law, while others are charged a nominal tuition. The colleges include those of agriculture, law, letters and science, and engineering, and the courses compare favorably with the leading institutions of America. The grounds of the university border on Lake Mendota, a beautiful sheet of water. It has a library of 85,000 volumes and in addition contains the library of the State Historical Society, which has 250,000 volumes. The value of the building and grounds is placed at \$2,150,000. The faculty includes 300 professors and instructors and the attendance is 4,500 students.

WISTARIA (wĭs-tā'ri-à), a genus of climbing shrubs of the bean family, so named after Caspar Wistar (1761-1818), professor in the



WISTARIA.

University of Pennsylvania. The leaves are pinnate and the flowers grow in clusters, generally having a lilac color. The seeds are bean-like, usually numbering five to eight, and grow

in a slender pod. Several widely different species are cultivated, the best known being the *common wistaria* and the *Chinese wistaria*. They are favorite plants to cover verandas and walls. Under careful cultivation they grow 18 to 25 feet in a season and produce flowers in profusion. Some have a delicate lilac-purple bloom and in some species the flowers are pure white.

WITCHCRAFT (wĭch'krăft), an alleged art which is supposed to be understood by witches and wizards. Evidences are abundant that good people in past ages were led to believe that certain individuals possessed supernatural power or influence by reason of being connected with some inspiration of darkness. It was supposed that these persons had made an oral or written compact with the devil, who came to their assistance in practicing infernal arts as a consideration for having abjured God. The compact was either for a certain number of years or of indefinite duration and not only implied obedience to the evil one, but the latter delivered to the witch an imp or familiar spirit to do whatever was directed. We read of an ecclesiastical decree, published at Ancyra in 350 A. D., in which soothsayers, sorcerers, and magicians were classed as witches and condemned as enemies of God. Many proofs may be cited of profound belief in witchcraft in all the civilized countries throughout the Middle Ages. Executions of supposed witches took place with official sanction in Great Britain as late as 1722. It is remarkable that a judge of the court of queens bench in England declared in the 17th century that the common law recognized witchcraft as a crime. Even Roger Bacon had a pronounced belief in the existence of witches. In literature we find mention of the popular beliefs regarding witchcraft. Goethe's "Faust" is one of the finest examples of the reflection of public opinion. Other notable instances are those of Shakespeare's "Macbeth" and Burns' "Tam O'Shanter."

A deplorable state of public practice prevailed in Europe for many centuries owing to the widespread belief in witches. Pope Innocent VIII. issued a bull in 1484 authorizing torture to secure confessions. These tortures were applied in the most hideous ways. It was believed that the evil one had marked a spot on the body of a witch which was insensible to pain, hence it became a common practice to cut into the flesh or pierce the skin with a sharp instrument in order to find whether the person tortured could be classed as guilty. In some cases persons were thrown into deep water, those floating being regarded innocent, while those sinking were

thought certainly to be possessed. The number of persons suffering martyrdom in Europe within a period of four centuries is estimated by some writers at 9,000,000. In 1515 500 persons were executed for witchery in Geneva and 975 were burned at Como in 1524. The total number of deaths in Scotland, owing to charges of witchery, is placed at 4,000. Belief in witchcraft spread rapidly among the Puritans of New England, in 1648, and for more than a century there was a widespread belief in the supposed supernatural power of certain individuals.

Cotton Mather, an eminent pulpit orator, aroused the superstitious to believe in witchery at Salem, Mass., where he preached with earnestness against the art. He wrote two works, entitled "Wonders of the Invisible World" and "Memorable Providences Relating to Witchcraft and Possessions," which had an unfortunate influence among the people. Samuel Willard, a minister of Massachusetts, in 1671, proclaimed that a woman of his congregation was bewitched, but afterward she was proved insane instead of possessed. In the period between 1684 and 1693 more than 100 persons were tried and convicted of witchcraft and many of them were hanged. Nineteen executions for alleged witchcraft took place at Salem in 1692. A man named Giles Corey, aged about eighty years, was pressed to death for refusing to plead in a special court of oyer and terminer. The delusion seems the more deplorable when it is considered that in many cases the evidence of little children and unreliable witnesses was taken as conclusive. Thomas Brattle and Robert Calef of Boston took a very decisive position against the delusion, and it is due largely to their efforts that the belief rapidly passed away.

WITCH-HAZEL (hă'z'1), or **Wych Hazel**, a shrub native to the eastern part of the United States and Canada, growing usually to the height of six to ten feet. The trunk branches near the ground, forming several crooked sub-trunks about four inches thick. These plants grow principally in damp woods and are so named from the resemblance of their leaves to the hazel. They bear yellow flowers late in autumn, when the leaves are falling, and the fruit, which is a woody, two-seeded capsule, matures the following summer. The small branches are used as divining rods by those who believe that they turn downward when held in the hand to indicate the location of water and water veins below the surface. The liquidambar is a forest tree belonging to the same class of plants and attains a height of twenty to thirty feet.

WITENAGEMOTE (wĭt'ê-nâ-gê-môt), the

national council of the Anglo-Saxons and the forerunner of the English Parliament. The small heptarchy was divided into separate kingdoms and each of these had a general council of this class. It consisted of the thanes, ealdormen, and the higher ecclesiastics and was presided over by the king. This body had general legislative power, concluded treaties, had authority to depose a king, and settled the question of succession to the throne when a dispute arose. In practice a powerful king subverted the authority of the council to a minor position, but a weak ruler was usually governed by its orders. This body was abolished by William the Conqueror, but not until after it had acknowledged his title to the throne.

WITNESS (wīt'nēs), one who appears before a court and is examined under oath or affirmation as to his knowledge of matters undergoing judicial investigation. The writ by which a witness is summoned to appear is called a *subpoena*. Testimony by a witness may be given in open court, when it is usually recorded by a reporter, or it may be taken before some officer in the form of a written deposition and read at the time of the trial. Any person who is of sound mind and has sufficient capacity to understand the nature of the obligation of an oath is competent to testify as a witness, but in some cases the husband and wife are not allowed to give testimony against each other. A person who signs his name to certify to the genuineness of another signature is termed a *witness*.

WITTENBERG (wīt'ten-bērg), a city of Germany, in the province of Saxony, on the Elbe River, 54 miles southwest of Berlin. It is at the junction of several railways. The surrounding country is fertile, producing fruits and cereals in abundance. Wittenberg is famous for its connection with the lives of Luther and Melanchthon, both of whom have tombs in the Schlosskirche, on the door of which Luther nailed his 95 theses. This church now has the theses in Latin upon its bronze doors and within the building are a number of fine paintings showing scenes in the life of Luther. The Stadtkirche is another excellent church. Luther and Melanchthon preached in this building and on its walls are pictures representing famous events connected with the lives of these reformers. The city contains the houses occupied by Luther and Melanchthon. The university in which Luther taught was united with Halle in 1817, but Wittenberg still has a gymnasium, several secondary schools, and the remains of the Augustine monastery. Fine monuments built to the memory of Luther and Melanchthon are in the market place. Wittenberg has beauti-

fully paved streets, waterworks, gas and electric lighting, electric street railways, and several valuable libraries. Among the manufactures are linen and woolen goods, leather, machinery, chemicals, and clothing. It was formerly a strongly fortified place and was the seat of the dukes of Saxony until 1422. In 1806 Napoleon captured it, but it was retaken by the Prussians in 1814. Population, 1905, 20,323.

WOAD (wōd), a genus of plants found in Europe, belonging to the mustard family. Several species furnish a blue dye, which is extracted from the leaves. These plants were the principal source of such dyes until indigo was introduced. The leaves do not contain the blue coloring matter ready formed, but it is produced after subjecting them to a process of fermentation. Formerly the common woad was cultivated extensively for its leaves, which were picked and dried for transportation to the factory, where the coloring matter was developed and extracted. However, indigo, being a finer and stronger blue, has replaced this coloring material. A species of wild woad is found in England, where the Picts are said to have used it in coloring their bodies.

WOBURN (wōō'būrn), a city of Massachusetts, in Middlesex County, ten miles northwest of Boston, on the Boston and Maine Railroad. Among the features are the public library, the high school, and many fine residences of Boston business men. The manufactures include leather, glue, chemicals, electric supplies, clothing, and machinery. It has public waterworks, electric street railways, and a considerable trade. The place was first settled in 1640 and two years later was incorporated. Population, 1910, 15,308.

WODEN (wō'den), the name of an ancient deity of the Anglo-Saxons, corresponding to Odin of the Scandinavians. Wednesday, the fourth day of the week, was named from him.

WOLF, a quadruped of the genus *Canis*. It is closely allied to the dog, of which it is thought to be the progenitor. A number of species have been enumerated, but the mammals generally classed as wolves are all native to the Northern Hemisphere. The possible exceptions are the Aguana wolves of South America, which are allied to the prairie wolves, and the Tasmanian wolf, a marsupial. The *gray wolf*, which is gray above and yellowish-gray below, is the most familiar species of North America. It is three to four feet long, has a somewhat bushy tail and pointed ears, and formerly roamed in packs in New England and westward. Other American species include the *dusky wolf* of the Northwestern States, the

rufous wolf and the *black wolf* of the Southern States, and the *prairie wolf*, or *coyote*, of the plains of Canada and the United States. The



COMMON WOLF.

last named is a burrowing animal and more nearly resembles the jackal than the wolf.

All the species of wolves are carnivorous, pursuing their prey with much swiftness and rapacity. They are the particular dread of shepherds, whose flocks they attack. They prey upon calves, deer, and elks and some species even attack man when they are hungry. Large numbers of wolves are found in many parts of Europe, especially in the more isolated sections of Russia, Spain, Turkey, France, Germany, and Italy. The *common wolf* of Europe gathers in packs on the northern plains of Russia, where it is dreaded as an enemy to man and domestic animals, often pursuing travelers and visiting barnyards. In Southern Europe they find a refuge in the forests and snowy slopes of the Alps, Pyrenees, and other mountains. The true wolf has a dismal howl, which it issues when in packs, but some species have a snapping bark. All the species are crafty and cunning in searching for food and protecting their young.

WOLF FISH, a fish found in the North Atlantic, so called from its voracious and carnivorous habits. It has a large mouth and strong teeth and bites savagely when caught by fishermen. In some localities it injures the nets set for other fishes. The Icelanders catch it for food, using it both fresh and salted, and a kind of shagreen is made of the skin. The common wolf fish is from five to seven feet long, but reaches its largest form in the colder

waters. Several species are caught off the shores of Norway and Great Britain.

WOLVERHAMPTON (wōol-vēr-hämp'-tūn), a city of England, in Staffordshire, twelve miles northwest of Birmingham. The surrounding region contains rich coal and iron mines. The city is the seat of important steel and iron works. It has railroad connections with many trade centers, pavements, gas and electric lighting, electric street railways, public baths, and several fine parks. The chief building of interest is the noted church of Saint Peter, which was built in 996. Other edifices include a number of schools, several public halls, a free library, and numerous churches. Among the manufactures are hardware, nails, locks, furniture, edged tools, tinware, japanned ware, and machinery. It has a large trade in cereals, merchandise, vegetables, and fruits. The city dates from the time of Ethelred II. and his sister, Wulfrune, founded a college and church here in 996. It was first called Wulfrune's

Hampton, from which its present name was derived. Population, 907, 102,016.

WOMAN'S CHRISTIAN TEMPERANCE UNION, a national organization of women in the United States, organized at Cleveland, Ohio, in 1874. It is the outgrowth of a crusade conducted by women to suppress the liquor traffic. The principal objects are to secure social reform and induce habits of temperance. It has 10,000 local unions, including a branch for children, and the total membership is given at over 600,000. It maintains departments under local, county, district, state, and national superintendents, and receives and disburses annually about \$72,500 in its efforts to further progression and educational work. This society has been instrumental in securing laws which require teaching the effects of stimulants and narcotics on the human system in nearly all of the states. It has exercised a wide influence in obtaining better protection of girls and women, in the appointment of police matrons, and in establishing houses of refuge for erring women. Conventions are held annually by the national organization. Evanston, Ill., is the headquarters of the society and the *Union Signal*, published at Chicago, is the official organ.

Frances E. Willard, an influential member of this society, promoted the organization of the World's Christian Temperance Union, which was established in 1883. In this work she was ably assisted by Mary H. Hunt of

Boston, Mass. Branch organizations are now maintained in most countries of the world. The international headquarters are at Rest Cottage, formerly the home of Miss Willard, at Evanston, Ill. The white ribbon is worn as the badge of these societies and the policy is declared to be "Do everything."

WOMAN'S RELIEF CORPS, a patriotic society of women, organized as an auxiliary to the Grand Army of the Republic in July, 1883. All loyal women are eligible to membership, but the organization is composed chiefly of mothers, wives, daughters, and sisters of soldiers who fought in the Federal army during the Civil War. The membership is about 151,500 and the society is divided into 35 departments and 3,150 corps. Meetings are held by loyal organizations in connection with the Grand Army. The purpose is to teach patriotism to the rising generation, to perpetuate the memory of Union soldiers, and to extend charities among the widows and orphans of veterans.

WOMAN'S RIGHTS, the term commonly applied to the claim that women should be placed as nearly as possible on an equality with men, legally, socially, and politically. An organized movement for general equality between the sexes began in the United States in 1848. The National Woman's Suffrage Association was organized in 1868. Susan B. Anthony was for many years an efficient promoter of this association and many eminent women have given it much time and attention. The object is to develop public sentiment in favor of woman suffrage in all the states of the Union. Other allied associations are widely organized and have the same or similar objects in view. Collectively they have exercised considerable influence in promoting the right of women to vote at special and general elections.

The questions involved in the movement to obtain greater rights for women in politics received early attention in New Zealand, Tasmania, and the several states of the Commonwealth of Australia, in which the right of suffrage is either wholly unrestricted by sex or is nearly equally extensive to males and females. Norway is one of the first countries of Europe to grant the free use of the ballot to both sexes. A campaign for the admission of women to the elections and to public offices was commenced in England in 1906. It reached a large place in the public mind as early as 1907, when many women were arrested for insisting upon being heard by the Parliament. The general tendency in Europe and America

is to extend the rights of women, but in most cases either an educational or a property standard is required. See **Suffrage**.

WOMBAT (wŏm'băt), an Australian marsupial, which somewhat resembles a small bear in appearance. The legs are short and strong, the head is large and flat, the body is broad and depressed, and the tail is rudimentary. Several species are native to Southern Australia and Tasmania, but all are nocturnal in



WOMBAT.

their habits. The body is two to three feet long. They range in color from gray to brownish-black. The day is spent largely in sleep, but at night they come forth in search of food, which consists mostly of roots and other forms of vegetation. Three or four young are brought forth at a birth and are carried for some time in the marsupium or pouch. They are animals of little intelligence and are not harmful unless they are provoked. The flesh is highly esteemed for food, its flavor resembling that of pork.

WOMEN'S CLUBS, the general name applied to organizations promoted and maintained by women. The first clubs were formed with the view of promoting religious and charitable work among women, but an extension of facilities to educate women and train them for responsible duties in public life brought about a widespread desire to coöperate more closely along general lines. Organizations of this kind are now very general in Europe and America. They are either social or educational in character, and in some countries they have assumed a form of association to promote the extension of political influence. All the larger towns and cities of Great Britain, Germany,

France, Canada, and the United States have numerous clubs to promote research in literature, arts, and social development. The General Federation of Women's Clubs was formed in 1892. In 1908 it had a membership of about 175,000 in the United States and other countries. This organization places a bar upon sectarian or political tests and confines its work to social, artistic, literary, and scientific culture. Women's clubs to further political measures are numerous in New Zealand, Australia, and some states of the United States where woman's suffrage has been adopted. Similar organizations were organized very generally in Great Britain in 1908, at the time when a great crusade was organized to promote the movement for extending the right to vote and hold office to women.

WOOD ALCOHOL, or **Methyl Alcohol**, a liquid obtained by heating wood in closed retorts, under conditions that exclude the air. The product resulting from the process involved is a mixture of wood alcohol, ammonia, acetone, and other substances and acids. This mixture is neutralized with slaked lime to separate the acids, after which the wood alcohol is isolated by distillation. When in a pure state, wood alcohol is a colorless liquid, has a peculiar aromatic odor, and mixes readily with water in any proportion. It is used extensively in the manufacture of varnishes and to prepare methylated spirit. The latter is a mixture of ten parts of wood alcohol to ninety parts of ordinary alcohol. While it is cheaper than ordinary alcohol, it contains most of its properties and is used as a substitute for it.

WOODBINE (wōd'bin), the name given in Europe to the honeysuckle, so called from its habit of clinging to and winding around trees. It is a woody climber with deciduous leaves. The fragrant yellow and red flowers are in terminal heads and are succeeded by red berries. This plant has been naturalized in Canada and the United States. The name woodbine is applied locally to several species of honeysuckles, especially to the *Virginia creeper*, which see.

WOOD CARVING, the art of carving wood into ornamental figures, or decorating it by carvings. The art is one of the oldest and long held an important position among the plastic arts. Specimens of wood carving dating from the early period of the Egyptians and Greeks have been preserved in many parts of Europe, Asia, and North Africa. The most noted is a life-size statue dating from about 4000 B. C., which was secured from the ruins

of Egypt and is now in the Boulak Museum. It is carved from sycamore wood, all parts being in the solid except the right arm, which is attached by a mortise and tenon. Other specimens of carving, such as furniture, toilet articles, surface reliefs of plants and animals, and coffin ornamentations, have been obtained from the Egyptian tombs. Though the Greeks and Romans excelled in wood carving, only a few specimens have come down in a preserved state.

In the Middle Ages, fine wood carvings were made to decorate the doorways and altars of churches and many church ornamentations, such as crucifixes. Some of the finest specimens of doorway decorations are to be found in the Scandinavian countries, while exquisite altar decorations in carvings of wood exist in Germany and Spain. The carvings made in England in the Middle Ages were destroyed largely during the Reformation, but there are newer specimens at Westminster Hall, Saint Paul's Cathedral, and Cambridge. Wood carving as an art was not confined to Europe in modern times, but there are many fine specimens made by the Mohammedans in Damascus, Constantinople, and Cairo. Other fine products of this kind were made by the Hindus, many of which are seen in the temples of India, and by the Chinese and Japanese. The modern wood carvings of China and Japan are counted the finest in the world. Many savage races are skillful in carving, especially the Polyynesians, who decorate their canoes, paddles, and huts with finely designed figures. The Eskimos are quite skilled in various kinds of carving, especially in making totem posts.

WOODCOCK (wōd'kōk), the name of several birds commonly classed in the same genus as the snipes, but they have a more bulky body and shorter and stronger legs than the true snipes. The *American woodcock* is about eleven inches long, with an alar extent of eighteen inches. It has a short tail and is of a yellowish-brown color shaded with black. The woodcock frequents fresh-water swamps, where it searches in the water for insects and worms, but its shy habits incline it to spend most of the time during the day in rushes and woods. The flesh is considered a delicacy for the table. These birds have the peculiar habit of occasionally conveying their young through the air, a trait found only in one or two other birds. This is done by the young bird being gently pressed between the feet and against the breast of the parent bird, though sometimes the bill is used to assist in holding the fledgling. Several species of woodcock are native to the Old World.

The *common European woodcock* is somewhat larger than the American. The female measures about thirteen inches in length and is somewhat larger than the male.

WOODCHUCK (wōd'chūk), an animal of the marmot family, which is native to the eastern part of North America, ranging from Ala-



WOODCHUCK.

bama to Hudson Bay. The color is blackish above and chestnut-red below. The body is fourteen to eighteen inches long and the tail is bushy. Woodchucks are vegetable feeders, subsisting mostly on plants and fruits, and dig burrows in the ground surrounded at

the upper part by a ridge so water cannot enter. They may be easily tamed and in a domestic state feed on bread and vegetables. In some sections they prove a pest to farmers in that they burrow on hillsides and destroy clover fields. The flesh is quite rank, but is eaten in some localities. The woodchuck is popularly called *ground hog*. It was formerly supposed that if the sun shines on Feb. 2, or Candlemas Day, so the ground hog may view its shadow, it returns to its burrow and sleeps for six weeks, but, if cloudy weather on that day prevents it from seeing the shadow, it becomes assured that spring is at hand and remains active. Hence, Feb. 2 has come to be called Ground Hog's Day.

WOOD ENGRAVING, the art of cutting figures or patterns on wood, which has long been one of the useful arts. It must be borne in mind that there is an important difference between wood engraving and plate or steel engraving, in that the former has the parts intended to print on the paper in relief, thus resembling ordinary printing type, while the designs in the steel engraving are sunk into the surface. It is not difficult to understand why wood engraving should be the oldest method of making illustrations, since there is but a small step between the ordinary block and the engraved cut, both making an impression on the paper by means

of ink. It is thought that block cutting and wood engraving originated in China and that they date practically from the same period. In making wood engravings it is necessary to use a hard and fine-grained wood, Turkish boxwood being the best. The wood is dried thoroughly and cut across the grain, but in large engravings several blocks are joined together. In thickness the block is equal to the length of a printer's type, thus making the engraving fit exactly to the ordinary type used in a printing press. The first step in engraving is for the artist to draw the picture by means of a pencil or brush, which is usually done after a thin coating of white has been applied to the surface, and the block is then turned over to the engraver. The tools employed by an engraver are made of the finest steel, thus making it possible to maintain sharp edges, a condition essential in producing high-class work. Large engravings are usually in several blocks, each of which is turned over to a special artist, and after the engraving has been completed they are fastened together and used as a single block.

The Chinese are thought to have produced wood engravings ten centuries before the Christian era, but the oldest work of this kind now in Europe dates from 1418. It is preserved in the library at Brussels and represents the Virgin and Jesus surrounded by four saints. Other specimens made in the 15th century are to be seen in Amsterdam, Paris, and Nuremberg. Albrecht Dürer of Nuremberg made many improvements in engraving on wood in the early part of the 16th century, and it is through him that the publication of illustrated books became general in Germany before they were common in other European countries. The finest drawing and engraving are still done in Germany, where many artists find employment in engraving on wood. Besides supplying excellent means of illustrating books and periodicals, there is the additional advantage in wood engravings that they can be duplicated with good results by electrotype and stereotype processes. Within recent years there has been a remarkable tendency to adopt photo-mechanical processes in the preparation of illustrations for books and periodicals, such as the half-tone process. See **Engraving**.

WOODPECKER (wōd-pĕk'ĕr), a genus of birds belonging to the climbers, so called from their habit of pecking into trees in search of insects. The body is quite slender, the beak is long and powerful, the tongue is pointed, and the tail is stiff. About 350 species have been described, of which about half are found

in the New World. These birds are skilled in discovering the holes of insects in trees, at which they peck with sufficient perseverance to make an opening large enough to secure the object sought. The tapping frequently is so vigorous that the noise may be heard at some distance. They commonly cut large holes into partially decayed trees to form nests, in which the female lays from four to six eggs, and in some cases make openings through the outer boards of buildings for the same purpose.

Nearly all the woodpeckers are birds of beautiful plumage, usually having bright mark-



RED-HEADED WOODPECKER.

ings of red, white, yellow, or green at the head and wings. The red-headed, hairy, three-toed, black, ivory-billed, golden-winged, and yellow woodpeckers are species native to North America. They differ materially in size and habits. The *ivory-billed woodpecker* is a southern bird. It is twenty inches long, with an alar extent of thirty inches. The *red-headed woodpecker* is found in North America from the Atlantic to the Rocky Mountains. It is ten inches long and has a crimson-colored head. The *California woodpecker* is common to the Pacific coast and is noted for feeding chiefly on acorns, which it stores as food in the hollows of old trees. Among the species

native to Europe are the *great spotted woodpecker* and the *green woodpecker*. The Asiatic *hornbill* is an allied species of these birds.

WOOD PEWEE (pē'wē), the name of a small bird belonging to the fly-catchers, found on the Atlantic coast from Nova Scotia to the Gulf of Mexico. It has a rapid flight, moving about with sudden darts, especially when in pursuit of insects. The expanse of its wings is from ten to twelve inches. It has a grayish band across the wings, is greenish-yellow below, and utters a slow and somewhat plaintive note, which resembles the sound of *pee-a-way*. The eggs number four or five, have a light yellowish color, and are characterized by spots at the larger end. This bird migrates toward the south in autumn, usually as far as the West Indies and Central America.

WOODSTOCK (wōd'stōk), a city of Ontario, county seat of Oxford County, on the Grand Trunk and Canadian Pacific railways. It occupies a fine site on the Thames River, at the point where it receives Cedar Creek, about thirty miles northeast of London. The chief buildings include the county courthouse, the public library, the Oxford Hotel, the Woodstock College, and a number of fine schools and churches. It has manufactures of woolen goods, flour, leather, furniture, and machinery. The public utilities include electric lighting, waterworks, and sewerage. It has a growing trade in farm produce and merchandise. Population, 1907, 9,285.

WOOL, the soft and curly hair obtained from sheep and some allied animals, used chiefly in the manufacture of clothing. The most noticeable difference between wool proper and hair is in the circumstance that the former is crisped or curly and has minute scales, while hair is usually smooth and straight. When examined under the microscope, it is noticed that the scales extend outward wherever a bend occurs in the fiber, but overlap each other when the fiber is straightened. It is due to this property that woolen threads are inclined to hold together or felt, while the wavy or curly form of the fibers prevents spun threads from untwisting, as is the case with smooth hair. Wool is generally divided into the two classes which are known as *short* or *carding wool* and *long* or *combing wool*. Carding wool is three to four inches long and combing wool is from four to eight inches. The value depends upon the degree of fineness and softness, but a considerable length is deemed essential to bring the highest market price. Spain has long produced the finest grade of carding wools, owing to its climate being particularly favorable to the merino sheep, but

large flocks of merinos are now bred in Germany, Australia, America, and South Africa.

WOOL INDUSTRY. Wool growing is an extensive industry in Canada and the United States. The latest estimates place the number of sheep in Canada at 2,685,000 and in the United States at 56,184,500. At present the annual clip of wool in the United States aggregates 300,550,000 pounds. This immense quantity of wool is not sufficient to supply the demand, hence about 142,500,000 pounds are imported annually, though the importations are mostly fancy grades. The total wool production of the world is placed at 2,910,104,500 pounds. Wool is supplied by the Rocky Mountain, Angora, and Cashmere goats. The beaver and some other animals have a growth of wool under the hair. Wool ranks next to cotton in the quantity consumed as a material for making clothing. It is shorn off the sheep and goats at different seasons of the year, this depending on climatic conditions, but generally the clippings are made in the spring.

In most countries the sheep are washed in a large bath or tank before being sheared, thus removing a part of the dirt from the wool. After shearing, the wool is separated into different grades, depending on the softness and length, and is then carefully washed and dried. In most cases the washing and cleansing is done at the factory, where suitable machines are employed for the different processes. Some wool is dyed immediately after cleaning, while in other cases it is manufactured into cloth and left undyed, as some flannels, or it is dyed in the piece. Wool is subjected to many processes before it is spun into threads, including dusting, scouring, and picking to remove the burs which still cling to it. It is then passed through the carding machines, by which it is further cleaned and formed into untwisted yarn, somewhat larger in size than ordinary yarn, after which it is placed on spools. When in this condition it is ready to be spun into a fine, firm thread for weaving. The cloth is scoured shortly after weaving to remove the oil and dirt still remaining, when it undergoes the fulling process, by which it is shrunk to form a more compact body. In fulling, the cloth loses ten to twenty per cent. of its width and length, but becomes much thicker.

The cloth is usually passed over frames in the burling room to remove broken threads and some cloths undergo teaseling, by which fine threads are raised on the surface and, after cutting them, they form the *nap*, the inclined and projecting fibers of thread on the surface, as in flannel, hats, and various fabrics. The finished cloth is usually made into fifty-yard bundles, in

which form it comes through the wholesaler to the retailer. The many kinds of woolen goods are divided into *broadcloths*, so called because they range in width from 56 to 60 inches, and *narrow cloths*. Beavers, cloakings, and meltons are among the broadcloths, while flannels, cashmeres, upholstery goods, doeskins, and blankets are included among the narrow cloths and are usually about 27 inches wide. Many manufacturers produce various kinds of woolens and make a difference in the material used. Thus, some goods are made entirely of wool, while others are partly of wool, containing either cotton, linen, or silk, or they may be made of a mixture of the different kinds of materials. Worsted goods are so named from being first manufactured in Worsted, England, and differ from other woolens in being made of a harder spun and stronger yarn. Formerly the spinning and weaving of woolens were slow processes, but with the improved machinery now in use it is possible for one man to do ten to fifteen times the work accomplished by a laborer of a hundred years ago. Australia is the greatest wool-producing country in the world and next to it rank Argentina, the United States, Russia, Great Britain, France, Spain, Uruguay, India, South Africa, Austria, Germany, and Turkey. However, the manufactures of woolen products are differently distributed, being largest in the United States, Germany, and Great Britain.

WOOLWICH (wōol'ich), a borough of London, England, formerly a town in Kent County, nine miles east of Saint Paul's Cathedral. It extends along the Thames River for three miles and has mostly narrow and irregular streets. The borough has extensive railroad facilities and steamboat connections with other trade centers, but its chief importance is due to the arsenal, which covers about 600 acres and includes barracks, gun factories, and ordnance departments. It is the seat of the Royal Military Academy and has extensive docks. About 10,000 men are employed at the arsenal. On the opposite side of the Thames is North Woolwich, which has extensive manufacturing establishments, especially of telegraph cables and earthenware. Population, 1907, 42,814.

WOONSOCKET (wōon-sōk'ēt), a city of Rhode Island, in Providence County, on the Blackstone River, forty miles southwest of Boston, Mass. It is on the New York, New Haven and Hartford Railroad and on several electric railways. The noteworthy features include the Harris Institute Library, the public high school, the Sacred Heart College, the soldiers' monument, and three parks. It has manufactures of cotton and woolen textiles,

rubber goods, hardware, musical instruments, machinery, and farming implements. Gas and electric lighting, street pavements, and sanitary sewerage are among the improvements. Near the city is Woonsocket Hill, an elevation 580 feet above sea level, which is the highest point in the State. The place was incorporated as a city in 1888. Population, 1910, 38,125.

WOOSTER (wōōs'tēr), a city in Ohio, county seat of Wayne County, fifty miles southwest of Cleveland, on the Pennsylvania and the Baltimore and Ohio railroads. The surrounding country has productive limestone quarries and bituminous coal mines. Among the noteworthy buildings are the county courthouse, the high school, the public library, the University of Wooster, and the Ohio Agricultural Experiment Station. It has manufactures of furniture, engines, paints and varnish, farming implements, and machinery. The place was platted in 1808 and named in honor of General Wooster. It was incorporated in 1868. Population, 1900, 6,063; in 1910, 6,136.

WORCESTER (wōōs'tēr), a city of Massachusetts, one of the county seats of Worcester County, 43 miles west of Boston, on the Boston and Maine, the Boston and Albany, and the New York, New Haven and Hartford railroads. Interurban electric railways furnish communication with Boston and many other cities. It is conveniently situated on the Blackstone River and is surrounded by a fertile farming country. The streets are handsomely paved and otherwise improved by waterworks, public parks, gas and electric lighting, and an extensive system of street railways. Among the chief buildings are the State normal school, the Clark University, the Worcester Polytechnic Institute, the Baptist Academy, the Odd Fellows' Home, the College of the Holy Cross, the Highland Military Academy, the public library with 140,000 volumes, the United States post office, and many fine public schools and churches. It is the seat of two State lunatic asylums, an industrial school, a military institute, and many hospitals and charitable institutions.

Worcester is important as an industrial and wholesaling center. It has one of the largest wire factories in the world. Among the general manufactures are boots and shoes, yarn, cotton and woolen fabrics, clothing, ironware, belting, wire, furniture, needles, flour, and machinery. Many tourists visit the city. It has fine resorts, both within the city and in the vicinity, including those at Mount Wachusett and at Lake Quinsigamond. The place was first settled in 1673, but the settlement was abandoned at the beginning of King Philip's War,

and a permanent settlement was established in 1713. It was incorporated as a town in 1722 and was made a city in 1848. Population, 1905, 127,763; in 1910, 145,986.

WORCESTER, a city of England, in Worcestershire, 110 miles northwest of London. It is conveniently located on the Severn and has good railroad facilities. The chief building is its cathedral, founded by Archbishop Theodore in 673, but subsequent additions and modifications have been made at different times. Other noteworthy buildings include the corn exchange, the shire hall, the museum of natural history, and several schools and churches. Worcester is noted for its extensive manufacture of leather gloves. It has manufactories producing carriages, porcelain goods, textiles, spirituous liquors, engines, and machinery. Worcester was founded by the ancient Britons and was rebuilt in 894, after being destroyed by the Danes. In 1651 it was the scene of a noted battle, in which Cromwell routed the royalists under Charles II. Population, 1907, 49,249.

WORKHOUSE, an establishment maintained for paupers, in which minor offenders are detained for a short time. The term applies in England to houses of correction that are maintained by the authorities to segregate paupers from others, and here they are required to work as a means of reform or as a punishment for some minor offense. In the United States the name is sometimes applied to places where vagrants and drunkards are confined at work, but such establishments are more generally spoken of as *houses of correction*. Workhouses have been a prolific means of suppressing vagrancy in England, especially under a general act of Parliament passed in 1782, which induced a dread that stimulated the poor to provide for themselves. Such establishments usually give secular and religious instruction and enforce the habits of cleanliness and industry. Those who are confined to the workhouse are usually unable to pay a nominal fine, and the expense of keeping them is at least partly compensated for by the labor they are required to do in confinement.

WORLD'S COLUMBIAN EXPOSITION, the official name of an international exhibition held in Chicago, Ill., in 1893, to commemorate the discovery of America by Columbus in 1492. The idea of holding such an exposition was suggested by Alexander D. Anderson, secretary of the board of trade at Washington, D. C., who published his approval of the enterprise as early as 1884. Subsequently he was joined by others in a movement to secure the recommendation of Congress favorable to such a celebration. At

the instance of Senator Hoar the Library Committee of the United States Senate recommended the promotion of the enterprise. In 1890 Senator Cullom of Illinois introduced a bill favorable to the holding of the World's Columbian Exposition in the year 1892, which bill was soon after passed by both houses of Congress. The city council of Chicago had already authorized Mayor Cregier to appoint a committee of one hundred citizens, of which Lyman J. Gage was made chairman, the object being to promote interest in the exposition and to urge the claims of Chicago to its being made the site. Other cities, including New York, Washington, and Saint Louis, entered into the competition, but the exposition was awarded to Chicago, which city was designated the seat of the same by an act of Congress.

The site of the exposition comprised 666 acres. It was mainly in Jackson Park, a fine tract of land on the shore of Lake Michigan, situated about six miles south of the mouth of the Chicago River, now the Chicago Drainage Canal. To it was added a boulevard connecting Washington and Jackson parks, which was 600 feet wide and was known as the Midway Plaisance. It required about two years to improve the grounds and construct the buildings, which were among the finest and certainly the most elaborate of their kind ever erected in the world. The many beautiful structures resembling marble in appearance caused the grounds to be called the *White City*. However, it was necessary to postpone the celebration until 1893 and on May 1 of that year the opening ceremonies took place. Grover Cleveland, President of the United States, delivered the dedicatory address and touched the electric button that set all the machinery in motion. The chief officers were George R. Davis, director-general; Thos. W. Palmer, president of the national commission; and H. N. Higginbotham, president of the Columbian Exposition Company.

The grand court of the exposition presented the finest aspect ever witnessed in America. It was beautified with exquisite architecture, sparkling fountains, extensive canals and lagoons, and masterful works of sculptured art. The building devoted to manufactures and liberal arts was the most extensive, covering an area of about forty acres. In it were exhibited the products of the skill and ingenuity of all the nations and peoples of the world. Other structures worthy of special mention included those containing the exhibits classed as representing mines and mining, electricity, horticulture, agriculture, live stock, machinery, fisheries, forestry, etc. The states and territories made elaborate

displays, for which purpose many of them expended large sums of money. Those appropriating \$200,000 or more for that purpose are Illinois, \$800,000; New York, \$600,000; California, \$550,000; Pennsylvania, \$360,000; Michigan, \$275,000; Wisconsin, \$212,000; and Ohio, \$200,000. Forty-one nations and colonies were represented at the exposition, which included all the civilized peoples and many of the barbarian. Foremost among those making elaborate displays were Canada, Germany, France, Mexico, Russia, Spain, Great Britain, and Italy.

The total assets of the World's Columbian Exposition were officially reported at \$28,151,168.75 and the total attendance was placed at 27,539,021, the latter number including free admissions. In October the receipts were \$3,195,670 and the attendance in the same month was 7,945,430, this being the best record for any one month. Chicago Day witnessed the largest attendance, the number being 716,881. It was estimated that 11,250,000 different persons attended the exposition from its opening until it closed on October 30, 1893. While the receipts for all purposes were about equal to the expenditures, the income from concessions and gate receipts was \$14,117,332. See **Exposition**.

WORMS (vōrms), a city of Germany, in the grand-duchy of Hesse, on the Rhine River. It is one of the oldest cities in Germany and its history is of much interest. The general aspects have been changed materially within recent years, owing to the construction of a number of important railway lines and the addition of many modern facilities. The streets are paved substantially and are improved by drainage, waterworks, gas and electric lighting, and an extensive system of rapid transit. It has manufactures of pottery, musical instruments, polished leather, tobacco products, wines, and machinery. Among the interesting buildings is a cathedral in the Byzantine style, dating from the 8th century. The Liebfrauenkirche is a beautiful church. It has a number of fine schools, a gymnasium, the town house, and the Saint Martin Church. Worms is connected with many of the incidents mentioned in the *Nibelungenlied*. During the Roman occupation it was an important military point. Attila destroyed it, but it was rebuilt by Clovis and was long a residence of Charlemagne. Henry V. made it a free imperial city. Several important diets convened at Worms, at one of which Luther appeared in defense of the Protestant faith before Charles V. and the imperial princes. This event is commemorated by an imposing monument to Luther, unveiled in 1868. The city suffered greatly in the Thirty Years' War, but

within recent years has shown evidences of re-
turning importance. Population, 1905, 43,841.

WORMS, or *Vermes*, the lowest class of articulated animals, which are characterized by elongate, flattened, or cylindrical bodies. The name is loosely applied to a large number of forms that do not have many features in common, but some writers restrict the group to those that have a digestive tract with two openings, the mouth and the anus, and which have a blood-vascular circulatory system. In most forms the nervous system has a principal center above the throat, the body cavity is present, and the excretory organs are simple. The name worms is applied to many entozoa that are found in the intestines of the human body. These animal forms may occur at any period of life, but are most frequent in young children.

WORMWOOD (wûrm'wôod), a class of plants, which have an erect, angular, and shrubby stem and yellowish flowers. A number of widely diffused species have been catalogued, of which the *common wormwood* of Europe is the best known. This plant is now naturalized in Canada and the eastern part of the United States. Its leaves are aromatic and yield a bitter tonic employed as a vermifuge and to protect clothing and furniture from moths and other insects. The *Roman wormwood* is native to Germany and has properties similar to those of the common wormwood. A tall greenhouse annual known as *wild wormwood* is native to the West Indies and is allied to the feverfew.

WORSTED (wûst'êd), the name applied to several varieties of woolen yarn or thread, so named from Worsted, England, where it was first manufactured. A fine and soft worsted woolen yarn, untwisted or lightly twisted, is used in knitting and embroidery. Long staple wool is employed to spin a well-twisted worsted yarn. This product is used in making gloves, carpets, hosiery, and cloth. Worsted goods of this class are produced largely from wool that has been combed carefully so that fibers lay parallel to each other.

WOUND, the name applied to any incision, or puncture, in the fleshy part of the body, especially to an injury where the tissues are divided by mechanical force. Injuries of this kind are termed *penetrating*, when a cavity is cut into the body without passing through it, and *perforating*, when they form an opening through the body or through a particular part of it. Sharp-edged instruments cause wounds that are classed as *cuts* or *incisions*, while pointed weapons thrust into the body produce *stabs* or *punctured wounds*. Animal venom or virus as well as poisonous matters produce *poisoned wounds*,

while those caused by dull instruments are usually classed as *lacerated wounds*. Injuries resulting from gunshot are usually penetrating and sometimes lacerated. They are usually dangerous because of the complications that may arise.

Wounds may be said to have a local and a general effect. The local symptoms consist of pain, bleeding, and impairment of function, while the general effect includes a shock upon the nervous system and injury by excessive bleeding. Later other complications may set in, such as inflammation, gangrene, and bacteria. The first object in the treatment of a wound should be to stop the bleeding, which may be done by bandaging so as to compress the vein or artery that has been opened. The next step is to wash the affected part with warm water, bathe with an antiseptic, such as a solution of boric acid, and then bandage with light cloth or gauze. It is necessary to disinfect and redress the wound from time to time, and it should be kept entirely free from foreign matter and impurities. Where the ruptured nerves and blood vessels remain in close contact, healing takes place rapidly by what is termed *primary adhesion*, or *first intention*, but when the edges of the wound are left apart the healing is by *secondary intention*, or *granulation*.

WRANGLER (răn'glêr), the term applied to a student who attains the first class in the mathematical honor in examination in the University of Cambridge, England. Any number of students may attain to the honor of wrangler, but the one who makes the best record is called the *senior wrangler*. The examination is public and the honors are commonly called *mathematical tripos*.

WREN (rên), the common name of several kinds of small birds related to the warblers. Most species are native to America, but birds of this class are found in abundance in the Old World. The *house wren* of Canada and the United States builds its nest near houses and in boxes placed for it in house yards. It is about five inches long with an alar extent of ten inches, has a reddish-brown color with whitish markings below, and is known to have great valor in defending its nest against other birds. Two broods of young are reared in a season. This species of wren is a very common kind of birds and has a beautiful song. Other familiar species include the *marsh wren*, *winter wren*, and *Carolina wren*. The common European wren is somewhat smaller, being about four inches in length, and with the exception of the golden-crested wren is the smallest bird in Europe. Nearly all the wrens are similar in be-

ing rather bold and having a slender bill, short wings, and a short and erect tail.



WREN.

WRESTLING (rēs'ling), an athletic sport between two persons, each of whom endeavors to force his antagonist to the ground without resorting to kicks or blows. It is one of the most universal of athletic exercises and is a trial of both skill and strength. The Greeks greatly encouraged wrestling as a gymnastic exercise and the victors at the Isthmian, Nemean, and Olympic games who excelled in this sport received the highest honor. It was cultivated extensively by the Romans, but their contests were more savage and brutalizing than a fair test of wrestling. The sculptures obtained from Egypt make it evident that wrestling was practiced at a very early date. However, the ancient wrestler was almost nude and covered his body with oil, thus to render himself more subtle in combat with his opponent. This practice made it very difficult to get a firm hold of one another and the wrestlers were permitted to use sand on their hands. They took hold of each other by the arms, employed many contortions of the body, interlocked their limbs, and used other similar methods to cause the opponent to be thrown to the ground.

Modern wrestling has been reduced to a skillful art and the rules for this sport are very numerous and quite elaborate. The *catch-as-catch-can* system places the antagonists in an open space facing each other, and at a given

signal permits them to move in close contact and take any hold they may choose. In the system of *collar and elbow wrestling*, the opponents face each other and at the signal make the attack by seizing hold by the collar and at the elbow. A contestant is not considered down unless both shoulders and one hip, or both hips and one shoulder touch the ground, which is decided by an umpire. If a contestant, to save himself from a fall, loosens his hold with one or both hands, it is counted against him as a fall. A contest consists of three or five falls, each being succeeded by an intermission of fifteen minutes.

Another system is the *back-hold catch*, in which the opponents stand close together, facing each other, but in such a position that the chins rest on the shoulders of the opponents. Wrestling begins at a signal and any method of throwing, except kicking or brutality, may be employed. To win the contest, it is necessary to throw the opponent so both shoulders will touch the carpet. Other systems include the *hammerlock*, the *half-Nelson*, the *Cornwall and Devon*, and the *Lancashire style*. *Jiu-jitsu* is a system of Japanese wrestling, but the methods employed are very numerous. Tokio alone has forty schools in which this form of wrestling is taught, but they all differ in some minor respect, and many others are practiced in different parts of that country.

WRIT, a written order issued by the authority of a state or province, requiring a person to do something mentioned in the same. Such a document is issued by a court or some other official and the person commanded to act is required to appear at the time or place mentioned, or do whatever may be directed. A writ is issued under the seal of a public official and it is served, or executed, by the sheriff or some other similar officer. A *writ of mandamus* commands a person or inferior court to do a duty or fulfill an obligation; of *injunction*, restrains action; of *error*, requires the removal of a cause from a lower to a higher court to correct an error; of *subpoena*, commands the attendance of a witness; of *ejectment*, removes an occupant from certain premises; of *replevin*, permits the recovery of goods taken illegally; of *certiorari*, requires the record of a cause to be sent for review from an inferior to a higher court for examination; of *quo warranto*, requires an official to show by what right an office is held or an act is done; of *attachment*, directs taking property into custody by virtue of a legal process; and of *habeas corpus*, has for its object to bring a party before a court or judge, especially one to inquire into the cause of a person's imprisonment.

WRITING, the art of recording ideas on paper, stone, parchment, or any other material by means of letters and characters. The art of writing is usually divided into *ideographic*, in which ideas are represented by signs, and *phonographic*, in which letters or signs are used to represent sounds or words. Writing was introduced into Europe from Phoenicia, which derived its system from the Egyptians. The Egyptian system was hieroglyphic, in which it was attempted to convey ideas by copying objects direct from nature. For this reason it is sometimes called *picture writing*. The characters used were afterward supplemented by a number of arbitrary signs; hence the Egyptian system became both ideographic and phonographic.

It is generally assumed that all alphabets are of hieroglyphic origin and that all systems of writing originated from four or five distinct hieroglyphic systems. These include the Egyptian, the Chinese, the cuneiform, the characters originally used in Yucatan, and the Aztec or Mexican. However, the Egyptian system has been the most potent in influencing the writing systems now employed, though there is still a question as to whether the cuneiform or the Egyptian is of the greater antiquity. The Latin, Greek, Sanskrit, and all European languages are written from left to right, but the Hebrew is written from right to left, while the Chinese signs or symbols are read in columns from top to bottom. No alphabet is employed in the mode of writing used by the Chinese. Their system is strictly ideographic, the characters are syllabic, and the words are monosyllabic. About 40,000 characters make up the Chinese system. The Sanskrit alphabet is the most perfect known and is made up of 14 vowels and 43 consonants.

Capital letters were not employed to distinguish prominent words until after mediaeval times. In the period from the 4th to the 8th century uncial letters were used principally in manuscripts. These were large and of nearly uniform size, resembling modern capitals, but they were characterized by greater roundness. In the 13th century the Gothic characters, differing slightly from the Roman types, came into general use in writing church books, but this form was supplanted largely in Saxony and other regions of Germany by the Saxon style. The Saxon style was introduced in England by the Saxon conquerors, but was afterward modified by the Roman, Lombardic, and other characters. It continued in general use until the time of George II., when it was abolished by law and the present Latin system was introduced. An improved form of the Saxon style is now employed by the Germans, Scandinavians, and other

classes. Attempts to introduce systems of phonetic writing have been made at various times, and it is still the hope of many educators to devise a method in which an invariable sign will represent each sound. The phonetic idea is exemplified in many systems of shorthand writing.

Two distinct systems of penmanship are generally taught in the English and American

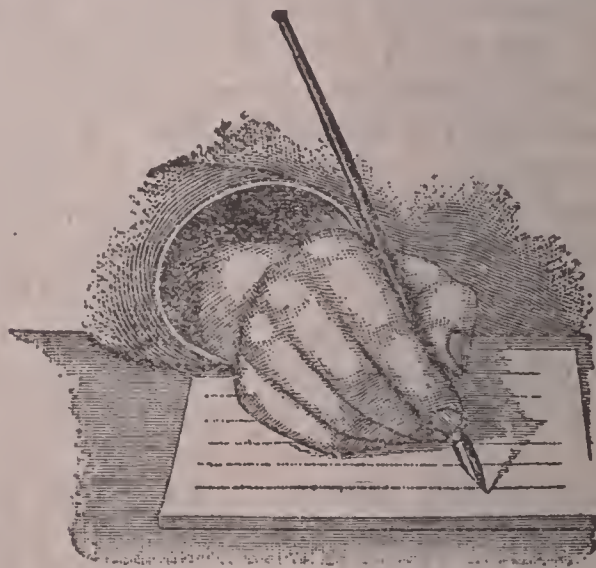
Vertical Writing

schools which are known as the slant and vertical. Until recently slant writing was employed almost universally and it is now taught most extensively, but vertical penmanship has been adopted in many schools, both public and private. The advocates of vertical writing, a sample of which is shown in the figure, make the claim that it so nearly resembles the forms em-



PRINCIPLES OF SLANT WRITING.

ployed in printing that the learners are able to read it as readily as print. However, makers of text-books have originated various styles of vertical writing, some differing but slightly from the slant. As a general rule beginners write more legibly in the vertical hand, but they do so at a loss of speed. Seven principles are employed in slant writing, as shown in the illustration. These



HOLDING THE PEN.

are known respectively as *slant line*, *left curve*, *right curve*, *extended loop*, *direct oval*, *reverse oval*, and *capital stem*. They are numbered from left to right, as 1, 2, 3, 4, etc. The fifth is the capital letter O, and all other letters are formed by combining two or more of the other six principles.

Three essentials should be made objective in

teaching and studying penmanship. They are legibility, rapidity, and beauty, but of these the first two are the most important. Both legibility and rapidity depend upon constant practice, but it is highly essential that learners acquire the habit of holding the pen correctly and of sitting properly at the desk. The feet should rest squarely on the floor and the desk and seat need to be of the proper height, else the pupil will be hindered in the free use of the muscles of the arm and hand. It is best to hold the pen loosely, as a firm grasp tends to tire the muscles, causing them to become overtaxed and unsteady. Little progress can be made until the eye becomes trained to perceive and judge of correct and beautiful forms and the hand has had sufficient practice to execute and produce them correctly. To do this pupils need adequate supplies, such as good pens, practice paper, copy books, and a superior grade of black ink. A definite period each day should be set apart to practice penmanship and the work needs to be done with care, else the progress will not be material and the copy books may become disfigured by blots. To teach writing successfully, one needs to be a good penman and a careful student of the movements employed by the learner.

WRITS OF ASSISTANCE, the warrants issued by the courts of revenue officers to enforce the navigation and revenue laws in the American colonies. Parliament passed an act providing for these writs, in 1754, and they were further legalized in 1766. They differed from an ordinary search warrant in that they were not limited as to time for making an inspection of the premises for goods, and it was not required to specify the premises where search was to be made. Much objection was raised by the colonists, since the general terms of the warrants made it possible to abuse the liberty of the subjects. James Otis argued against such writs before the superior court of Massachusetts in 1761, but they were held to be legal. Subsequently they were rarely issued.

WRYNECK (rī'nĕk), the name of a small bird of the woodpecker family, so called from its peculiar habit of twisting the neck in a serpentine manner. The body is about seven inches long, has a rusty ash color, and is marked by irregular spots of brown and black. The common wryneck of Europe is migratory. It moves north in the spring as far as Great Britain and Russia and feeds upon ants and other insects. Several species are found in Africa.

WÜRTTEMBERG (vürt'tĕm-bĕrg), a kingdom in southern Germany, lying between Hohenzollern, Baden, Bavaria, and Lake Constance. It is separated from Switzerland by Lake Con-

stance, a beautiful sheet of fresh water. The length is 138 miles; width, 106 miles; and area, 7,535 square miles. It is chiefly an agricultural region, about two-thirds of the entire area being under cultivation, and fully three-tenths is covered with forest. Ranges of the Alps cross the southern part, and in the interior are the Hohenstaufen Hills. It has fine forests of pine, oak, beech, and other valuable timber. The mineral deposits include gypsum, copper, coal, iron, bismuth, cobalt, limestone, salt, and granite. The climate is highly favorable to the cultivation of cereals and fruits and is exceptionally healthful. Wheat, corn, rye, hay, barley, hops, tobacco, and vegetables are the principal productions. The vineyards yield large quantities of excellent grapes, which are made into Rhine and Champagne wines. Live stock of all kinds is abundant, especially milch cows, horses, cattle, and swine. The manufactures include ironware, clothing, woolen and silk textiles, beet sugar, spirituous liquors, chemicals, scientific instruments, and machinery. Navigation facilities are provided by several canals in connection with the Danube and Neckar rivers, but extensive railroad facilities are maintained in all parts of the country. The chief cities include Stuttgart, Ulm, Heilbronn, and Esslingen.

Württemberg is a constitutional kingdom. The sovereign holds his office by heredity. It is divided into four circles (*Kreise*) for governmental purposes, which include the provinces of Neckar, Jaxt, Black Forest, and Danube. The kingdom has four votes in the federal council of the German Empire and seventeen representatives in the national diet. Efficient elementary and secondary school systems are supported by the government and school attendance is compulsory. A recent official census shows that not an individual in the kingdom, above the age of ten years, is unable to read and write. The government maintains a fine system of benevolent and reformatory institutions, industrial schools, and institutions of higher education. The University of Tübingen, founded in 1477, is one of the famed institutions of Europe, and the Polytechnic School at Stuttgart is noted for its educational influence on public thought. Although no established religion is recognized by the government, the inhabitants are almost exclusively Protestant and the king is vested with the supreme direction of the Protestant Church.

The earliest inhabitants of Württemberg probably were Celtic, but the Suevi occupied the country at the time of the Roman conquest, and in the period of the decline of Rome it was overrun by the Alemanni and the Franks. Conrad, Count of Württemberg, possessed a small terri-

tory in 1090, but his successors added considerably to the possessions, especially Ulrich I., who governed the country from 1246 to 1265. It was erected into a dukedom in 1495 by Emperor Maximilian, who conferred upon the reigning duke the title of Eberhard I. In 1805 it became a kingdom, in consequence of Duke Frederick II. having aided Napoleon. His son, William I. (1781-1864), reigned for a period of fifty years, giving the people a liberal and progressive government. The kingdom joined the German Empire in 1871 and has since been an influential factor in the Federal government. Stuttgart is the capital and largest city. Population, 1905, 2,302,179.

WÜRZBURG (vürts'böörg), a city of Germany, in the northwestern part of Bavaria, sixty miles southeast of Frankfort-on-the-Main. It is finely situated on the Main River, which is crossed by a number of substantial bridges, and has extensive railroad facilities. The principal buildings include the Julius Hospital, the Neumünster Kirche, the Episcopal Palace, and the famous University of Würzburg. This university was founded in 1582 and has 1,500 students and a library of 352,000 volumes. The city has a number of other institutions of learning, including a gymnasium, a seminary, and a college of agriculture and mechanic arts. Marien Kapelle, a church of great beauty, is adorned with fourteen statues of famous men. Würzburg has a number of beautiful monuments and statues, including one erected to the memory of Walther von der Vogelweide. The streets of the city are paved with stone and asphalt. It has systems of gas and electric lighting, sanitary sewerage, waterworks, and electric street railways. Among the manufactures are cotton and woolen textiles, leather, glassware, railroad cars, machinery, and farming implements. A battle occurred between the Prussians and Austrians near Würzburg in 1866. About 7,000 French prisoners were confined in its prison and barracks at the time of the Franco-German War. Population, 1905, 80,327.

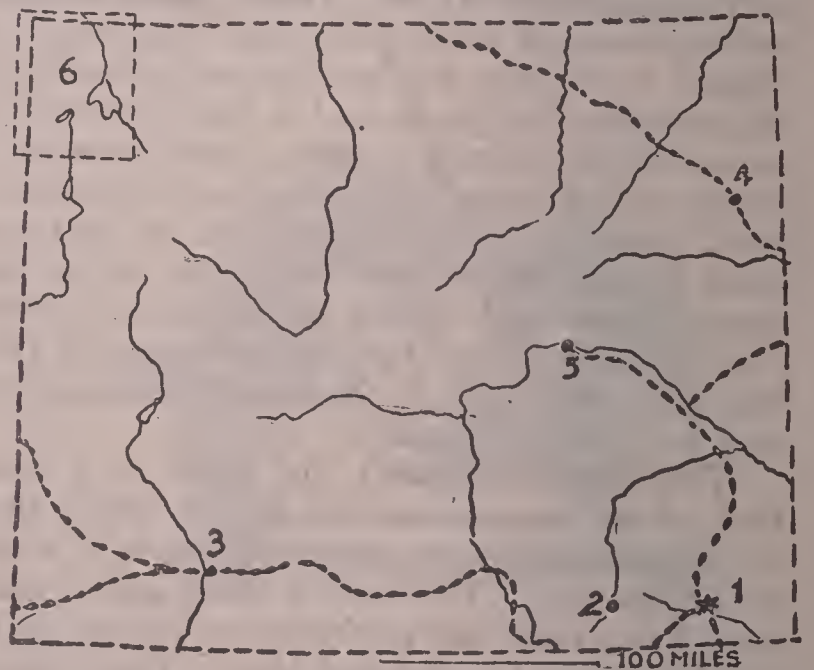
WYANDOTS (wī-ān-dōts'), a North American Indian tribe of the Iroquois family. They first came in contact with the whites in the vicinity of Lake Huron, where they engaged in the culture of tobacco, from which circumstance they were called the Tobacco Indians for some years. The Iroquois nearly exterminated them in 1636 and the surviving remnant settled in the vicinity of Detroit, Mich. In 1812 400 Wyandots sided with the English. Subsequently they sold their lands to the United States, some of them removing to Canada and others to Kansas. At present they number about 800, of which

about 100 are in Ontario, 350 are in Oklahoma, and 400 are in Quebec.

WYANDOTTE (wī-ān-dōt), a city of Michigan, in Wayne County, twelve miles southwest of Detroit. It is situated on the Detroit River and on the Michigan Central, the Grand Trunk, the Lake Shore and Michigan Southern, and other railroads. The chief buildings include the public library, the high school, and a number of fine churches. It has manufactures of malt liquors, furniture, gasoline engines, salt, chemicals, clothing, and farming machinery. The public utilities include electric lighting, sanitary sewerage, and waterworks. Wyandotte was platted in 1854 and incorporated in 1867. Population, 1904, 5,425; in 1910, 8,287.

WYANDOTTE CAVE, an important subterranean passage four miles north of Leavenworth, Ind. It rivals the Mammoth Cave of Kentucky and has been explored about 22 miles. The two largest rooms range in height from 150 to 245 feet and have beautifully formed chambers of stalactites and stalagmites. The different places of interest include those known as the White Cloud Room, the Mammoth Hall, the Pillared Palace, and the Beauty's Bower. In some places the walls are covered with crystals of Epsom salt. Beautiful white gypsum rosettes are in the cave.

WYOMING (wī-ō'mīng), a western State of the United States, popularly called the *Equality State*, owing to its having been the first to ex-



WYOMING.

1, Cheyenne; 2, Laramie; 3, Rock Springs; 4, New Castle; 5, Casper; 6, Yellowstone National Park. Principal railroads shown by dotted lines.

tend the right of suffrage to women. It is bounded on the north by Montana, east by South Dakota and Nebraska, south by Colorado and Utah, and west by Utah, Idaho, and Montana. The length from east to west is 356 miles and

the width from north to south is 275 miles. It has an area of 97,575 square miles.

DESCRIPTION. The State is crossed from southeast to northwest by the Rocky Mountains, which form the Continental Divide and are the source of a number of important rivers. Wyoming is a lofty plateau with an average altitude of about 6,000 feet, but many of the mountains tower far above the snow line. The principal mountain chains include the Shoshone, the Teton, the Wind River, the Big Horn, the Sweetwater, and the Laramie ranges. On the eastern boundary, between Wyoming and South Dakota, is the group known as the Black Hills. Among the chief peaks are Laramie, height 10,975 feet, and Fremont, 13,570 feet. In the northwestern part is the famous Yellowstone National Park, which has an area of 3,575 square miles and is remarkable for its natural scenery and numerous geysers. This region is a rugged complex of lofty mountains and extensive cañons, but is beautified by fine lakes and streams.

The drainage belongs to two systems, the head-streams being separated by the Rocky Mountains. The streams on the eastern slope belong to the Missouri system and those on the western slope are classed with the systems of the Colorado and the Columbia rivers. Yellowstone and Jackson lakes are the only large sheets of water. Jackson Lake is the source of the Snake River, which is a tributary of the Columbia, and Yellowstone Lake is the source of the Yellowstone, a confluent of the Missouri. Other streams belonging to the Missouri system include the Big Horn, the Powder, the Cheyenne, the Belle Fourche, the Wind, the North Platte, and the Laramie rivers, while the Greene River belongs to the Colorado basin. None of the rivers is navigable, but many are important for irrigation and the water power that they furnish.

The climate, like that of other Rocky Mountain states, is arid and healthful. At Sheridan the mean temperature for January is 18° and at Cheyenne it is 25°, while the mean in July of both localities is 67°. The maximum temperature is somewhat above the 100° and the minimum falls as low as 40° below zero. Rainfall for the State is given as 13 inches, but it ranges from 16 inches in the eastern to 8 inches in the western parts. The largest falls of rain occur from March to June and the remainder of the summer season is extremely dry.

MINING. Wyoming is rich in many of the useful minerals. It has an abundance of coal and there has been a steady increase in the output of this product. The normal average is placed at 6,800,000 short tons per year. Petroleum is found in many parts of the State, espe-

cially in Fremont and Natrona counties, and the annual production is placed at 10,500 barrels. Iron deposits occur in many localities and granite and limestone are abundant, but these minerals have not been developed extensively. Gold and silver are mined profitably and mineral waters and natural gas are found in abundance. Other minerals include copper, zinc, salt, soda, asbestos, gypsum, sulphur, bismuth, clays, and graphite. The deposits of minerals are not worked as extensively as conditions would justify, owing largely to the lack of adequate transportation facilities.

AGRICULTURE. It is estimated that about one-sixth of the State is capable of cultivation, though irrigation must be resorted to for the production of most crops. The lands lying between the mountains and the valleys of the rivers are generally fertile and a large supply of water is available for irrigation. A large proportion of the inhabitants reside in the valley of the North Platte River, which supplies a large part of the water. Extensive forests of cedar, pine, spruce, aspen, and cottonwood abound in the mountains and along the streams, but the broad plateaus are without timber and can be easily cultivated. Hay and forage crops are grown most extensively. Oats and wheat are the leading cereals. Other products include corn, barley, rye, potatoes, and the hardier fruits.

The native grasses cure naturally in the dry climate, hence are of much value for grazing, especially in that they furnish food for stock throughout the winter. Sheep are raised very extensively, the number being 6,525,000 head. Cattle are grown chiefly for meat, but rapid developments are taking place in dairying. Other domestic animals include horses, swine, mules, and poultry. Cattle, horses, and sheep are raised extensively on large ranches.

MANUFACTURES. A lack of facilities to transport iron, timber, petroleum, and other products to the towns has retarded manufacturing to a considerable extent. A large proportion of this enterprise is confined to railway repair shops. The leading products include lumber, flour and grist, brick and pottery, soda and chemicals, clothing, and machinery. There has been a material increase in the output of butter and cheese, tobacco products, and farming implements the past decade.

TRANSPORTATION. None of the rivers within the State is navigable and many sections are not provided with railway facilities. The railway lines have a total of 1,650 miles in operation and they are confined principally to the southern and eastern parts of the State. The transcontinental line of the Union Pacific crosses the

southern part of the State from east to west, the Chicago, Burlington and Quincy crosses the northeastern corner, and a line of the Chicago and Northwestern penetrates the east central part. Other railways have branches in the southeastern section and the Yellowstone National Park is reached by a branch of the Northern Pacific, though it does not enter the State. Few of the highways have been improved, but trails for interior travel have been located, which are used chiefly for transportation by mules and horses.

GOVERNMENT. The constitution was adopted at the time Wyoming became a State, in 1890. It grants equal political rights to both sexes and is the first document of this kind to extend the right of suffrage to women. The executive authority is vested in the governor, secretary of State, treasurer, auditor, and superintendent of public instruction, each elected for four years. The Legislature consists of a senate of 23 members and a house of representatives of 50 members. Sessions of the Legislature are held biennially. A chief justice and two associates constitute the supreme court. Other courts may be established by the Legislature, including circuit, probate, and justices' courts. Local government is vested in the towns, municipalities, and counties.

EDUCATION. The State has occupied an enviable position from the standpoint of education since its admittance to the Union, having had a very small per cent. of illiteracy during the entire period. However many sections within the State are so sparsely settled that it is difficult to provide educational facilities in some localities. All parts which are settled have public schools. A compulsory attendance law has been enforced since 1907. The schools are maintained largely by the rental of public lands which have been set aside for school purposes, but additional support is given through a system of general and local taxation. Text-books are supplied free by the State, under a graded and uniform course of instruction.

The University of Wyoming, located at Laramie, is at the head of the public school system. Cody City is the seat of the Cody Military College, Evanston has the insane asylum, and Cheyenne is the seat of the soldiers' home. Rock Springs has a State hospital and Rawlins has the penitentiary. All the schools and the State institutions are managed efficiently.

INHABITANTS. The State has a foreign-born population of 17,415, consisting chiefly of Germans, Scandinavians, and British. Among the leading religious denominations are the Mormons, Catholics, and Methodists. Cheyenne, on

the Crow River, is the capital and largest city. Other cities include Laramie, Rock Springs, Rawlins, Sheridan, Evanston, and Green River. In 1900 the State had a population of 92,531. This included 3,480 colored people, of whom 393 were Japanese, 461 Chinese, 940 Negroes, and 1,686 Indians. Population, 1910, 145,965.

HISTORY. The region now included in Wyoming was acquired by the United States partly through the Louisiana Purchase of 1803 and partly by the Mexican cession of 1848. In 1834 the first white settlement was made on the present site of Fort Laramie. At that time the overland route to California extended through the country now included in the southern part of the State, particularly along the North Platte River, and many emigrants from the states further east sought their fortune on the Pacific coast by passing through the region. Mormons settled in the Green River valley in 1853 and about the same time several mining camps became developed. Wars with the Indians were extended and numerous, the chief tribes including the Sioux, Utes, Crows, Arapahoes, and Shoshones. General Crook reduced most of the tribes to submission in the period extending from 1876 to 1877, and soon after the Indians were either transported or placed on reservations. Wyoming was organized as a Territory in 1868 from lands which at one time were included in South Dakota, Idaho, and Utah. It was admitted as a State in 1890.

WYOMING, University of, a coeducational institution of higher learning at Laramie, Wyo., founded from the proceeds of public land grants in 1887. This institution includes all the departments of higher learning within the State. It is composed of the College of Liberal Arts, the Graduate School, the School of Mines, the College of Agriculture, the College of Mechanical Engineering, the School of Music, the School of Commerce, and the Normal School. Since many sections of the State are not supplied with high schools, the institution maintains a preparatory school with a two years' course. No tuition is charged in any department of these schools. Since Laramie has an ideal climate and Wyoming presents a great field for research work, many learned men and women are attracted to this institution as lecturers and instructors. It has a library of 20,000 volumes, an income of \$90,000, and property valued at \$250,000. The attendance is about 300 students.

WYOMING VALLEY, a fertile and beautiful valley of the north branch of the Susquehanna River, in Pennsylvania. It is inclosed by mountains. The chief city in the region is Wilkesbarre, county seat of Luzerne County.

Wyoming Valley is noted for its history as well as fertility. The Wyoming massacre occurred at the town of Wyoming on July 3, 1778, when 800 Tories and a large number of Indians made an attack on the inhabitants. Most of the men were absent on service in the Continental army and the town was obliged to surrender on July 5, when all those unable to flee were massacred by the Indians, who took 227 scalps and spared only the women and young children. The set-

tlers were largely from Connecticut and their descendants made claim to the titles of the lands, which were afterward also claimed by citizens of Pennsylvania. This gave rise to the so-called Pennymite wars. Connecticut claimed the region until 1782, when Congress decided the contest in favor of Pennsylvania, and the State Legislature in 1788 confirmed the titles to those holding property. A fine monument was erected, in 1843, on the scene of the Wyoming massacre.



X

X-RAYS

X, the twenty-fourth letter and nineteenth consonant of the English alphabet. It is often spoken of as a superfluous letter, because it represents no sound that may not be represented by other letters. Usually it has the sound of *ks* when occurring in the middle of a word, as in *taxes*, *axis*, *foxes*. At the beginning of a word it has the sound of *z*. In some words it has the sound of *ks* as a terminate letter, as in *lax*, *wax*, *tax*. In Roman writing *x* was the last letter in the alphabet. It signifies ten as a Roman numeral; when placed horizontally (X) it represents a thousand, and with a dash over it ($\overline{\text{X}}$) the symbol indicates ten thousand. In algebra *x* is the usual symbol for the unknown quantity which is to be determined.

XANTHUS (zăn'thŭs), an ancient city in the southwestern part of Asia Minor, capital of Lycia, on the Xanthus River, near the present village of Gunik. The city seems to have been founded at a very early date, and its inhabitants were governed by independent princes. Lycia was invaded by the Persians and the capital was twice destroyed, the last time in 546 B. C., and Alexander captured it at the time of his campaign in the East. Brutus with a Roman army took possession of the city in 43 B. C., when only a few of the inhabitants survived. Many ruins of ancient structures have been uncovered, showing that the place was well built and contained many tombs and sculptures. The most noted buildings belonged to the 6th century B. C. and were evidently of Greek origin. They included many theaters, the statues of the Nereids, and a sculpture known as the Harpy Tomb, now in the British Museum. Among the remains still intact are the walls of the Acropolis, a Roman gate, and several tombs and temples.

XEBEC (zē'bĕk), a small vessel which has three masts with both square and lateen sails, being variously arranged. It differs from the *felucca*, a coasting vessel employed on the Mediterranean, in that the latter has only lateen sails. The Algerian pirates used xebecs which carried from twelve to twenty guns. Most of these vessels had low sides and the deck was

somewhat convex, permitting the water to flow off through the scuppers.

XENIA (zē'nĭ-ă), a city in Ohio, county seat of Green County, fifty miles southwest of Columbus, on the Pennsylvania, the Cincinnati, Hamilton and Dayton, and other railroads. It is surrounded by a fertile farming region and has communication by several electric railroads. The chief buildings include the county courthouse, the public library, the city hall, the Ohio Soldiers' and Sailors' Orphans' Home, the United Presbyterian Theological Seminary, a business college, and a number of parochial schools. Near the city, at Wilberforce, is the Wilberforce University, which was opened in 1856 for colored students. Among the manufactures are paper, powder, tinware, cordage, glass, shoes, carriages, earthenware, and machinery. The city has pavements, gas and electric lighting, municipal waterworks, sewer drainage, and other improvements. Settlements were made in the vicinity as early as 1804. It was incorporated in 1808. Population, 1900, 8,696; in 1910, 8,706.

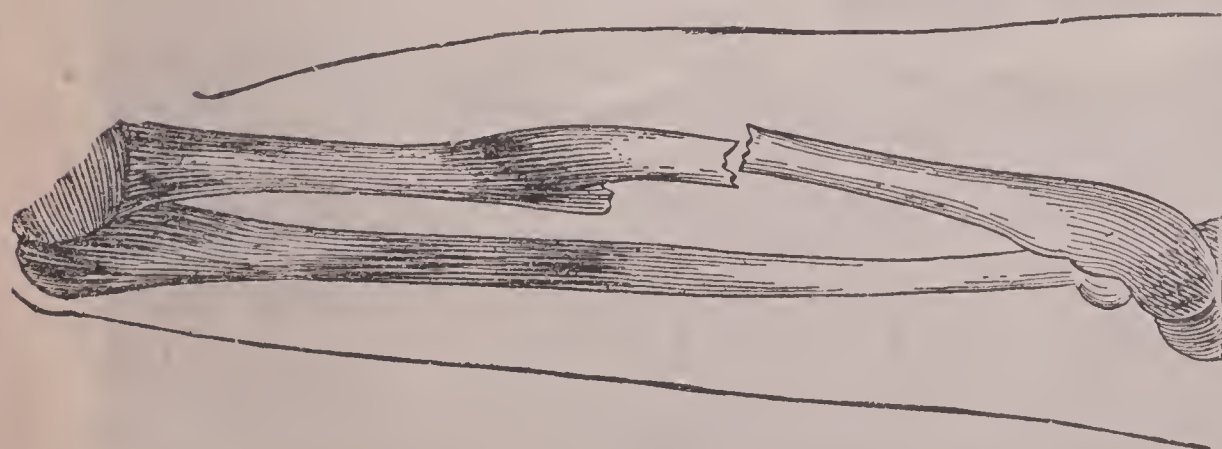
XINGŪ (shĕn-gōō'), an important river of Brazil, which rises on the plateau of Matto Grosso and, after a northerly course of 1,150 miles, flows into the Amazon, near the head of the estuary. Several impassable falls and rapids obstruct the stream in the course about 150 miles from its mouth, in a part of the river known as the Great Bend. It is navigable for steamers for 110 miles. In 1885 the river was explored with much care under the direction of the Brazilian government.

X-RAYS, or **Röntgen Rays**, the peculiar rays of light which are produced by sending electric discharges through exhausted glass tubes. They were discovered by Professor Röntgen in 1895 and were named *X-Rays*, meaning unknown rays. X-Rays are peculiar for their power of penetrating opaque objects, an example of which is shown in the accompanying illustration. All bodies seem to be transparent when subjected to these rays, but in different degrees. It will be seen that the flesh of the hand appears as a mere outline, while the rings on the fingers

give a darker effect than the bones. The rays pass freely through blocks of wood, flesh, thick books, and plates of ebonite. Metals are among



EFFECT OF X-RAYS.
Showing Bones of Hand.



EFFECT OF X-RAYS.
Showing Broken Bone in Arm.

the most highly opaque substances, and bone is more opaque than flesh.

By means of these rays it is possible to make a photograph of the bones of the living hand, or

of the organs in any part of the body, as the lungs, heart, muscles, and kidneys. It is possible to so apply these rays that a surgeon may locate and examine minutely the fracture of a bone, a bullet, or a tumor in any part of the body. These rays are very serviceable in detecting pulmonary tuberculosis, to examine the size and position of the heart, and in fact to observe the form and condition of practically all organs of the living body. It has been computed that one person in every 800 is blind to the X-Rays, that is, when looking through the fluoroscope is unable to see the objects clearly seen by the ordinary observer. The nature of the X-Rays and their origin are still in doubt, and, like electricity, they may be studied only by their manifestations. See **Cathode Ray**; **Crookes Tubes**.

XYLENE (zī'lēn), the name applied to three isomeric hydrocarbons, which were first obtained in a pure state from coal naphtha in 1863. Subsequently a process was discovered by which xylene is obtained successfully from wood spirit. The product is a volatile, inflammable liquid. It is colorless, boils at 282°, and has a peculiar odor. Several derivatives are obtained from it, including methyle-xylene, ethyle-xylene, and the nitro-xylenes.

XYLOPHONE (zī'lō-fōn), a musical instrument which consists of a series of bars of wood or glass, arranged horizontally upon two longitudinal cords or sills. The bars are graduated in length to the musical scale, and the instrument is played by striking them with two small hammers held in the hands. This instrument has a compass of about two octaves. It is of ancient origin and is now used extensively among the Poles and Russians. Recently it has become popular in connection with the phonograph, its tones being suitable for clear reproduction by the latter instrument.

XYZCORRESPONDENCE, the name applied to certain dispatches between the United States and France, at the time John Adams was President. The United States had received valuable aid from France at the time of the Revolution, which was in accord with treaties made in 1778, and the latter

country desired an alliance with the United States in the war against England and other countries, following the overthrow of the monarchy in 1789. An effort to make such an

alliance not only failed, but President Washington persisted in preserving neutrality and the government contracted the Jay Treaty with England, whereby the directory, which then governed France, became offended. It promptly issued letters empowering French vessels to assail American ships, but the President convened Congress in extra session and named John Marshall, Charles C. Pinckney, and Elbridge Gerry as commissioners to treat with France. In the meantime John Adams had succeeded to the Presidency.

Talleyrand, who was then minister of foreign affairs, did not manifest a desire to hold an interview with the Americans, but instead sent Hauteval, Hottinger, and Bellamy as special agents to confer with the commissioners. In the dispatches these agents were designated as X,

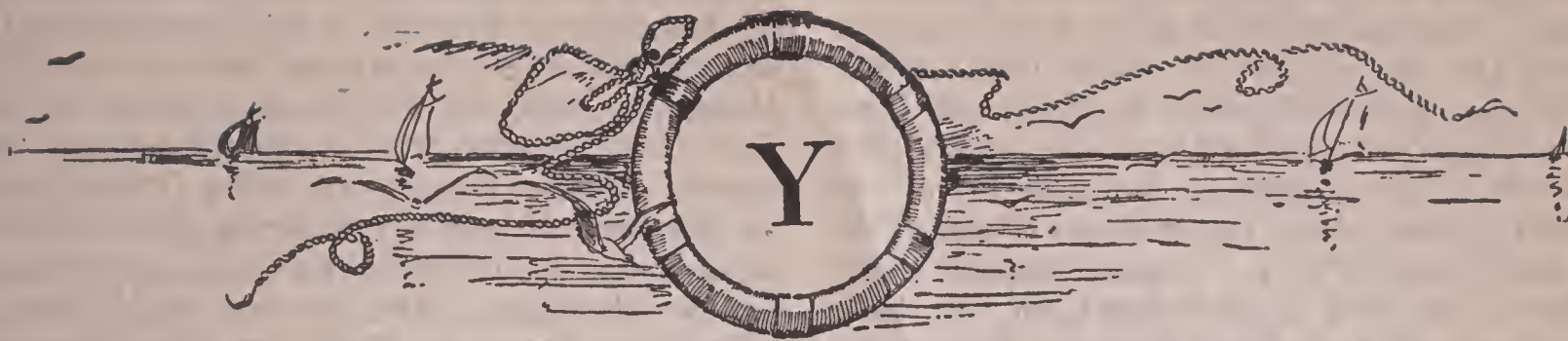
Y, and Z, hence the whole matter became known as the *X Y Z correspondence*, or *mission*. The French agents in the course of the conference requested a monetary consideration or a loan in order to conclude the matter, but the Americans refused to grant such a demand. It was in this connection that Pinckney is quoted as saying, "Millions for defense, but not a cent for tribute." Shortly after the dispatches were submitted to Congress France ordered Pinckney and Marshall to leave the country and the United States government recalled Gerry. War with France was threatened on account of these matters and a few naval engagements occurred, but Napoleon became first consul of France and was favorably inclined toward the United States. Both countries ratified a treaty in 1800, which was declared in force on Dec. 21, 1801.



RELIANCE.

Reliance, the noted racing craft built to defend the America's Cup, represents a decided departure from former Herreshoff boats. A greater overhang forward gives her a length over all of 140 feet. Her water-line measures 90 feet, while her great mass towers above the deck 150 feet. Reliance carries more sail than any other yacht ever built for racing purposes. Columbia, with her 13,000 square feet of canvas, was considered a prodigy, but this cup defender spreads 15,000 square feet to the breeze in the endeavor to keep in America the most interesting sporting trophy in the world.





Y

YACHTING

Y, the twenty-fifth letter of the English alphabet. It is used both as a consonant and a vowel. The letter *y* was adopted into the Latin from the Greek letter *upsilon*, and afterward became incorporated into the alphabet of the Anglo-Saxons. As a vowel it is now employed regularly for final *i*, as in *city*, *pity*, and *multiply*. At the beginning of syllables it is usually a consonant, but is a vowel in that case when it is followed by a consonant, as in *Ypsilanti*. It is always a consonant when followed by a vowel. In the Spanish it is used instead of the personal pronoun *I*, and in Latin it is employed only as a small letter. It has no place in the German writings aside from its use in words of foreign origin. *Y*, as a symbol in algebra, stands for the second variable or unknown quantity.

Y, or **Ij**, the portion of the Zuyder Zee which extends north of Amsterdam, in the province of North Holland. Formerly it was 21 miles in length and had a width of several miles, but it has been almost entirely reclaimed for cultivation, except the central part, which has been deepened as a portion of the North Sea Canal. This canal is connected with the Zuyder Zee through a lock.

YABLONOI (yà-blà-noi'), the name of a range of mountains in Eastern Siberia, in the region east of Lake Baikal. It has a general direction toward the north and northeast, extending a distance of 1,000 miles, and merges into the Stanovoi Mountains. The highest altitudes are in the southwest, where they rise about 8,500 feet above the sea. Their slopes are covered with forests, but the summits are bleak and cold.

YACHT (yŏt), a sailing vessel which is specially built with the view of obtaining speed. Such a vessel is usually designed for pleasure, as for racing or for traveling. Many varieties of yachts are in successful use, ranging from those comparatively small and best adapted for pleasure trips to the seagoing vessels designed for pleasure and racing. In the latter two classes

they are supplied with luxurious furnishings. The rigs are various, and many pleasure yachts now have steam power as an accessory or for use during calms. The hull of racing yachts is ballasted quite heavily and they are rigged with large sails, thus supplying the necessaries for considerable speed. Among the chief rigs for yachts are those known as the yawl, cutter, and schooner. The *yawl* has a running bowsprit, one mast, and a small mizzenmast, while the *cutter* is without the last mentioned. The schooner has two masts—a foremast and a mainmast—and either a standing or a running bowsprit. Besides these three classes there are a number of others, and those of each class differ widely as to the sails and lines and the quantity of steam power supplied.

YACHTING, the art of racing and traveling for pleasure by means of a yacht. Yachting has long ranked as an agreeable sport, in racing with yachts and boats with sails, either for pleasure, for money, or for a cup. Competition has caused many improvements to be made in yacht building, just as horse racing has improved horses, and there is an authentic record of yachting clubs for about two centuries. The first sailing club on record, known as the Cork Harbor Water Club and now called the Royal Cork Yacht Club, dates from 1720 and is still the most efficient in Ireland. In the early history of yachting the boats were small, but they gradually increased in size, while other improvements were added to give them both speed and security. The first yacht club in America was founded at New York by nine yacht owners in 1844. At first the main object was to bring the American record up by making improvements in sailing vessels, but later attention turned to competition with foreign yachting clubs.

The schooner *America* crossed the Atlantic in 1851 and won the Queen's cup by defeating the *Aurora*. Several efforts have been made to recover the lost cup, but the United States has

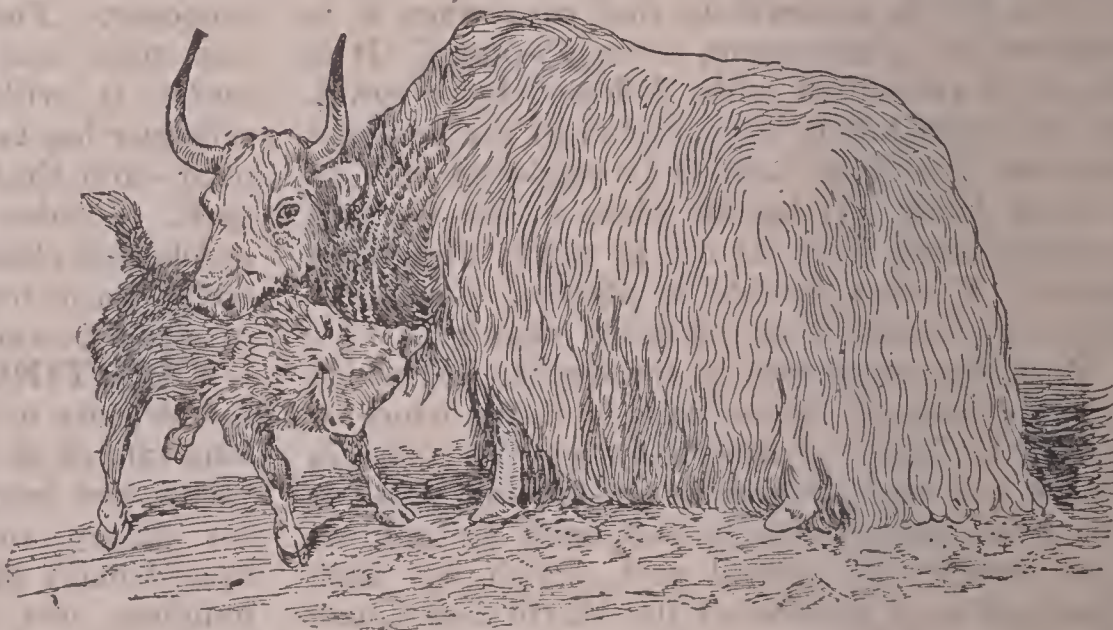
held it ever since. The memorable contests embrace that of the *Cambria* against the American schooner *Puritan* in 1870; that of the *Galatea* against the *Mayflower* in 1886; that of the *Thistle* against the *Volunteer* in 1887; and those of the *Shamrock* against the *Columbia* in 1901 and since. The *Shamrock* was owned by Sir Thomas Lipton, of the Royal Ulster Yacht Club, and the *Columbia* by J. Pierpont Morgan, commodore of the New York Yacht Club. In these contests, which are among the most notable on record, the *Columbia* demonstrated in successive competitive races that the American vessel was superior in every respect for security and speed. At present about 200 famous yachts are maintained in the United States, including, besides those named, the *Defender*, *Genesee*, *Vigilant*, *Gloriana*, *Katrina*, *Rainbow*, *Ramona*, *Colonia*, *Virginia*, *Coronet*, *Sachem*, *Minnesota*, and *Amorita*. The races in America are usually sailed off Sandy Hook.

Since 1903 the launches propelled by motors using products of petroleum in place of steam have grown in popularity. The first naphtha launches were set afloat in 1886. To this class belongs the *Adios*, built in 1902 by H. S. Leighton. This launch has a motor of 120 horse power, is 55 feet long, and attained a speed of 23 miles an hour. In some yachts alcohol is used in place of naphtha and electric storage batteries are employed to some extent, especially where the trips are not far from shore, though in some vessels the power is generated by dynamos on board.

The most eventful yacht racing in 1905 occurred in May, when the international transatlantic race from Sandy Hook to the Lizard, England, took place. Emperor William of Germany had offered as a prize the Kaiser's Cup, valued at \$5,000, and it was won by the American yacht *Atlantic*, making the trip in twelve days, four hours, and three minutes, the best record for cross-ocean passage of yachts. In September the racing for the Astor Cups took place off Newport, the *Yankee* winning the sloop cup and the *Elmina* winning the schooner cup. Edward VII. offered the King's Cup as a challenge for American yachts. The first race occurred off Newport in August, 1906. Other famous races have been stimulated by the Canada Cup, the Lipton Cup, etc.

YAK (yäk), a bovine ruminant native to

Central Asia. It is found chiefly in Tibet, and is regarded intermediate between the bisons and the true oxen. The yak is still abundant in the wild state in the lofty plateau between the Altai Mountains and the Himalayas, where it subsists on the coarse, wiry grass common to that region. In size it does not differ from a small ox, but there is long hair fringing the shoulders, sides, and tail. Its horns are long, smooth, and nearly cylindrical. The color of wild yaks is either dark brown or black, but those domesticated are lighter in color, even white specimens being quite common, and some are hornless. These animals have been domesticated to a considerable extent in Central Africa for their milk and hair, and they are employed as beasts of draught and burden. The milk is considered very rich and yields a curd valuable for food, both in the fresh and dried state. An excellent grade of butter is made of yak milk. Both the butter and flesh are important articles of



DOMESTICATED YAK AND CALF.

commerce in Tibet, while the hair is utilized in making jackets, caps, and blankets, and the skin is of value as a leather product. The tail is used as a chowry, or fly flap, in India and Tartary. The domesticated yak differs quite as much in size, appearance, and usefulness as do the cattle raised in Canada and the United States. It is the inseparable companion and most trusty servant of the Tibetans and is used extensively by the people of Ladakh, Cashmere, Mongolia, and Urga. No animal is better fitted to endure cold.

YAKIMA (yäk'î-mä), a river of central Washington, which rises in the Cascade Mountains and flows in a general direction toward the southeast. It has a length of about 165 miles and flows into the Columbia some distance above Kennewick. The country along the Yäk-

ima includes fine agricultural land, and the river and its tributaries furnish water for irrigating a large region. It receives the inflow from the Natchez River near North Yakima. The valley is traversed by the Northern Pacific Railroad almost the entire length.

YAKIMA, a confederacy of Indians in North America, formerly found in the eastern part of Washington, but now confined on the Yakima Reservation, in the south central part of Washington. Lewis and Clark came in contact with them in 1804, and they ceded most of their land to the government by treaty and agreed upon the present reservation in 1855. At present they engage chiefly in stock raising and farming, for which purpose they employ irrigation. The Indians upon the Yakima Reservation number about 2,350, but less than half are Yakimas.

YAKUTSK (yā-kutsk'), capital of the province of Yakutsk, in eastern Siberia, on a tributary of the Lena River. The province includes nearly one-third of Siberia and is populated largely by Yakuts, Lamuts, and descendants of those exiled from Russia. It has a remarkably cold climate, the winters being long and severe, but there is a steady increase in population. The city of Yakutsk is reached in the summer time by vessels sailing on the Lena, Viliui, and Aldan rivers, but in the long winters little commercial activity is manifested. Among the principal manufactures are candles, implements, utensils, earthenware, and clothing. It has a considerable trade in fur, live stock, and native products. Cossacks founded the city in 1632. Population, 1909, 8,604.

YALE UNIVERSITY, an institution of higher learning in the United States, one of the most noted in America. It was founded as the Collegiate School of Connecticut at Saybrook, Conn., in 1698, but was removed to New Haven in 1716, where it was located permanently. Two years later, in 1718, it was renamed Yale College in honor of Elihu Yale, from whom it received valuable gifts. The consistent growth of the institution as a center of learning naturally caused it to become one of the leading universities of the country. As now organized it includes the graduate department, the academic department, the Sheffield Scientific School, the theological school, the law school, the medical school, the school of music, the school of art, and the school of forestry. The courses are well classified and lead up to the usual university degrees.

The campus of Yale University borders on the green of New Haven, being bounded by Elm, High, Chapel, and College streets. It has a very convenient and imposing location. The

buildings include those of the university proper, the Sheffield Scientific School, the School of Fine Arts, the Peabody Museum of Natural History, and the University Library. At present there are 550,000 volumes in the general library. The annual income is about \$1,250,000. The general average attendance is 3,500 students. Fully 25,000 persons have graduated from the different departments. In October, 1901, was celebrated the two hundredth anniversary of the granting of a charter to Yale College, on which occasion President Roosevelt and other distinguished men made addresses. Among the eminent men who have been connected with the institution are Timothy Dwight, James L. Kingsley, Theodore D. Woolsey, and Arthur T. Hadley.

YALU (yā'lōō'), an important river in the eastern part of Asia, known in Corea as the Annok or Apnok. It rises on the eastern border of China, flows in a general direction toward the southwest, and discharges into the Yellow Sea, forming the larger part of the northwestern boundary of the country. Several rapids obstruct its upper course, but it is navigable a distance of 145 miles, though seagoing junks do not ascend more than 30 miles. The entire course is 300 miles. In the war between Japan and China, the Japanese destroyed the fleet of China off the mouth of the Yalu, in 1894. The Japanese forced a passage of the mouth of this river in 1904, when it was the scene of important battles during the Russo-Japanese War.

YAM, the common name of several species of plants, having twining stems and edible, tuberous roots. The roots are eaten in much the same way as potatoes. They more nearly resemble the sweet potato than the common potato, but differ distinctly from both these products. Starch is the chief constituent and the taste is somewhat acrid when raw, but they become mealy and pleasant when boiled. Yams are cultivated chiefly in the tropical countries and are propagated by their tubers, which are planted in much the same way as potatoes. A light colored kind of sweet potato grown in the Southern States is commonly called yam, but is a different plant. The *cinnamon vine* is an ornamental plant belonging to the yams.

YANG-TSE-KIANG (yǎng'tsē-kǎ-äng'), one of the principal rivers of Asia, which is situated wholly within China. It rises in the Kuen-lun Mountains and, after a general course toward the southeast, makes a bold curve at the northern boundary of the province of Yun-Nan and flows toward the northeast, entering the Yellow Sea at Shanghai. The entire length is 3,200 miles, of which 900 miles are navigable

by ships of the largest class and 1,500 miles by smaller steamboats. It is joined by the Han River from the north and by the Kan and Heng rivers from the south. Many important cities of China are located on its banks, and it is the seat of a vast interior and foreign trade. The valley is highly fertile, producing rice, cotton, tobacco, silk, and fruits.

YANKEE (yăn'kê), the name popularly applied in the United States to people residing in or coming from New England, but in Canada and Europe it has reference to all the people of the United States. The name originated from a misunderstanding of the word *English* by the Indians, who pronounced it *yanghies* and *yemghies*, and finally coined the word *yankees*. The British soldiers applied it as a term of reproach to the New England troops, in 1775, and they adopted it afterward. In the Civil War it was generally applied to the Northern people by those residing in the Southern States, while the latter became known as *Johnnies*.

YANKEE DOODLE, a popular air which is now regarded as one of the national tunes of the United States. It is thought to have originated in the time of the rebellion in England, when Cromwell was nicknamed Yankee Doodle and the following rhyme was applied to his entry into Oxford:

Yankee Doodle came to town
Upon a Kentish pony;
He stuck a feather in his hat,
And called him Macaroni.

The tune of Yankee Doodle was played by the British troops at the time of the Revolution in derision of the New Englanders, who afterward adopted it as a popular air. It has become superseded quite generally by *America* and *Hail Columbia*. The Legislature of South Carolina, in 1861, enacted a law forbidding its use, it having become highly popular in the North at the beginning of the Civil War.

YANKTON (yăn'k'tŭn), a city in South Dakota, county seat of Yankton County, on the Missouri River, fifty miles above Sioux City, Iowa. Communication is furnished by the Chicago and Northwestern, the Great Northern, and the Chicago, Milwaukee and Saint Paul railroads. It is finely situated on an elevated site and is surrounded by a fertile farming region. Among the principal buildings are the county courthouse, the Yankton College, the hospital of the Sisters of Saint Benedict, the Saint Joseph Academy, the public high school, and the South Dakota Hospital for the Insane. It has manufactures of flour, earthenware, and utensils, and is the seat of extensive grain elevators and railroad shops. It has a growing trade in farm

produce and merchandise. Yankton was settled in 1862 and incorporated in 1883. It was the capital of the Territory of Dakota until the latter year. Population, 1905, 4,189; 1910, 3,787.

YARKAND (yär-känd'), a town of the Chinese Empire, in Eastern Turkestan, on a head-stream of the Tarim River, about 100 miles southeast of Kashgar. It is surrounded by a fertile region and protected by a high wall. Most of the houses are of sun-dried brick. The chief buildings include a citadel, an ancient palace, and numerous bazaars and mosques. It has manufactures of silk and cotton goods, woolen clothing, carpets, utensils, and dyestuffs. Formerly it was the center of a vast caravan trade, but the construction of railways in Russian and British territory has lessened its commercial importance. Intercommunication is carried on chiefly by narrow canals that intersect the streets. A larger part of the inhabitants are Chinese, Tartars, and Turks. Mohammedanism is the principal religion. Population, 1907, 85,500.

YARMOUTH (yär'mŭth), a city of Nova Scotia, capital of Yarmouth County, 200 miles southwest of Halifax. It is situated at the entrance of the Bay of Fundy and on the Dominion and Atlantic and the Halifax and Yarmouth railways. The principal buildings include those of the county, the customhouse, the Grand Hotel, and several elementary and secondary schools. The manufactures consist principally of cotton goods, boots and shoes, machinery, and sailing vessels. It has large interests in fishing and canning. During the summer it is visited by a large number of tourists. Population, 1909, 7,385.

YARMOUTH, or **Great Yarmouth**, a seaport city and watering place of England, 122 miles northeast of London and 20 miles east of Norwich. It is situated conveniently at the mouth of the Yare River, has railroad facilities, and is noted as an important fishing station. The chief buildings include the Church of Saint Nicholas, the Walrond Home, and a number of charitable, benevolent, and educational institutions. It has a fine monument, 144 feet high, erected to the memory of Admiral Nelson. Among the manufactures are cordage, fishing nets, twine, silk and woolen textiles, leather, machinery, and sailing vessels. Fishing is the chief industry. The catches include herring, cod, mackerel, and whitefish. Population, 1906, 52,879.

YAROSLAV (yär-ös-läf'), a city of Russia, capital of the government of Yaroslavl, 165 miles northeast of Moscow. It occupies a fine sight on the Volga, has transportation facilities by the river and several railways, and is sur-

rounded by a fertile farming country. The manufactures include flour and grist, cotton goods, pipe tobacco and cigars, white lead, and machinery. It is the seat of a theological seminary, a college and law school, and a cathedral dating from 1215. Yaroslav was founded in the 11th century and has been under the Russian government since the 15th century. Population, 1906, 73,810.

YARROW (yăr'rō), a river in the southern part of Scotland, in Selkirkshire. It rises at Yarrow Clough, near Loch Skene, and flows into the Ettrick after a course of 25 miles. The current is rapid and furnishes an abundance of water power. Scott and Wordsworth made the stream famous by writing of the picturesque scenery along its banks.

YAWS (yās), the name of a contagious disease which is more or less prevalent in warm countries. Many local names are applied to it in different localities, such as tonga, bubas, and koko. The patient is generally covered with yellowish tubercles or granules, which may appear on any part of the body, and the period of the disease is from two to five months, but it may continue many years. Some consider it a form of leprosy. Mercury, arsenic, and sulphur are the principal drugs used in treating the disease. Yaws is a common malady in the West Indies, Ceylon, the East Indies, and the warmer parts of Africa and South America.

YAZOO (yǎz'ōō), a river in Mississippi, which rises in the northern part of the State, near Friarpoint, from several bayous thrown off by the Mississippi River. Later it is joined by the Yalobusha and the Tallahatchie and, after a general course toward the southwest, it flows into the Mississippi ten miles above Vicksburg. It is about 300 miles long and has a rather tortuous course, but is navigable at all seasons. Fertile cotton plantations are located along its banks. Yazoo City is the chief city on its banks.

YAZOO CITY, a city of Mississippi, county seat of Yazoo County, on the Yazoo River, 45 miles northwest of Jackson. It is on the Yazoo and Mississippi Valley Railroad and is surrounded by a fertile farming country, which produces large quantities of corn and cotton. The industries include lumber mills, machine shops, and cotton mills. It has several fine buildings, including the county courthouse and a number of schools. Population, 1910, 6,796.

YEAR, the period of time in which the earth completes a revolution around the sun, or in which the seasons pass through their changes. Owing to the fact that this period is not an exact number of days, there are many kinds of years, each differing somewhat in length. The

period between two passages of the sun through the same equinox, which determines the changing seasons, is called the *solar, tropical, or equinoctial year*, and is constituted of 365 days, 5 hours, 48 minutes, and 48 seconds. The *sidereal year*, in which the sun apparently returns to the same stars, is equal to 365 days, six hours, nine minutes, nine seconds. It differs in length from the tropical year, owing to the precession of the equinoxes among the stars. The *common year* of 365 days, the integral number of days nearest to the solar year, is in popular use, and every fourth year is a *leap-year* of 366 days, except the centuries not exactly divisible by 400, as 1800 and 1900. Other years include the *civil year* of 365 days, the *lunar year* of twelve lunar months, and the *ecclesiastical year* counted from Advent to Advent.

YEAST, a fungus growth consisting of minute vegetable cells that collect and form a frothy substance of a yellowish color. When placed in contact with saccharine liquids, it develops or increases by germination, producing alcoholic fermentation and carbonic acid. Yeast is employed chiefly in the brewing of beer and the raising of bread. In the former it imparts the sparkling and stimulating qualities to the beer, while the carbonic acid causes porosity in the bread. A quantity of yeast is mixed with the dough, which is allowed to stand and rise for some time, and the dough is then made into loaves. The action of yeast is to produce a small quantity of alcohol and carbonic acid from the sugar present in the dough, the rising being due to the escaping carbonic acid. Yeast is now used very largely in all classes of bakery, although in the East, as in former times, *leaven* is still employed to a considerable extent. In Canada, the United States, and many countries of Europe *yeast powders*, or *baking powders*, are used very extensively as a substitute for yeast in bread making.

YEDDO. See **Tokio**.

YELLOW (yě'lō), the color of the solar spectrum which is between the orange and the green. It is best represented by the lemon and canary yellow, and is the color of gold and of brass. Violet and yellow are complementary to each other, that is, if these two colors are mixed they will produce white light. Blue is made paler by increasing the light to which it is exposed, but an increase of light seems to strengthen the color of yellow.

YELLOW BIRD, an American bird of the finch family, which is widely distributed in North and Central America. It is about six inches long, with an alar extent of nine inches. The male has a bright yellow plumage in sum-

mer, while the female is yellowish-brown. A number of species have been catalogued, all of which are birds of pleasing song and are favorites as cage birds. They feed on insects and seeds, and in autumn gather in large flocks.

YELLOW FEVER, an acute, specific disease, which is epidemic in tropical countries. It was first made known to Europeans in the 15th century in connection with the discovery of America, and was so named from the yellow appearance of the skin seen in patients. Yellow fever is thought to be caused by a specific virus, which becomes complicated with jaundice conditions, and at an advanced stage is accompanied by the vomiting of dark-colored matter called *black vomit*. It depends for its origin and diffusion on a temperature not lower than 70° Fahr., and its spread immediately stops when the atmospheric temperature falls to the freezing point.

In 1895 J. Sanarelli, of Montevideo, Uruguay, published the opinion that yellow fever is a toxic disease, induced by a poison generated by the bacillus *icteroides*, to which he gave the name *amaril*. Subsequent investigations of many yellow fever patients have confirmed that view. Infection takes place when the blood of a yellow fever patient is injected into healthy persons. Horses, cattle, monkeys, rats, and many other animals are subject to it. An antitoxic serum has been obtained by inoculating horses and oxen with virulent toxin, and it is thought that medical science will soon be able to apply effective treatment to this much dreaded contagion. However, wholesome sanitary measures, such as were introduced in the Panama Canal zone by the United States, are the most effective preventives.

In 1878 a very fatal epidemic of yellow fever ravaged New Orleans, continuing from May to October, and 4,125 persons succumbed to its attacks. The disease is most prevalent in Central America, the West Indies, portions of Mexico, and the tropical countries of Africa. It is frequently carried to the gulf states and other sections of America. An epidemic prevailed in Cuba, Brazil, Mexico, and Central America in 1900. In 1905, during an epidemic at New Orleans, it was clearly shown that the bites of a certain species of mosquitos, the *Stegomyia fasciata*, are the cause of spreading the disease. This accounts for the fact that the appearance of a frost causes it to abate or to be stamped out entirely.

YELLOW-HAMMER, a common European bird of the bunting family. It is about seven inches long, has an expanse of wings of eleven inches, and the male has a bright yellow head and throat. This bird is common in the wooded

districts of all parts of Europe and during the winter is seen with the finches and sparrows. The name yellow-hammer is applied to the flicker, or golden-winged woodpecker, in the United States.

YELLOWLEGS, the name of two species of snipes found in North America, especially along the Atlantic coast. The *common yellowlegs* is ten inches long and is much prized for its flesh. The *greater yellowlegs* is somewhat larger. These birds migrate north as far as Nova Scotia, and in autumn pass south to the West Indies and South America. Hunters sometimes call them *tatlers*, or *yelpers*, owing to their peculiar noise when flying from danger.

YELLOW SEA, an extensive inlet of the Pacific Ocean, lying between Corea and China and merging into the Gulf of Pe-chi-li. It is 600 miles in length and 400 miles wide, and is largely a shallow expanse of the sea. This is due to the large amount of silt carried into it by the Yang-tse-Kiang and Hoang-ho rivers. Shanghai, Kiao-chau, and Seoul are the chief cities on the Yellow Sea, and Port Arthur and Tien-Tsin are on the Gulf of Pe-chi-li. It has valuable fisheries and is important for its commerce.

YELLOWSTONE, a river of the United States, which rises in Yellowstone Lake, a fine sheet of water in the northwestern part of Wyoming. It has a general course toward the north until reaching Livingston, Mont., where it assumes a northeasterly direction and flows into the Missouri near the boundary of North Dakota. The chief tributaries are the Powder, Big Horn, and Tongue rivers, all of which rise in Wyoming. The Yellowstone is 625 miles long and a portion of this distance is navigable for small vessels. A number of beautiful cañons are situated in its upper course, especially the Grand Cañon, which is 1,500 feet deep. Near the exit of the river from the lake is a belt of hot springs three miles long and a half of a mile wide. About fifteen miles below the lake the river plunges over two precipices, the upper being 112 feet high and the lower 310 feet high. Yellowstone Lake is 7,375 feet above sea level and has an area of 300 square miles. Its shores are picturesque, being characterized by rugged cliffs, and it has excellent trout and other fisheries.

YELLOWSTONE NATIONAL PARK, the most wonderful natural park in the world, which is situated in the northwestern part of Wyoming. A small strip along the eastern side is included with Idaho and a tract in the northern part belongs to Montana. The reservation was set apart as a public park by the national government in 1872. It has an area of about

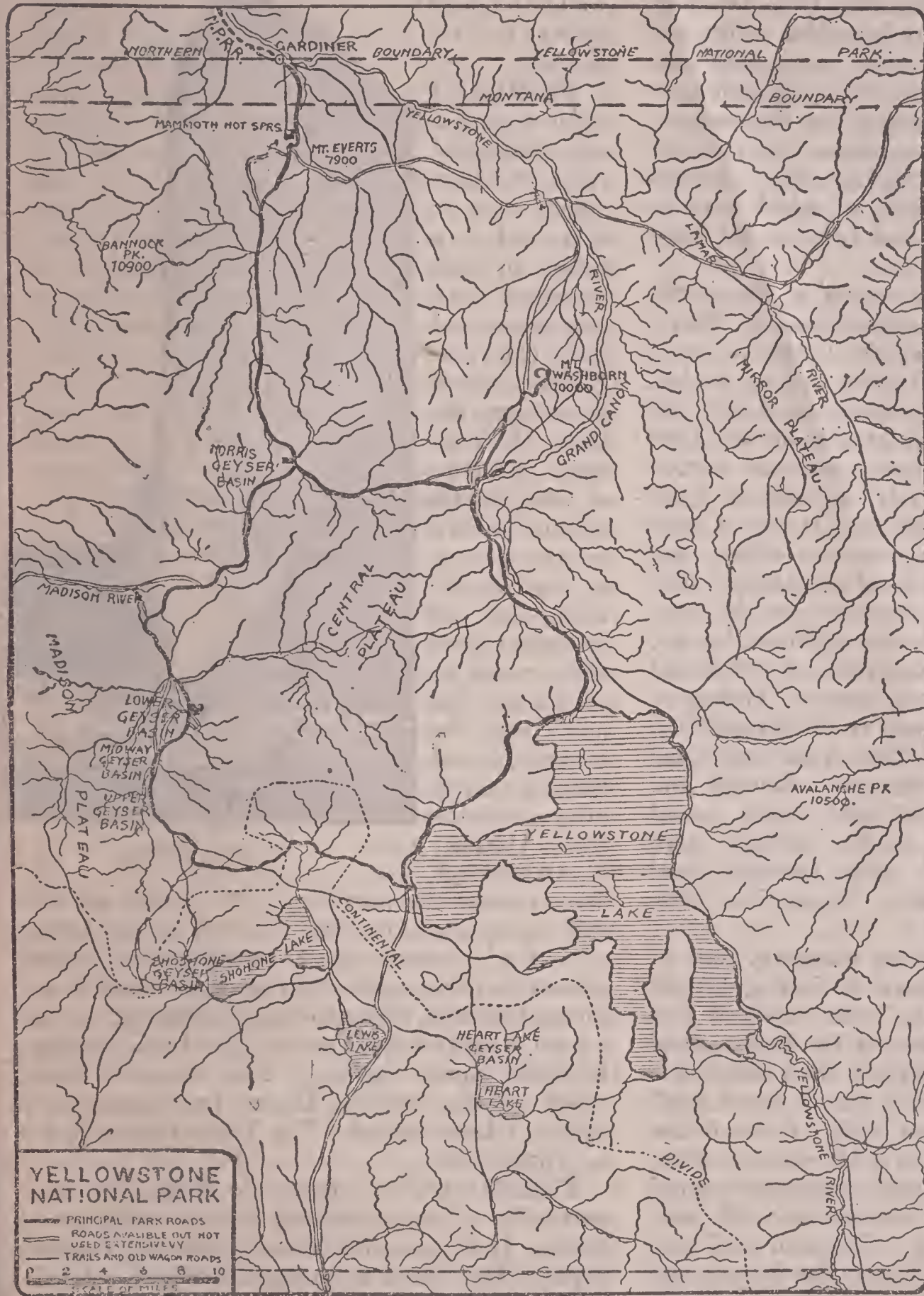
YELLOWSTONE NATIONAL PARK 2557 YELLOWSTONE NATIONAL PARK

3,575 square miles, is 62 miles in length from north to south, and has a width of 54 miles. Near it is the Yellowstone Park Forest Reserve, which adjoins the park on the south and the east, increasing the area to 5,500 square miles.

tributary of the Missouri, drains the eastern part, and the Snake River, a tributary of the Columbia, has its source in the southern part. This park contains some of the most beautiful natural curiosities in the world, including about 25

waterfalls, 100 geysers, and 4,000 hot springs. Many of the springs are laden with minerals, such as the Mammoth Hot Springs, which are situated near the northern entrance to the park. Although the general surface ranges from 6,980 to 8,500 feet above the sea, 24 peaks exceed an altitude of 10,000 feet.

The Grand Cañon of the Yellowstone, with its vast volume of water rushing at great depths; many snow-capped mountains, towering about 10,000 feet above sea level; the Grand, Old Faithful, Giant, Giantess, and Bee-Hive geysers; and numerous cascades and waterfalls are among the natural curiosities to be viewed by the tourist. In this great natural zoölogical garden are beautiful forests, in which are protected herds of buffalo, deer, elk, antelope, and other animals. Tourists often marvel at the peculiar tameness of the animals in the park, especially the bear, which is due to the fact that they receive marked care and are under protection of the laws of the United States. The government has planted German, brook, and



MAP OF YELLOWSTONE NATIONAL PARK.

The park has an abundance of rainfall, thus giving it beautiful ponds and lakes, numerous streams, and excellent vegetation. Yellowstone, Shoshone, Lewis, and Heart lakes are the chief bodies of water, and the principal drainage is by the Yellowstone River. The Madison River, a

rainbow trout, whitefish, and other species in the lakes and rivers, thus giving travelers an excellent opportunity to find recreation in angling.

The park is reached most conveniently from Livingston, Mont., by the Northern Pacific Railway, which has its terminus at Gardiner, a small

town at the northern boundary of the park. The main entrance is through a stone arch built by the Federal government, which bears the inscription, "For the Benefit and Enjoyment of the People." Other gateways are reached from Cody, Wyo., on the east, and from Monida, Idaho, on the west. Many beautiful walks and drives are maintained in the park, with fine villa and hotel accommodations. Adequate protection to tourists is provided by the government. Transportation companies convey the tourists by carriages in regular trips through the park, the principal points of which may be visited in six days. June and July are the most favorable touring months.

YEMEN (yēm'ēn), a region in the southwestern part of Arabia, constituting a vilayet or province of the Turkish Empire. It is bounded on the north by Hedjaz, east by Arabia, south by the British protectorate of Aden, and west by the Red Sea. The area is about 74,500 square miles, but in a larger sense the section includes all of the region lying between Syria and the Strait Bab-el-Mandeb. It has a hilly and mountainous surface, but the valleys are rich in tropical and sub-tropical vegetation. The coast is hot and arid in some parts of the year. Stock raising is the principal occupation, but the country produces large quantities of coffee and fruits. Yemen was made a part of Turkey in the 16th century. It belonged to the Arabs from 1630 until 1872, and since then it has remained a part of the Ottoman Empire. Medina and Mecca are the principal and most noted towns of Yemen. Sana, in the southern part, is the nominal capital and Hodeida and Loheia are the chief ports. Population, 1905, 750,500.

YEN, a coin of Japan, the monetary unit of that country. It was minted in both gold and silver until 1897, when the gold standard was adopted, and since that time it has been coined chiefly in larger denominations than the single yen. The value of the gold yen is about \$0.99 and of the silver yen, about \$0.52. Coins in the denominations of 20 yens in gold, equal to \$9.97, are circulated more generally than the smaller denominations. A yen is divided into 100 *sens*, which are coined in bronze. The coin of 5 *sens* is coined in nickel; the 10-*sen*, the 20-*sen*, and the 50-*sen* pieces are in silver. The *sen* is divided into 5,000 *rin*, and this is coined in bronze in the denomination of 5 *rins*.

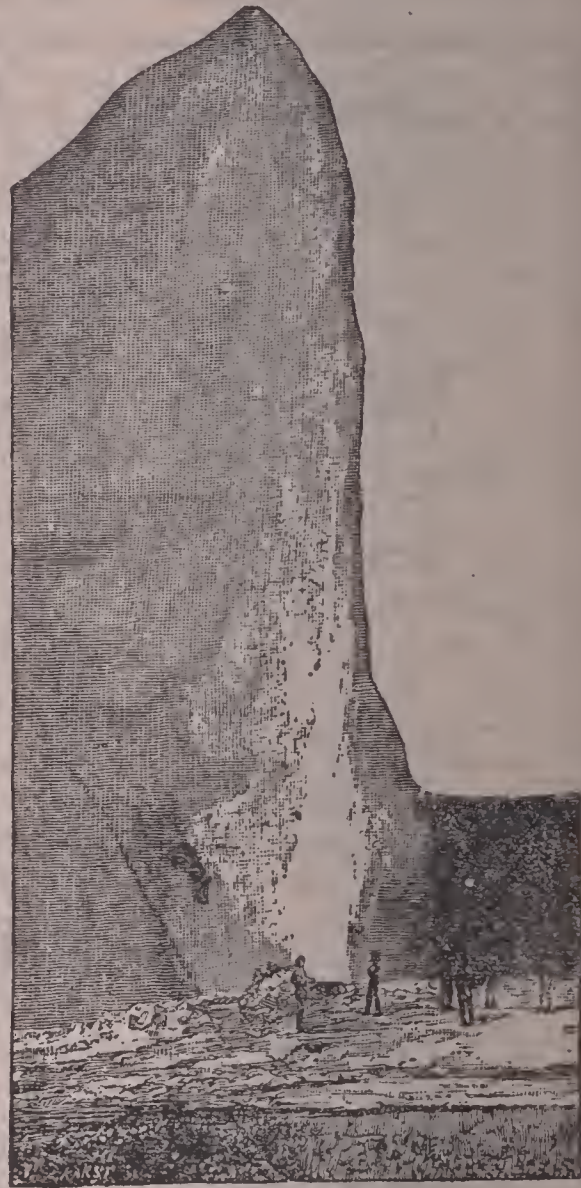
YENIKALE (yēm-ē-kā-lā'), **Strait of**, a narrow passage which separates the western extremity of the Caucasus from the Crimean Peninsula and forms the connection between the Black Sea and the Sea of Azov. The strait is

25 miles long and about three miles wide at its narrowest place. It contains numerous shoals. In the central part is an expansion, known as the Harbor of Kertch, and the stretch south of it is usually called the Strait of Kertch.

YENISEI (yēm-ē-sā'ē), an important river of Asia, which rises in northern China by two branches, the Bey-Keme and the Onlon-Keme, and flows into the Gulf of Yenisei, an inlet of the Arctic Ocean. The upper course is toward the west, but it assumes a general course toward the north near the boundary of Siberia and, after receiving the Upper Tunguska,

flows toward the northwest. A number of falls and rapids are in its upper course, but the larger part of it is through great steppes and it receives numerous tributaries. It is navigable only in the summer months, owing to the cold climate. It has a total length of 3,000 miles. The basin contains 1,100,000 square miles. The Angara River, which merges into the Upper Tunguska, is the outlet of Lake Baikal. The Yenisei is navigable to Turukansk.

YESSO (yēs'sō), **Jesso**, or **Yezo**, the most northerly of the principal islands included in Japan. It is separated from Hondo by Tsugaru Strait. The island is mountainous and volcanic, but has excellent timber and fine minerals. Mount Tokachi-dake, height 8,210 feet, is one of the most elevated peaks. The Ishikari, length 407 miles, is the chief river. Among the minerals are gold, silver, iron, and coal, and there are valuable fisheries in its streams and off the coasts. Sheep, cattle, horses, and cereals are grown in abundance. Yesso has an area of 36,-



GRAND GEYSER.

299 square miles and a population of 926,582. Hakodate is the chief city and the capital.

YEW (ū), an evergreen tree with spreading branches, solid and massive trunk, and dense, dark green foliage. Naturalists have catalogued many species, all of which yield wood of a fine, close grain, which is very durable and valuable for architectural and manufacturing purposes. Many species are now cultivated, especially as ornamental trees, either for separate growth or for hedges. The best known species include the *California yew*, *Mexican yew*, *Irish yew*, and *Japan yew*. Yew trees have a slow growth and a long life, some species attaining an age of 300 to 500 years, and the leaves contain a potent narcotic principle. The yew tree is commonly called hemlock, and the poisonous properties are referred to in the classical writings of Virgil, Livy, Plato, and Caesar. Though poisonous to some extent when in a state of growth, the leaves develop a larger per cent. of poison when undergoing fermentation in large piles or heaps.

YGDRASIL (ig'drā-sīl), in Scandinavian mythology, the name of the most sublime of all trees, the ash, whose branches were supposed to reach from earth to heaven. It was regarded the symbol of the universe. The fountain of wisdom was beneath one of its roots, and under its bows was a familiar meeting place of the gods. Some writers regard it as the source of the Christmas tree.

YIDDISH, the language spoken by a large proportion of the Jews, but particularly in the eastern part of Europe. The name is from the German word *jüdisch*, meaning Jewish, and applies to the most widely spoken dialect of the Jewish people. German was spoken and written with facility by the Jews in Germany up to the 14th century, when large numbers migrated to the Slavic lands in the eastern part of Europe, to which they brought the German language as spoken at that time. Later the German underwent many changes through the influence of Luther and the development of a larger literature, hence, when the Jews returned to Germany in the 17th and 18th centuries, they continued to speak a vernacular which was based on the German of the Middle Ages. However, many of the newer words were intermingled with the spoken tongue and a large number of Hebrew terms continued to be used, which resulted in finally developing a characteristic but largely German dialect. Ultimately this language was carried to all parts of the world where the Jews of this class founded homes. It is now heard in practically all the Ghettos in America and Europe. The literature of this language is very extensive.

YOKOHAMA (yō-kō-hä'mä), a large port city of Japan, in the island of Hondo, eighteen miles southwest of Tokio. It has good railroad facilities and a commodious harbor on Tokio Bay, and is noted as a trade and manufacturing city. The chief buildings include the custom-house, several institutions of higher learning, the official residences, and a number of temples and synagogues. Among the principal manufactures are embroidery, clothing, porcelain, leather, silk and woolen textiles, soap, edged tools, hardware, and machinery. Many of the streets are paved substantially and are improved by avenues of trees, drainage, and gas and electric lights. An extensive system of rapid transit has been introduced recently under government sanction. It has a large trade in rice, silk, woolens, tea, cotton, and porcelain. The edifices include several Christian churches, many fine schools, and a large number of temples. Yokohama is a modern city and owes its importance to a treaty whereby the port of Tokio became open to foreign trade in 1859. At that time it was only a small fishing village and the chief business was transacted at Tanawaga, but the latter was soon after abandoned and Yokohama grew rapidly in population and commercial importance. The harbor is now protected by a granite breakwater. It has extensive docks and wharves. Population, 1909, 342,684.

YOKOSUKA (yō'kō-sō'kā), a seaport and naval station of Japan, on the western shore of the Bay of Tokio, twelve miles south of Yokohama. It has a fine harbor on the Bay of Yedo and is connected by railways with the leading cities of the island of Hondo. The chief industries include shipbuilding, machine shops, brick and pottery works, and flour and grist mills. It has a number of fine schools and several temples of considerable size. Electric lighting, waterworks, and sewerage systems are maintained. Population, 1908, 31,246.

YONKERS (yōn'kērz), a city of New York, in Westchester County, on the Hudson River, and on the New York Central Railway, ten miles north of New York City. It is situated on a beautiful site elevated about 415 feet above the river, has extensive electric street railway facilities, and is a popular residence of New York business men. The principal buildings include the public library, the Federal post office, the city hall, the Saint John's Riverside Hospital, the Woman's Institute Library, the Saint Joseph's Seminary, the Hebrew Home for the Aged and Infirm, and the Greystone House, which was once the residence of Samuel J. Tilden. Among the manufactures are textiles, lead pencils, carpets, hats, sugar, steam engines,

clothing, machinery, and farming implements. The city has a large trade in farm produce and merchandise. Yonkers was settled by the Dutch in 1650. The ground upon which it stands was included in the Philipse Manor from 1672 to 1779. It was organized as a township in 1778 and became a village in 1855. In 1872 it was incorporated as a city. Population, 1905, 61,716; in 1910, 79,803.

YORK, a city in Nebraska, county seat of York County, on the Chicago and Northwestern and the Chicago, Burlington and Quincy railroads, fifty miles west of Lincoln. The surrounding country is fertile, producing cereals, vegetables, hay, and fruits. Among the principal buildings are the county courthouse, the high school, the public library, the School of the Holy Family, and the York College, a United Brethren institution. Telephones, electric lighting and waterworks are among the improvements. York was settled in 1871 and incorporated in 1880. Population, 1910, 6,235.

YORK, a city of Pennsylvania, county seat of York County, 28 miles southeast of Harrisburg, on the Wabash, the Pennsylvania, the North Central, and other railroads. The surrounding country is agricultural and dairying. Among the chief buildings are the handsome granite courthouse, the York County Academy, the high school, the Federal building, the city hall, the opera house, the public library, the orphans' home, and the York Collegiate Institute. Penn and Farquhar parks are fine public resorts.

York has a large trade and is important as an industrial center. It has manufactures of boots and shoes, railway cars, furniture, tobacco products, clothing, machinery, and hardware. The city has well-paved streets, electric and gas lights, electric street railways, waterworks, and other municipal improvements. It was founded in 1741 and was the seat of the Continental Congress in 1777, when the British occupied Philadelphia. The place was incorporated as a borough in 1787 and as a city in 1887. Population, 1900, 33,708; in 1910, 44,750.

YORK, a river in Virginia, which is formed by the junction of the Mattaponi and Pamunkey rivers, constituting an estuary forty miles long and from one to three miles wide. Eleven miles from its mouth is Yorktown, which was the scene of the surrender of Lord Cornwallis, on Oct. 19, 1781. At its mouth is a noted lighthouse.

YORK, a city of England, in Yorkshire, at the junction of the Foss and Ouse rivers, about eighteen miles northeast of Leeds. The city is the converging center of several important railroads and is surrounded by a fertile farming

and dairy region. Among the chief buildings are the cathedral, the archbishop's palace, the Saint Peter's School, a school for the blind, and numerous other educational, benevolent, and charitable institutions. Its cathedral, known as the York Minster, was founded in the 7th century. It has a tower 213 feet high. Many of the streets are narrow and antique in appearance, but the main portion of the city is paved substantially and has gas and electric lighting, sewer drainage, telephones, and rapid transit. Among the manufactures are glass, flour, leather, confectionery, spirituous liquors, ironware, clothing, and machinery. York ranks as one of the oldest cities in England and there are evidences that it had considerable importance before the Roman invasion. It was the chief seat of Hadrian and the death place of Severus. Henry II. made it the seat of the first English Parliament, in 1160. James II. took away its charter, in 1688, for its opposition to his policies. Population, 1907, 84,937.

YORK, House of, a dynasty of English kings, which was founded by Richard, Duke of York. He claimed the throne in opposition to Henry VI., who had been crowned king as a representative of the Lancaster line and ultimately took up arms, the wars that followed being known as the *Wars of the Roses*. By virtue of a compromise it was agreed that Henry should remain king until his death, and that the succession should then pass to Richard and his heirs. Queen Margaret repudiated this compromise and Richard took up arms, but was slain in the Battle of Wakefield. The Wars of the Roses finally terminated in favor of the Yorkists and Richard's son, Edward IV., was proclaimed king in 1461. He reigned until 1483, when his eldest son, Edward V., succeeded him, but was murdered two and a half months later by his uncle, Richard III., who was slain in the Battle of Bosworth in 1485. The Tudor dynasty then succeeded to the throne in the person of Henry Tudor, Earl of Richmond, who united the houses of York and Lancaster by marrying the daughter of Edward IV., and was crowned as Henry VII.

YORKTOWN, a town and the county seat of York County, Virginia, on the York River, eleven miles from its mouth and sixty miles southeast of Richmond. Communication is furnished by several steamship lines. The features include the customhouse, the county buildings, and several schools and churches. It was platted as a town in 1705 and at one time had considerable importance as a commercial center, but the Revolution and the Civil War left it in a ruined condition.

Yorktown is noted for two famous sieges, one in the Revolution and one in the Civil War. On Oct. 19, 1781, the British troops under Lord Cornwallis surrendered at Yorktown to the Americans under Washington. The British had possession of Yorktown and defended it with 8,000 men, while the American army under Washington consisted of 9,000 men and the French troops under Lafayette numbered 7,000.



SIEGE OF YORKTOWN IN 1781.

This surrender practically ended the Revolution. The second siege of Yorktown took place in 1862, when the Confederates under General Magruder held the place, but that commander was superseded by General Johnston, who commanded an army of 53,000 men. General McClellan besieged the place with an army of 120,000 men, but the Confederates succeeded in withdrawing their forces. In 1879 a fine monument of the Corinthian style was erected at Yorktown to commemorate the surrender of Cornwallis. Population, 1900, 151.

YOSEMITE (yō-sēm'ī-tē), a famous and beautiful valley in Mariposa County, California, 150 miles southeast of San Francisco. It rivals in grand and magnificent scenery the Yellowstone National Park and is famed for its purling brooks, bubbling waterfalls, splendid foliage of trees, and gayly decked birds of song. The valley is seven miles long and about a mile wide, but its boundary lines wind in and out among the adjacent mountains, which rise to heights of from 4,500 to 5,280 feet. Among the beautiful and scenic places are those known as

Sentinel Rock, 2,275 feet high, Cathedral Rock, the Spires, the Three Brothers, the Cloud's Rest, and the Bridal Veil Falls. This falls drops 2,660 feet by three plunges and is counted among the most beautiful in the world. Through the valley flows the Merced River, forming not only the Bridal Veil Falls, but several others of great beauty, the whole series constituting a sublime panorama of nature.

Tourists from all parts of the world are attracted to the Yosemite valley, not only because of its grand scenery, but also because of its mild and beautiful climate and the great forest trees growing in the valley and in its vicinity. The valley was first discovered by white men in 1855. An act of Congress, passed in 1864, transferred the valley to the State of California with the condition that it should always remain a public resort. However, since 1890 it has been known as the Yosemite National Park. A large part of the adjacent country is included in the National Forest Reserve, which contains the big trees of Mariposa. Tourists find the period from May to September the most agreeable for visiting the valley. A place known as Inspiration Point, near the entrance, is counted the most beautiful situation from which to obtain a general view. The gateway of the park is reached by the Yosemite Valley Railroad, which communicates at Merced with the Southern Pacific and the Atchison, Topeka and Santa Fé railways. See illustration on following page.

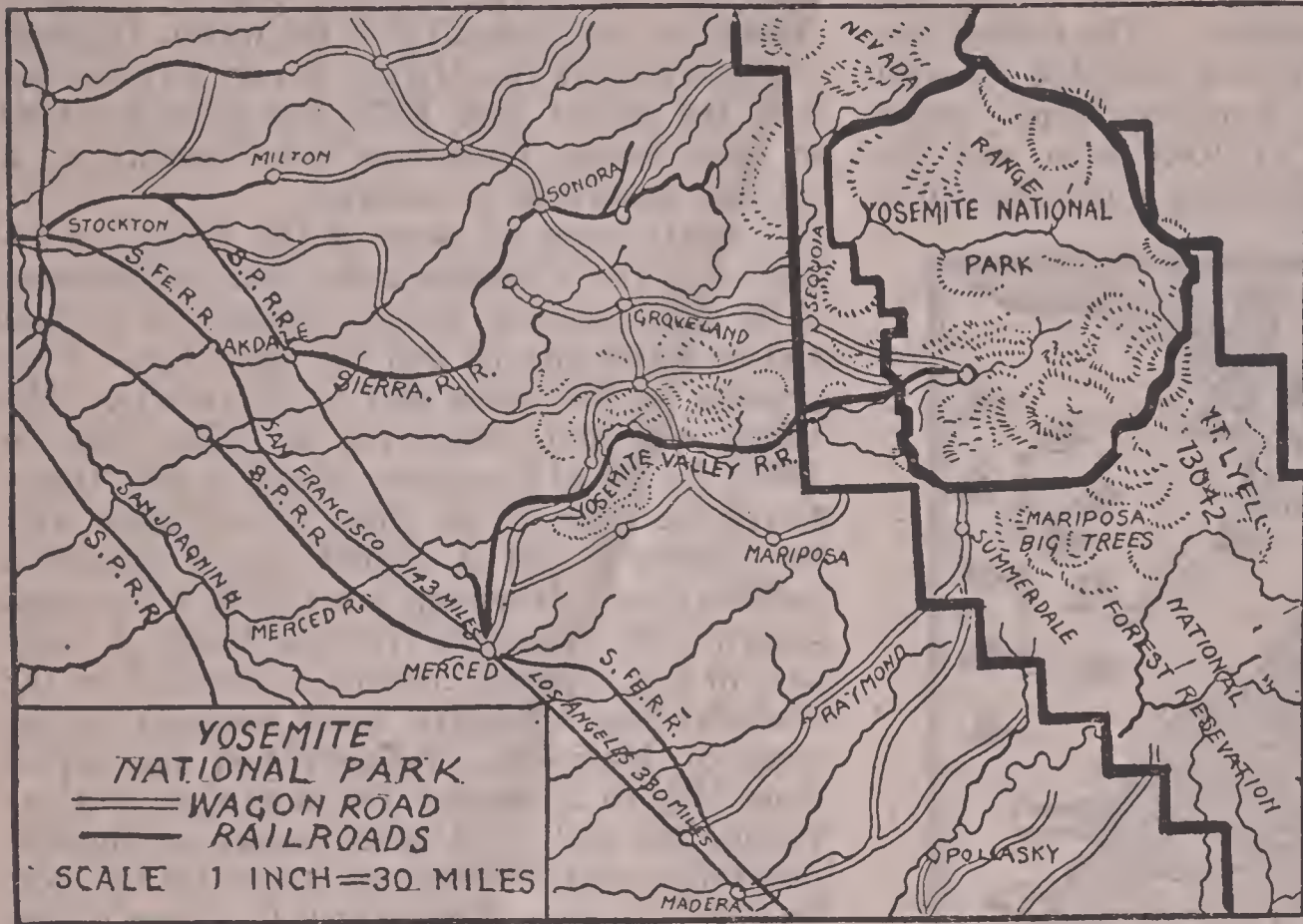
YOUNG GERMANY, the name applied to a school of German writers, of whom Laube and Heine were the foremost representatives. These writers came into prominence about the middle of the 19th century. Their prevailing spirit was to displace romanticism, emancipate the Jews, and separate the church from the state. As writers they maintained the principles of democracy and rationalism.

YOUNG ITALY, a society established in Italy in 1831, under the direction of Mazzini. It had for its purpose the union of the Italian people under an independent government, which it sought to attain by a revolutionary movement. Savoy was invaded by a military force under Mazzini in 1834, but this movement resulted in a failure. However, the feeling for unification of Italy was strengthened and the monarch of Sardinia became the leader in the purpose, and the end sought was finally accomplished by Victor Emmanuel in 1871.

YOUNG MEN'S CHRISTIAN ASSOCIATION, a religious society founded in London, England, by George Williams, in 1844, but which now has branch organizations in all the continents. In 1908 it had organizations in 3 countries

of Australasia, 5 of Africa, 9 of Asia, 10 of North and South America, and 24 of Europe. The purpose is to improve the spiritual condition of

buildings are an excellent county courthouse, the Federal building, the public library, the Park Theater, the Elks' and Odd Fellows' halls, the



Y. M. C. A. building, the Children's Home and many schools and churches. The streets are paved substantially and have gas and electric lights, sewer drainage, and waterworks. They are traversed by an extensive electric street railway system. Among the manufactures are hardware, vehicles, soap, brooms, machinery, engines, boilers, furniture, railway cars, bridges, and farming implements. The city has a large trade in merchandise, cereals, and fruits. The place was settled by John Young in

young men, but active membership is limited to members of evangelical churches. Others are taken in as associate members and are entitled to all the privileges and benefits, except holding office and voting on questions affecting the constitution. The first association in America was founded in 1851, but there are now 1,940 associations in the United States and about 160 in Canada. Prosperous organizations are maintained in Mexico, South America, and the West Indies, the total membership in America being 496,348 persons. The American associations have property valued at \$39,642,863.

The associations generally, besides conducting religious services, provide for the benefit of the members libraries and reading rooms, bath rooms, gymnasia, lectures, and special instruction in various branches. In most cases they aim to obtain employment for the members. At present there are 500,000 volumes in the libraries of these associations in the United States. The colored departments have 10,460 members and the boys' departments have 70,982 members.

YOUNGSTOWN (yŭngz'toun), a city in Ohio, county seat of Mahoning County, 67 miles southeast of Cleveland, on the Erie, the Pennsylvania, the Baltimore and Ohio, the Lake Shore and Michigan Southern, and other railroads. It is surrounded by a fertile farming and dairying region, which contains extensive deposits of bituminous coal. Among the chief

1797. It was made the county seat in 1874. Population, 1900, 44,885; in 1910, 79,066.

YOUNG WOMEN'S CHRISTIAN ASSOCIATION, an organization having the fourfold purpose of ministering to the social, physical, mental, and spiritual wants of young women. The work of this society is promoted in much the same way as that of the Young Men's Christian Association and in the influence for good it keeps pace with that institution. It was founded as an international association in 1886, but national organizations date from a period several decades earlier. The local organizations are well represented in the cities of Canada and the United States. At present there are 648 associations in the latter country, with a membership of 130,045. State organizations are maintained in nearly all the states. *The Evangel*, a monthly publication issued in Chicago, is an official organ. About 1,340 branches are maintained in Great Britain, 500 in Germany, 425 in Denmark, and 300 in France. Equally strong organizations have been established in many other countries.

YPSILANTI (ip-sī-lān'ti), a city of Michigan, in Washtenaw County, on the Huron River, thirty miles west of Detroit. It has communication by the Michigan Central and the Lake Shore and Michigan Southern railroads. The surrounding country is a fertile farming and fruit-growing region. The features include the city hall, the high school, the public library, and

the Michigan State Normal College. It has electric railway facilities, electric and gas lighting, waterworks, and sanitary sewerage. Among the chief manufactures are furniture, silk goods, woolen and cotton textiles, paper, flour, vehicles, and machinery. The place was settled in 1825 and incorporated in 1858. Population, 1904, 7,587; in 1910, 6,230.

YTTRIUM (it'tri-ŭm), a rare metal discovered by Gadolin in 1794, so named from Ytterby, Sweden, where the minerals containing it were first found. It occurs in small quantity as a component of several scarce minerals, such as allanite, gadolinite, and tankelite. Yttrium is a grayish powder, has no odor or taste, and is soluble in the carbonates of the alkalis. When burnished, it assumes the luster and color of metallic iron. More or less crystalline salts are formed by uniting yttrium with sulphur, iodine, or phosphorus.

YUCATAN (yōō-kā-tān'), a peninsula of North America, lying south of the Gulf of Mexico and extending between the Gulf of Campechy and the Caribbean Sea. It is separated from Cuba by Yucatan Channel and constitutes two states of Mexico, Campeche and Yucatan, with an area of 55,425 square miles. The three bays of Ascencion, Espiritu Santo, and Chetumal indent the eastern shore, where a number of well-protected harbors are formed. A number of productive islands lie off its coast, especially toward the east and north. The surface is generally level, but through the central part extends a chain of hills. A large portion of the interior has fine forests of valuable timber, such as rosewood and mahogany. The Usumacinta is the only river of importance, which forms a part of the western boundary of the state of Campeche. Among the productions are tobacco, coffee, maize, vanilla, cotton, rice, indigo, sugar cane, fruits, and vegetables. Horses, cattle, sheep, and swine are reared in abundance.

Yucatan is inhabited chiefly by Indians of the Maya race, and only about one-fifth of the people are of Spanish descent. Many ruins of magnificent pyramids, palaces, and cities are common to Yucatan, indicating that in former times a people of skill and advanced civilization occupied the region. They occur not only on the peninsula proper, but in the northern parts of Guatemala and Belize and on some of the islands. Within recent years several railroad lines have been built, and there is a steady growth in population and industrial wealth. Mérida is the chief railroad and manufacturing city and Campeche, on the Gulf of Campechy, is the principal seaport. The peninsula has a population of 548,660.

YUCCA (yŭk'kā), a genus of plants of the lily family, having woody stems, lanceolate leaves, and a large panicle of showy, whitish, bell-shaped, drooping flowers. A number of species have been catalogued, all of which are native to the southern part of the United States, Mexico, and Central America. Most of the well-known species are cultivated as ornamental plants, especially the kind known as the *common Adam's*



THREE SPECIES OF YUCCA.

needle, which attains a height of eight to twelve feet in the native state, but is much smaller when cultivated in gardens. The stem and foliage are employed in Mexico for preparing a fiber useful in making cordage and the fruit, which is quite similar to small bananas, is consumed as an article of diet.

YUKON (yōō'kōn), a river of North America, the most important waterway of Alaska. It rises in Yukon Territory, near Fort Selkirk (now Pelly), by two branches, the Pelly and the Lewes, flows toward the northwest to Fort Yukon, where it receives the Porcupine River, and assumes a general course toward the southwest,

flowing into Bering Sea. The Yukon has a total length of 2,125 miles, is 20 miles wide in its lower course, and enters the sea by an extensive delta. Great deposits of silt have been made near its mouth, thus preventing the largest vessels from entering from the sea, but it is navigable for almost its entire course. The extreme cold of winter prevents navigation the greater part of the year. Vast numbers of salmon swarm the river in the summer months and ascend fully 1,500 miles from the sea. The chief tributaries of the Yukon include the Koyukuk, Porcupine, Tanana, and Stewart rivers. It receives the discharge from Lake Teslin through the Hootalingua and the Lewes rivers. The Klondike is a noted tributary, joining the Yukon at Dawson, and is famous for its gold fields.

YUKON, a Territory of Canada, situated in the northwestern part of the Dominion. It is bounded on the north by the Arctic Ocean, east by Mackenzie, south by British Columbia, and west by Alaska. The southern boundary is formed by the 141st meridian of west longitude, which separates from Yukon a strip of land belonging to Alaska. Its extent from north to south is about 650 miles, from the Arctic Ocean on the north almost to the Pacific on the south. The area is 196,327 square miles.

DESCRIPTION. The surface is elevated and mountainous, and the altitude of the interior ranges from 2,000 to 3,000 feet. A coast range extends along the shore of the Arctic, and another range of highlands passes from southeast toward the northwest through the southwestern part of the Territory. The latter includes some of the highest summits in North America, such as Mount Logan, 19,539 feet, and Mount Saint Elias, 18,010 feet. Many of the loftiest summits rise considerably above the snow line, both in the north and in the southwest, and here is the source of many glaciers. Valuable forests of vast extent skirt the slopes and streams.

The drainage is chiefly by the Yukon and its tributaries. This great river has its source in the southwestern part and crosses the west central border into Alaska. It is formed by two headstreams, the Pelly and the Lewes rivers, at Pelly, whence it is navigable for boats to its mouth. Among the tributaries of the Yukon in the Territory are the Chandindu, the White, and the McQuesten rivers. The Porcupine River drains the northern part and joins the Yukon after passing into Alaska. A large region in the southwestern part is drained by the Kaskawulsh River through southern Alaska into the Pacific, and the southeastern part has a number of headstreams that flow through the Liard River into the Mackenzie.

The climate is marked by great extremes of temperature, ranging from 68° below zero in winter to about 85° above zero in summer. The long and cold winters are followed by short but pleasant summers. In the north are masses of ice covered by thick moss and here the ground never melts. However, the cold is somewhat mitigated by the dryness of the air. Ice closes the navigation of the Yukon River from the middle of September until the middle of May. Constant darkness prevails during the winter in the northern part, and daylight continues without intermission from the middle of May until the early part of August. The rainfall is not heavy.

RESOURCES. The natural resources of Yukon are very extensive. While lumbering has not been developed extensively, the large forests of fir, cedar, pine, spruce, and poplar possess great commercial value. Fish and game are abundant and furnish the chief sustenance to the white hunters and to the Indians. Among the wild animals are the elk, bison, deer, musk ox, caribou, mountain sheep, ducks, geese, partridge, and prairie chicken.

The southern part has a large expanse of territory that is susceptible to cultivation. Here may be grown profitably the hardier crops, such as rye, barley, potatoes, cabbage, turnips, and peas. Many native grasses abound and grazing and dairying have been developed to some extent. The domesticated animals include cattle, horses, dogs, and reindeer.

Yukon is especially rich in mineral resources. Gold is the principal product and the annual output averages about \$7,500,000. In the eleven years from 1896 to 1906 the total output of gold was \$112,864,363. Bituminous coal of a good quality is obtained, but the output is consumed locally. Copper mines are worked in the southern part. Other minerals include silver, platinum, asbestos, granite, limestone, and petroleum, but these are not worked to any extent.

TRANSPORTATION. The Yukon River is the principal highway of commerce, but it is closed by ice from the middle of September until the middle of May. A railway extends into the southern part of the Territory from Skagway, in Alaska, with its terminus at White Horse. This line is 111 miles long and furnishes transportation between Lynn Canal, which is reached by vessels from the Pacific, to the Tahkeena River, a headstream of the Yukon. Canadian vessels are permitted to pass free throughout the entire length of the Yukon River. Telegraphic communication is maintained between Yukon and the leading cities of the Dominion.

GOVERNMENT. The Territory is administered

by a commissioner, who is assisted by an executive council of ten members, five of whom are elected by the people. It is represented by one member in the Dominion House of Commons. Many missionary schools are maintained by religious denominations, and public instruction is provided in elementary and secondary schools under government support. The northwest mounted police, a force of constabulary, is instrumental in maintaining peace and enforcing the authority of the government of the Dominion.

INHABITANTS. The people who reside within the Territory consist largely of Eskimos and prospectors, but substantial business interests have been developed in the towns and the mining districts. Dawson, the center of the gold fields, is the capital and largest town. Other towns include White Horse, Pelly, Bonanza, and Dominion. In 1907 the Territory had a population of 33,842.

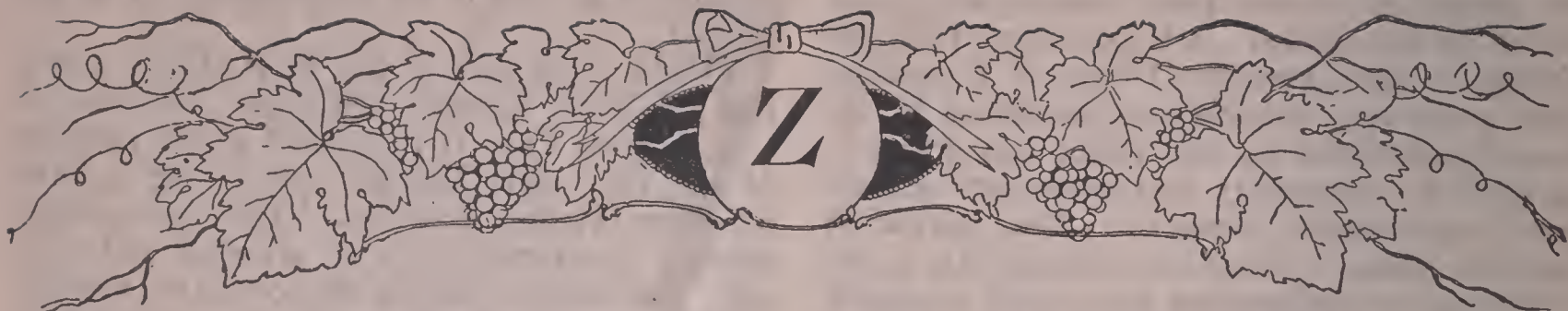
HISTORY. The interior of Yukon was unknown until 1840. In that year Robert Campbell, a representative of the Hudson's Bay Company, explored the region to find a stream flowing westward to the Pacific. He followed the Pelly to its confluence with the Lewes, in 1843, and thus discovered the real source of the Yukon River. Fort Selkirk was soon afterward built at the junction of the two streams, but the town was afterward named Pelly. A large rush of prospectors and gold miners came into the region in 1908, when it was organized as a Territory of the Dominion. A public school system was inaugurated in 1901 and the following year representation was granted in the Parliament of

the Dominion. Since that time there has been a constant growth in the development of its resources.

YUMA (yōō'mà), a city of Arizona, county seat of Yuma County, 250 miles southeast of Los Angeles, Cal. It is situated at the junction of the Gila and Colorado rivers and on the Southern Pacific Railroad. The surrounding country is agricultural, fruit growing, and mining. The features include the county courthouse, the high school, and several schools and churches. It has a large trade and good municipal improvements, such as electric lights, telephones, and waterworks. Population, 1900, 1,402.

YUMAS (yōō'măz), an Indian tribe of North America, which includes the Mohaves of Arizona. These Indians formerly occupied western Arizona and eastern California, but they are now confined principally to the region near the junction of the Gila and Colorado rivers. Fort Yuma, Cal., opposite from Yuma, Ariz., has long been a chief center of government supervision. The Yumas are a small tribe.

YVERDUN (ē-vâr-dôn'), or **Yverdon**, a city of Switzerland, in the canton of Vaud, at the southwestern end of Lake Neuchâtel. It is noted for its fine site among the scenic places of Switzerland. The palace, built by Duke Conrad of Zähringen in 1135, was the seat of the institute conducted by Pestalozzi from 1805 until 1825. Among the improvements are electric lighting, a museum of Roman antiquities, several fine promenades, and a gymnasium. It was fortified by the Romans, when it was noted for its trade and manufactures. Nearly all the inhabitants are French Protestants. Population, 1907, 8,045.



Z

ZANESVILLE

Z, the twenty-sixth and last letter of the English alphabet. It is a sibilant or hissing consonant and has the sound of the hard terminal *s*, as in *dies*, *stands*, *multiplies*. In the Phoenician, Greek, and Latin it was the seventh letter, but was dropped from the Latin in the 3d century B. C. It was restored in the 1st century B. C. to write Greek words, when it was placed at the end of the alphabet. The words in modern English which begin with *z* are all derived from other languages, principally from the Greek. It is the rarest English tone, representing less than three per cent. of the recognized sounds, and first came into use in 1688.

ZAANDAM (zän-däm'), or **Saardam**, a city of the Netherlands, in the Province of North Holland, six miles northwest of Amsterdam. It is at the junction of the Y and the Zann, the latter of which has been well canalized. Many of the buildings are of brick and are surrounded by well arranged gardens in which roses and tulips are plentiful. It is noted for its cleanliness and for being a typical place of the Netherlands. Among the industries are machine shops, lumber yards, iron works, and flouring mills. Peter the Great, in 1697, occupied a cabin in this place while he worked as a shipbuilder. Population, 1906, 24,166.

ZABRZE (zäbr'zhę), a city of Germany, in Silesia, 95 miles southeast of Breslau. It has extensive railroad and electric railway facilities. The noteworthy buildings include the city hall, the central railroad station, the high school, and a number of churches. It is in the center of one of the richest coal mining districts of Silesia, the works being operated by the state. Other industries include wire mills, coke ovens, machine shops, and brick and tile yards. The place owes its recent growth almost entirely to the mining and manufacturing interests. Population, 1905, 55,634.

ZACATECAS (sä-kä-tä'käs), a city of Mexico, capital of the state of Zacatecas, 300 miles northwest of the city of Mexico. It has connections with other trade centers by railways

and is surrounded by one of the most productive mining regions in the world. The silver veins in the vicinity were discovered by Juan de Tolosa, in 1546, and a thriving silver-mining camp soon sprang up on its site. With the construction of railways and the development of its mineral resources the city grew into importance. It now has a number of public schools and churches, several hospitals and convents, and a considerable trade in farm produce and merchandise. Among the manufactures are ironware, utensils, tobacco products, clothing, and machinery. The place was incorporated as a city in 1585. Population, 1908, 42,192.

ZAMBEZI (zäm-bä'zë), a large river of South Africa, which ranks as the fourth in size of that continent. It rises near the southern boundary of the Congo Free State and, after a tortuous course of 1,650 miles toward the southeast, flows into the Mozambique Channel by an extensive delta. The upper course is generally toward the south, while the middle portion flows toward the northeast, and the lower course is toward the southeast. A short distance above Sesheke, at the eastern extremity of German Southwest Africa, is the Katema Molilo Rapids, and some distance below it is the celebrated Victoria Falls. This falls is 400 feet high and about 2,500 feet above sea level. The Zambezi basin includes 750,000 square miles, much of which is highly fertile and contains valuable forests. The Zambezi delta has an area of 25,000 square miles. Among its chief confluent is the Shire river, which rises in Lake Nyassa and joins the Zambezi 90 miles above the sea. The Zambezi system furnishes about 4,000 miles of navigation, but as a whole it is comparatively unimportant for commercial purposes, since the stream and many of the tributaries are obstructed by falls and rapids. See **Victoria Falls**.

ZANESVILLE (zänz'vil), a city in Ohio, county seat of Muskingum County, 52 miles east of Columbus, on the Ohio River and Western, the Baltimore and Ohio, the Cincinnati and Muskingum, and other railways. It is beautifully

situated at the confluence of the Licking and the Muskingum rivers, is surrounded by a fertile farming region, and is connected with other trade centers by a number of electric railroads. The rivers are crossed by several fine bridges. Among the chief buildings are the county courthouse, the city hall, the high school, the Masonic Temple, the Clarendon Hotel, the Memorial Hall, the public library, and many churches. It has a large trade in farm produce, merchandise, and bituminous coal, which is mined in large quantities in the vicinity. The manufactured products include cotton and woolen goods, flour, paper, soap, chemicals, cigars, wire, hardware, steam engines, and machinery. It has large foundries and railroad machine shops. The streets are well improved by grading and paving. One of the first settlements in the Northwest Territory was made at Zanesville, in 1799, by Jonathan Zane, and it was the seat of the State Legislature from 1810 to 1812. Population, 1900, 23,538; in 1910, 28,026.

ZANTE (zän'tê), one of the largest islands of the Ionian group, situated nine miles west of the Peloponnesus. It has an area of 277 square miles. The island is of volcanic origin, but has fertile soil. The climate is pleasant and healthful. Oranges, olives, melons, citrons, and currants are the chief products. It has manufactures of wine, carpets, cotton and linen goods, gold ornaments, and clothing. The wine and currants of Zante are widely known. Anciently the island was known as Bacynthus and was long an independent state. In 1864 it was annexed to Greece along with the Ionian isles. Zante is the capital and largest city. Population, 1908, 46,380.

ZANZIBAR (zän-zī-bär'), a British protectorate in Africa, lying east of German East Africa. It includes the islands of Zanzibar and Pemba, off the eastern shore. The island of Zanzibar has an area of 625 square miles. It contains the city of Zanzibar, which is the chief town and seat of local government and has an estimated population of 100,000, thus being the largest city on the eastern coast of Africa. Pemba has an area of 360 square miles. Both these islands have fertile soil and good harbors. They produce cloves, hides, ivory, copra, shells, cotton, indigo, rice, fruits, and vegetables. Domestic animals, such as horses and cattle, are reared successfully. A small strip of the mainland was formerly claimed by Great Britain, but it is now included in German East Africa. Great Britain, Germany, and France have the larger part of the export and import trade. A railway is in operation from the city of Zanzibar to the plantations in the northern part of the island.

a distance of seven miles. Natives known as Swahillis form the laboring class. They are peaceable, loyal to the government, and apt in learning civilized arts. Other inhabitants include Arabs, Germans, English, Portuguese, French, Hindus, and Italians. Most of the people are Mohammedans, but many Christian missions are maintained. Slavery in a modified form still exists, though the laboring classes have their own houses and cannot be separated from their wives and families. The entire population is estimated at 250,000.

ZEALAND or **Zeeland** (zē'land), the largest island of Denmark. It is separated from Sweden by The Sound and from the island of Fyen by the Great Belt. The shores are indented by numerous inlets, thus reducing the land area to 2,638 square miles. Farming and dairying are the chief industries, but it has considerable interests in stock raising, fishing, and manufacturing. The chief manufactures include woolen and linen goods, leather, dairy products, salt, clothing, machinery, and sailing vessels. Copenhagen is the capital of Zealand and of Denmark. Other important cities include Roeskilde, Elsinore, and Slagelse. Population, 1908, including the islets of Amager and Møen, 1,103,602.

ZEBRA (zē'brá), an animal resembling the horse, but which has external characteristics found in the ass. It resembles the latter in having no warts on the legs, in the tail being covered with long hairs only toward the extremity, and in the full and arched neck having an erect and stiff mane. Several species have been enumerated, all of which are more or less striped. The height is about four and a half feet at the shoulder and the form is light and graceful. The general color is a yellowish-white, with black stripes on the neck, limbs, and body. Zebras have ears rather longer than those of the horse and the senses of hearing, smell, and sight are well developed. They are shy animals and on the least alarm gallop to a place of safety. When attacked by an enemy, they defend themselves by forming a compact body and beating with their heels. In this way they are able to protect themselves successfully against the leopard and lion. Zebras were formerly found



MOUNTAIN ZEBRA.

throughout the region of Africa lying south of the Equator, but their number is diminishing quite rapidly. The *true zebra*, or *mountain zebra*, of the mountainous parts of Cape Colony is nearly exterminated. It is more barred than *Burchell's zebra*, found in herds on the plains of South Africa. Other species inhabit the country south of Abyssinia and Somaliland. The natives prize the flesh of the zebra and use these animals as beasts of burden in the domesticated state.

ZEBÜ (thā-vōō'). See **Cebü**; **Philippines**.

ZEBU (zē'bū), a class of animals of the ox family, which are reared extensively in the region from Japan to East Africa, but they attain the greatest perfection in India. Many species have been originated by breeding, varying much in size, strength, and color. They differ from the cattle reared in Canada and the United



ZEBU.

BUFFALO.

States mainly because of their drooping ears and convex forehead, and in having a fatty hump on the withers, which in the larger breeds weighs 40 to 50 pounds. Zebus are docile and gentle animals. In general they are reared for their milk and flesh, but are used quite extensively as beasts of burden and draught. They are able to travel 25 to 30 miles per day with a reasonable burden. The larger breeds, when yoked to the wagon or plow, serve every purpose of the strongest ox. The zebu is as important in India, Persia, Arabia, and other Asiatic countries, in the industries and household economy, as cattle are in America and European countries.

ZEBULUN (zēb'ū-lūn), one of the twelve tribes of Israel, whose country lay in the fertile valleys and hills north of the plain of Jezreel, extending from the Lake of Gennesaret to the Mediterranean. We learn from Genesis xxx.,

20, that the Zebulunites descended from the sixth son of Jacob and Leah. They were noted for their skill in commercial enterprises and warlike spirit. In their prosperous times they had a profitable trade from their ports on the Mediterranean with the Phoenicians.

ZEMSTVO (zēmst'vō), the chief political body in the government of a province in Russia. The members are chosen by the suffrage of the three classes known as landed proprietors, peasants, and householders of the town. It is presided over by the president, or governor, of the province and has general administrative power within its jurisdiction. This body elects an *upraba*, whose duty is to see that the regulations of the zemstvo are enforced.

ZENANA (zē-nā'nā), the name of a dwelling used by a high caste family of India, in which the women and girls have their quarters. A typical dwelling of this kind is in two parts, each built around its own court, and the one nearest the street is occupied by the men. The zenana is in the rear building, usually on the second floor, while the first floor is occupied by the kitchen and in part is used for storage. The poorer buildings of this class are so constructed that milch cows and other domestic animals occupy a part of the first floor.

ZEND-AVESTA (zēnd'ā-vēs'tā). See **Avesta**.

ZENITH (zē'nīth), the point in the heavens which is precisely over the head of the observer. The point directly opposite under the feet of the observer is called the *nadir*. These terms are employed in astronomy. A plumb line suspended from the zenith would pierce space so as to rest upon or directly above the nadir.

ZERO (zē'rō), in physics, the term applied to the point in time or space which constitutes the base or origin of measurement. Originally the zero point in thermometers was fixed at the normal temperature of the human body, and later the fundamental point was based upon the temperature of spring water. Fahrenheit fixed the zero in his thermometer by the temperature obtained from mixing salt and ice, while the freezing point of ice was made the zero by Ré-

aumur. In the Centigrade thermometer the freezing point is zero and the boiling point is 100°. In mathematics, the zero is a symbol written *O*, signifying the absence of number or quantity. It is used in the same way as a symbol to signify an infinitesimal quantity. In algebra the positive numbers proceed to infinity in one direction from *O*, and the negative numbers proceed from it to infinity in the opposite direction.

ZHITOMIR (zhī-tā-mēr'). See **Jitomir**.

ZILLEH (zā'lě), or **Zileh**, an ancient town of Asiatic Turkey, formerly called Zela, 28 miles southwest of Tokat. It occupies an eminence overlooking the surrounding country and in former times was the seat of beautiful temples and vast fortifications, but now only ruins remain of the ancient structures. Zilleh was the scene of a battle between Julius Caesar and the Pharnaces. It was in regard to this engagement that the former sent his famous report, "I came, I saw, I conquered." The town now has manufactures of cotton and woolen goods, utensils, earthenware, and turbans. It is ruled by the chief officer of the vilayet of Sivas. The inhabitants consist chiefly of Turks. Population, 1906, 21,450.

ZINC (zīnk), or **Spelter**, a bluish-white metal which is capable of taking a high luster. It occurs in combination with other metals and is found native in small quantities. When heated to redness in the air, it takes fire and burns with a bluish flame, giving off clouds of white zinc oxide. Sulphuric and nitric acids dissolve it. It is brittle at ordinary temperatures, but commercial zinc may be hammered into sheets or drawn into wire when heated to 212°. Dry air does not alter its lustrous surface, but in moist air it becomes dull from the formation of a film of hydrated carbonate which protects the metal from further action. Zinc was known as a component of brass long before it was discovered as an individual metal. The ores from which it is obtained are the carbonate, which is called *smithsonite*, and the sulphide called *blende*. These minerals are broken up and roasted in furnaces resembling limekilns to extract from them the zinc.

Zinc has many uses in the arts, as in the manufacture of brass for roofing and as the positive element in batteries. The property of forming a film or crust when exposed to moist air, thus keeping it from rusting, makes it valuable in the construction of water spouts, bath tubs, and tanks, and for covering iron cables and sheets to keep them from rusting. Articles covered in this way with a coat of zinc are said to be *galvanized*, though the term is not strictly proper,

for the reason that electricity is not employed in the process, but the coating is put on in the way that tin is applied to iron plates when making sheet tin. Besides brass, other alloys, as bronze and German silver, contain a considerable quantity of zinc. It is of much value in the printers' art in that it is employed in making zinc etchings, which have taken the place of wood cuts and steel engravings in many printing offices, and is used for molds in casting artistic works, such as ornaments and statues. The production of zinc in the United States aggregates annually about 225,250 tons and represents a value of \$20,000,000. Among the productive zinc fields are those of Missouri, Kansas, New Jersey, Iowa, Wisconsin, Virginia, and other states. Productive zinc mines are worked in Ontario, British Columbia, and other provinces of Canada. The chief productions in European countries are in Spain, Germany, England, and Austria. Much of the American product is exported. The value of zinc per ton ranges usually from \$25 to \$45.

ZINC ETCHING, a method of preparing plates for printing from designs made by hand or otherwise, such as a drawing or lettering. The design is made in black ink on white paper or cardboard, or it may consist of a print from type. The drawing or print is photographed and the photograph is reversed on a sensitized plate, after which the negative is developed on a zinc plate. This plate is prepared by etching, which is done by covering the surface with a thin coat or ground that is not affected by acid. The design is traced with a sharp tool so as to lay the metal bare where it touches, after which diluted acid is poured over the surface. This acid bites or corrodes on the lines made through the ground. The acid is removed after the etching is sufficiently deep to render the desired contrast between the light and dark shades. When thoroughly cleaned, it is nailed to a wooden block so as to make it type-high. Etchings of this kind may be small, as the illustrations used in books, or they may constitute an entire column or even a page for printing. Fine shading cannot be reproduced by this process, as with half-tone plates and engravings, but it is convenient and inexpensive, hence is employed extensively in preparing illustrations for periodicals.

ZINC WHITE, a product used extensively for making white paint. It was formerly made by burning pure zinc and collecting the fumes, but is now obtained by a process which combines the burning of the zinc and the collecting of the vapors in the same apparatus. The method in common use consists of placing a

mixture of anthracite coal and zinc upon a perforated hearth, below which is a closed ash pit. After the coal has been kindled, a blast of air is forced through the ash pit. This causes the zinc to rise in the form of fumes, but the products of combustion contain an excess of air with vapor of metallic zinc, and they undergo another combustion after leaving the charge. This final combustion causes the formation of fumes of zinc oxide, which are caught, after cooling, by being forced through bags of some textile fabric. The finished product is a white powder, which is mixed or ground with linseed oil. In this form it is used extensively as a substitute for white lead in painting woodwork, but it is less valuable for exteriors, since it is more easily injured by the weather.

ZION (zī'ōn), **Mount**, an eminence in Jerusalem, forming the southwest part of that city. The portion of the city built on Mount Zion was formerly called the City of David, owing to its containing the citadel of David. It was entirely within the walls of the ancient city, but at present only the north half is included, the wall running over the hill in an oblique direction. Mount Zion is 2,525 feet above sea level. Toward the southwest it descends quite abruptly into the vale of Hinnom. Many of the Old Testament writers speak of Jerusalem as the Zion, and frequently refer to it as the Daughter of Zion. It is supposed to be the Salem associated with Melchisedek, who is spoken of in Genesis xiv., 18.

ZIONISTS, the name applied to a large organization among the Jewish people of the world, whose ultimate object is to centralize influences with the view of founding a Jewish nation. While some have proposed the colonization of new countries, as portions of South America, the general inclination is to favor emigration to Palestine, where they hope to redeem the city of David and once more rear a vast temple for the worship of Jehovah. Those who are not so hopeful as to believe it possible to develop a powerful Jewish state by emigrating to Jerusalem still favor the plan for the reason that it would be the means of isolating themselves, thereby making it possible to observe Saturday, their Sabbath, more successfully than is possible while living among Christian nations. However, the enterprise of conducting a large emigration of Jews into Syria is opposed strenuously by the Sultan of Turkey, who has fears lest such colonization would prove harmful to the interests of the Turks and Mohammedans.

The latest estimates place the Jewish population of the world at 11,800,000. If all these people could be brought together in some land

having favorable climatic conditions and an abundance of natural resources, it would seem that their hopes of building an independent nation could be realized. This is made even more feasible when it is considered that collectively these people are in possession of vast wealth and progressive intelligence, and that they include doctors, teachers, artisans, traders, agriculturists, and laborers. However, it is doubtful whether the rich would be willing to leave the country in which they now enjoy abundance and equal political rights with others, and whether the poor would be able to defray the expenses of transportation to the country selected for settlement.

Several examples of successful experiments in Jewish colonization may be cited. For instance, the Jewish Colonization Association purchased 325,000 acres of arable land in Argentina, where about 10,000 Jewish settlers founded homes in the period between 1898 and 1908. The Zionists held a general congress in London, England, in 1900, at which 500 delegates attended. They represented several thousand Zionist societies and came from all countries in the world. This congress was one of many successful meetings held both before and since, all of which have operated to cement the bond of sympathy existing among the representatives coming from different countries. Among the Jews are many who think that they should seek an enlargement of their influence in each country instead of venturing on an enterprise so vast as the building of an independent state.

ZIRCONIUM (zēr-kō'nī-ŭm), a rare metal discovered by Klaproth in 1789, so named from being found principally in the mineral called zirzon. The latter is a silicate of zirconium and occurs in various parts of Ceylon, Norway, and Ireland. Berzelius first obtained zirconium in the isolated state in 1824. It is gray, solid, somewhat brittle and combines with oxygen to form a dioxide, which is a white tasteless powder. Zirconium is used in various forms with other metals to construct the mantle of the Welsbach gas burner, by which a bright colorless flame is obtained.

ZITHER (zīth'ēr), a musical instrument used extensively among the Germans of the Alps in Europe, so named from the word *zither*, meaning to shiver. It is the modern successor of the ancient *cithara* of the Greeks and is supposed to be identical with the psaltery mentioned in the Bible. The form is that of a flat stringed instrument, with a shallow resonance box, and is fitted with two sound holes and 32 or more strings. The strings consist of five melody, twelve accompaniment, and thirteen bass strings, made partly of

metal and partly of gut and silk. In playing this instrument, it is placed on the knees or on a table, and the thumbs of both hands as well as the first, second, and third fingers are used. A partially open ring, used to strike the melody strings, is worn on the thumb of the right hand and takes the place of the bow used in playing the violin. The zither is very popular in the Tyrol and in Austria.

ZITTAU (tsit'tou), a city of Germany, in Saxony, fifty miles southeast of Dresden, with which it is connected by railway. It occupies a fine site on the Mandau River and is populated almost entirely by Protestants. The chief buildings include the Byzantine Church of Saint John, a fine courthouse, the public library of 40,000 volumes, and several secondary schools. Among the manufactures are paper, machinery, bicycles, cotton and woolen goods, earthenware, and dye-stuffs. It carries a large trade in bituminous coal, which is mined in the vicinity. Population, 1905, 34,719.

ZODIAC (zō'dī-āk), an imaginary belt encircling the heavens, extending about 8° on each side of the ecliptic, 16° in width, and containing the paths of the moon and planets. It is impossible for the moon and the larger planets ever to travel outside this belt. Early astronomers divided it into twelve parts, called *constellations*, and designated them by certain arbitrary signs, termed *signs of the zodiac*. The signs indicate equal parts of 30° each, which 2,000 years ago corresponded to twelve constellations bearing the same names. Now each constellation is in the sign that has the name next following that of the constellation, this being due to the precession of the equinoxes. The signs of the zodiac, as they appear at present in relation to the seasons of the year, are as follows:

♈ Aries	} Spring Signs.	♎ Libra	} Autumn Signs.
♉ Taurus		♏ Scorpio	
♊ Gemini		♐ Sagittarius	
♋ Cancer		♑ Capricornus	
♌ Leo	} Summer Signs.	♒ Aquarius	} Winter Signs.
♍ Virgo		♓ Pisces	

The ancients named the signs from the constellations in the following order: *Aries*, the Ram; *Taurus*, the Bull; *Gemini*, the Twins; *Cancer*, the Crab; *Leo*, the Lion; *Virgo*, the Virgin; *Libra*, the Balance; *Scorpio*, the Scorpion; *Sagittarius*, the Archer; *Capricornus*, the Goat; *Aquarius*, the Water Bearer; and *Pisces*, the Fishes. These names were derived from the fanciful similarity between the supposed configuration of the stars and the objects designated. When Hipparchus observed the constellations at Rhodes, about 150 B. C., they coincided with the signs of the zodiac named above, but the pre-

cession of the equinoxes in space has caused them to fall back, or westward, about 30° , hence the sun enters Pisces on March 20 instead of Aries as formerly. The revolution will be complete in a period of about 25,868 years from the time observations were made by Hipparchus, when the sign and constellation of Aries will again coincide.

ZODIACAL LIGHT (zō-dī'ā-kal), a faint light frequently seen after sunset on clear evenings in the winter and spring, and before daybreak from September until January. It is triangular in appearance, its base being on the horizon, and its greatest length extending along the path of the sun. In our latitude it is seen most clearly on favorable evenings of winter and spring on the western horizon, when it extends back along the path of the sun, but within the tropics it sometimes rivals the Milky Way. The light should be looked for from a half hour to an hour before sunrise or after sunset. Theories differ as to the origin of the zodiacal light, but the one most probably true is that it is composed of an immense number of meteoroids, reflecting the sunlight, and which are so small that their united luster is barely distinguishable.

ZOLLVEREIN (tsōl'fē-rīn), a customs union established in 1818 by the German states for fiscal purposes under the leadership of Prussia. It was organized to equalize tariff rates and to overcome the inconveniences caused by the collection of tariffs when making transportations of products either among the different states or receiving imports from foreign countries. This commercial union paved the way to political consolidation and the establishment of the present empire. At the formation of the new empire, in 1871, several free cities were not included, but the free ports were brought into the union in 1888. In this way the original zollverein was superseded by the imperial customs and the freedom of trade became established between the different states and cities.

ZONE, in geography, a region of the earth inclosed between two parallels of latitude. The term is applied specially to one of the five divisions of the earth's surface, which take their names from the prevailing climate. They are the North Frigid Zone, North Temperate Zone, Torrid Zone, South Temperate Zone, and South Frigid Zone. Since the axis of the earth is inclined $23\frac{1}{2}^\circ$ to the plane of the ecliptic, the Arctic Circle and the Antarctic Circle are located $23\frac{1}{2}^\circ$ respectively from the North and South poles, and the tropics of Cancer and Capricorn are situated respectively that distance north and south of the Equator. The region lying within the Arctic Circle is called the North

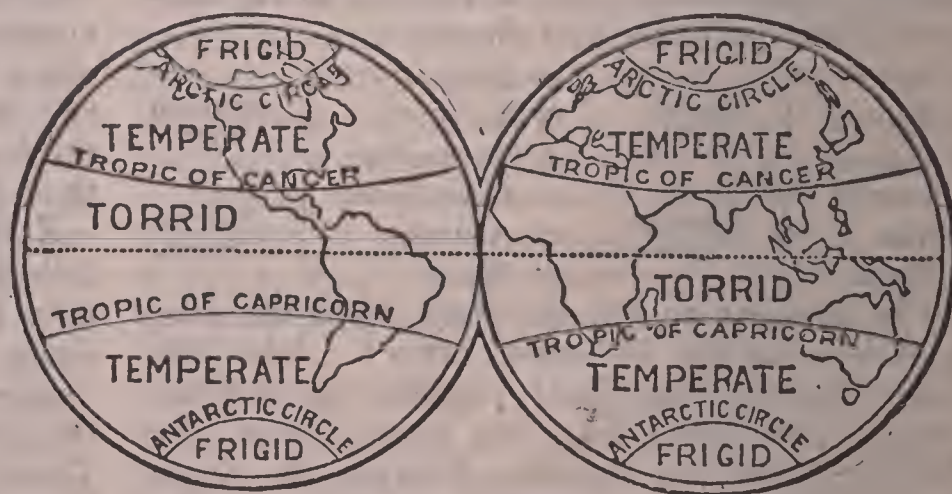
Frigid Zone, and the region within the Antarctic Circle is designated the South Frigid Zone. The Torrid Zone is between the tropics of Cancer and Capricorn; the North Temperate Zone, between the Arctic Circle and the Tropic of Cancer; and the South Temperate Zone, between the Antarctic Circle and the Tropic of Capricorn. Hence, measured from pole to pole, the Frigid zones have each a width of $23\frac{1}{2}^{\circ}$; the Temperate zones, each a width of 43° ; and the Torrid Zone, 47° , making a total of 180° . In the illustration is shown the zone belts of the earth, together with the location of the land masses and oceans. The term *zone* is applied in natural history to well-defined belts within which certain forms of animal or plant life are confined, as found in ascending mountains. It applies in ordinary use to a belt of land distinguished by similar characteristics, as the corn zone, cotton zone, free-trade zone, etc.

ZOÖLOGICAL GARDEN (zō-ō-lōj'i-kal), an inclosure maintained for the development and study of animal life, usually in connection with a public park. The first establishment of this kind was planned by Jardin des Plantes in Paris, France, where a fine garden of this kind was founded in 1804. This institution was soon succeeded by other gardens of a similar kind in the leading countries of the world, but especially in Europe and America. The finest zoölogical gardens maintained at present are in Germany and the one at Berlin is the most extensive establishment of the kind in the world, both in the buildings and the collections of animals. Other celebrated gardens of this kind are maintained in Vienna, Antwerp, London, Amsterdam, Tokio, Melbourne, and Rio de Janeiro. In most cases they are owned and operated by stock companies or zoölogical societies and visitors who are not members are required to pay a nominal admission fee upon entrance. However, many are free exhibitions of living animals and in many cases the institutions include extensive collections of rare plants, usually brought together from many lands. The Zoölogical Society of London has a membership of about 2,350, each member being charged annual dues amounting to \$15.00, and the receipts are further augmented by the collection of nominal fees from visitors who do not belong to the society.

In Canada and the United States distinctly zoölogical gardens are not numerous, but in many parks are collections of animals. Cincinnati, Ohio, has one of the leading establishments of this kind in America. It consists of a fine

collection in the eastern part of the city, located on beautiful and elevated grounds. In most cases the zoölogical collections are in parks, such as Lincoln Park, Chicago; Bronx Park, New York City; Highland Park, Pittsburg; and Forest Park, Saint Louis. The National Zoölogical Park at Washington, D. C., was established by Congress in 1889 and is under the direction of the Smithsonian Institution. The leading parks of cities in Canada have similar collections of animals, such as Standley Park, Vancouver. Well-equipped zoölogical collections are maintained in Ottawa, Montreal, Quebec, Toronto and other cities of Canada.

ZOÖLOGY (zō-ōl'ō-jÿ), (a word derived from the Greek *zōōn*, an animal, and *logos*, discourse), the branch of biology which embraces the study of animals, with reference to their structure, functions, distribution, and classification. It is quite difficult to draw a precise line between zoölogy and botany for the reason that some organisms, low in the scale of life, are of such structure as to be classified by some writers as animals and by others as plants. The subject-matter covering a large field, it is classified into various branches, and these are studied in many schools as distinct sciences. Even in ancient times man gave attention to the study of the lower animals. Thus, Solomon speaks of the habits of the ant, Jeremiah alludes to marine mammals, and Job refers to the peculiar method by which the ostrich incubates its eggs. Many zoölogical facts were recorded by Aristotle and Pliny, but no well-defined attempt was made at scientific classification of animals until in the 18th century. However, many modifications have been made in the study and classifi-



ZONE BELTS.

cation of animals, especially in the 19th century, and it is probable that there are still numerous errors to be rectified by the naturalists of the future.

The chief divisions of zoölogy include *mammalogy*, treating of mammals; *herpetology*, of reptiles; *entomology*, of insects; *ornithology*, of

birds; *ichthyology*, of fishes and lower aquatic vertebrates; *conchology*, of mollusks; *arachnology*, of spiders, scorpions, and related forms; *helminthology*, of worms; *crustaceology*, of the crustaceans; *spongiology*, of the sponges; and *protozoölogy*, of the protozoa. These departments were made in accordance with different forms of animal life. However, besides these may be mentioned certain divisions of the subject-matter that refer to aspects in animal life which are applicable to any one or all life forms. Among these are *physiology*, treating of animal functions, such as nutrition, reproduction, and innervation; *anatomy*, which investigates the position and relation of organs and parts; *embryology*, dealing with development from the ovum to maturity; and *classification* or *taxonomy*, which classifies animals into natural groups. Among the names famous in zoölogical research are those of Agassiz, Darwin, Haeckel, Cuvier, Max-Müller, Harvey, Johannes Müller (1801-1858), and Linnaeus. See **Amoeba; Animal; Birds; Embryology; Fish; Insects; Mammalia; Reptiles; Vertebrata.**

ZOÖPHYTE (zō'ō-fit), the name applied by Cuvier to the forms of animal life that more or less resemble a plant in external form or mode of growth, as a coral, sponge, or polyzoan. The animal organisms belonging to this class are fixed to a definite object or spot, as a rock or shell. Many zoöphytes have a close external resemblance to flowers, but they are true animals instead of massive plants.

ZOUAVE (zwäv), the name of a light-armed infantryman, originally part of a corps recruited from the Kabyle tribe of Zouaoua, in Algeria, but now a part of the regular army of France. The French occupied Algiers in 1830, when they incorporated the zouaves into their army, but later gradually eliminated the native element from the corps. After 1840 the zouaves were strictly French soldiers, bearing the native name and wearing the native dress. The apparel is Moorish, but the arms and discipline are European, and recruits are obtained by voluntary enlistment. Zouaves wear a loose jacket and waistcoat, usually of blue cloth which is ornamented with yellow braid, a yellow-tasseled fez cap, loose trousers, yellow leggings of leather, and white or yellow gaiters. They are armed with carbines or rifles and carry a sword bayonet. In the American Civil War the zouave uniform was popular on the side of the Northern forces, several regiments of which were uniformed as zouaves.

ZULU (zōō'lōō), the name of a warlike branch of the Kaffir race, which is native to South Africa. Originally the Zulus inhabited a

part of the region included in Natal and the country toward the northeast. These people are classified as distinct tribes, differing somewhat in language and minor characteristics, but all are noted for their high degree of physical and intellectual development. Though ordinarily social and amiable, they are good warriors and resisted European encroachment upon their territory with marked heroism. The Zulu government was a form of democracy, in which the chiefs were elected by popular suffrage and held office during the time sanctioned by the people. They practiced a form of polygamy, reared domestic animals, cultivated the soil, and made utensils of wood, stone, and clay. Many of them are now engaged in civilized arts, such as farming, stock raising, mining, and fishing, and some have made considerable advancement in education. Several conflicts between the Boers and the Zulus occurred at different times, but they lived quite peaceably most of the period up to 1879, when the British came in conflict with Cetewayo, King of Zululand. The British under Lord Chelmsford crossed the Tugela and entered Zululand, but were defeated with a loss of 800 men and compelled to retreat. Later the Zulus were defeated. Cetewayo was captured soon after and died in 1884.

Zululand, the chief seat of the Zulus, is now a province of the British colony of Natal. It lies between Natal and Portuguese East Africa, immediately east of the Transvaal, and has an area of about 12,500 square miles. Its population is given at 181,500, including about 1,200 whites. The region was formally annexed to Natal in 1897 and has since been divided into twelve magisterial districts. Agriculture is the chief occupation of the natives, but they also engage in stock raising and trading. The country has considerable mineral wealth in gold, silver, coal, iron, copper, lead, and asbestos. Zululand has been reserved for the natives, only one district being opened to the whites. The Boers invaded the province at the time of the Anglo-Boer war from 1899 to 1900. The province is represented by one delegate in the legislative council at Natal and by one member in the legislative assembly.

ZUÑI (zōō'nyê), a range of mountains in New Mexico, in the west central part of that political division. These mountains are intersected by the 108th meridian west from Greenwich and lie between the 35th and 36th parallels of north latitude. The general altitude is 6,500 feet. Within these mountains is the village of Zuñi, about 40 miles southwest of Fort Wingate, which is the largest of the Pueblo villages. These Indians were first met with by the

Spaniards, in 1539, and they still retain their former modes of weaving, agriculture, and house building. They belong to the cliff-dwelling Indians and constitute a distinct linguistic stock. These natives call themselves *Ashiwí*, but they are generally known as the *Zuñi* among the whites. At present they have several villages and number about 1,650.

ZURICH (zōō'rik), a lake in Switzerland, situated about forty miles southwest of Lake Constance and surrounded by the cantons of Zurich, Schwyz, and Saint Gaul. Its length is about 25 miles; breadth, two to three miles; and the greatest depth, 512 feet. The lake is noted for its fine fisheries and beautiful scenery. Its overflow is carried by the Limmat River to the Rhine. The city of Zurich is near its outlet. In its vicinity are fine gardens, orchards, and farms.

ZURICH, the largest city of Switzerland, capital of the canton of Zurich, at the junction of the Limmat and Sihl Rivers. The city has excellent railroad facilities and has had a remarkable growth in population and industries in the past century. Though the older streets are narrow and tortuous, many notable improvements have been wrought within the last half century, and the city is fast becoming one of the most beautiful of European trade emporiums. The chief buildings include a cathedral founded in the 11th century, a federal polytechnic school, the city hall, and numerous public schools and churches. It has a university which is attended by 1,450 students. In connection with it is a fine collection of botanical specimens and engravings and near by is an observatory. Many of the streets are paved substantially with stone. They are improved by gas and electric lighting, sewer drainage, waterworks, and an extensive system of rapid transit. It has a large public library and may be regarded the intellectual center of German-speaking Switzerland. The manufacture of machinery and cotton spinning are two leading industries, but the silk trade is the most important commercial enterprise. The silk exported annually aggregates a value of \$15,500,000. Other manufactures include steam engines, boilers, paper, chemicals, flour, clothing, tobacco products, earthenware, musical instruments, and utensils. Zurich was the capital of Switzerland until 1848. Austria, France, and Italy signed a treaty of peace here in 1859. Population, 1908, 188,486.

ZUYDER ZEE (zī'dēr zē'), or **Zuider Zee**,

an inlet from the North Sea, on the northwestern coast of Holland, including an area of 1,350 square miles. It formed a marshy lake at the time of Roman occupation, when it was called *Flevo*, and a small river carried the water to the sea. Subsequently the dikes were broken by several inundations, since which time it has become an arm of the sea. Near its entrance are the four islands of Terschelling, Vlieland, Ameland, and Texel. The government of Holland is now actively prosecuting the work of redeeming Zuyder Zee by means of dikes and canals, which improvement is estimated at a cost of \$50,000,000.

ZWICKAU (tsvīk'ou), a city of Germany, in the kingdom of Saxony, forty miles south of Leipsic. It is finely situated on the Mulde River, has large manufacturing interests, and is connected with other cities by a number of important railroads. Four bridges cross the river. The railroad station, which is one of the largest in Germany, includes a number of important buildings. These railway buildings and the machine shops cover about eighty acres. The city is the seat of a penitentiary, has excellent schools and churches, and is the center of a large transit trade. Among the chief manufactures are machinery, glass, chemicals, porcelain, clothing, textiles, and dyestuffs. In the vicinity are extensive coal mines, which employ 12,000 persons. Gas and electric lighting, pavements, rapid transit, and a fine library are among the municipal facilities. Zwickau was mentioned as early as 1118. Population, 1905, 68,502.

ZWOLLE (zvōl'lē), a city in the Netherlands, capital of the province of Overijssel, on the Zwarte Water, about fifty miles northeast of Amsterdam. It has railroad facilities and is connected by the Willemsvaart Canal with the Yssel River. The Saint Michael's church is its most noted building, which contains many fine paintings and a celebrated organ. Other edifices of note include the townhall, a museum of natural history, and several art and industrial schools. The streets are paved with stone and are traversed by street railways. Among the improvements are electric lighting, a public library, and many promenades. It has a considerable market in cattle, cereals, and fish. The chief manufactures are clothing and ships. Zwolle belonged to the Hanseatic League and joined the United Provinces in 1580. Population, 1907, 34,160.

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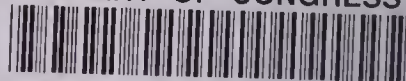
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